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# Analyzing the Nexus between ESG Scores and Financial Performance:
# A Panel Study on European Banks

PhD Thesis

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# ABSTRACT

The thesis explores the significant influence of Environmental, Social, and Governance (ESG) considerations on the operational and strategic frameworks of the European banking sector, highlighting a pivotal shift towards sustainable financial practices. Employing advanced panel data regression analysis on data from 51 European banks covering the period from 2017 to 2021, the study investigates the relationships between banks' ESG scores, non-financial performance ratios, and their financial performance and credit ratings. The analysis reveals that certain metrics, such as the Risk-Weighted Assets to Total Assets ratio (RWA.TA) and the number of employees (NOEMP), have significant impacts on ESG scores, underscoring the complex interplay between traditional banking operations and the growing imperatives of sustainability. Key findings include the significant negative impact of RWA.TA on both ESG and social scores, indicating that higher exposure to risk is associated with lower ESG compliance, especially in social terms. Conversely, the size of the workforce positively influences governance scores, suggesting that larger banks with more employees tend to have better governance practices. However, other hypotheses, such as the impacts of Non-Performing Loans to Total Loans ratio (NPL.TL) on Environmental scores and Return on Equity (ROE) on Governance scores, found no significant relationships, highlighting the nuanced and multifaceted nature of ESG factors in banking. The research underscores the need for banking institutions to integrate ESG criteria within their risk evaluation frameworks and to consider the strategic importance of human capital and organizational culture in enhancing governance structures. Furthermore, it challenges the traditional view of a trade-off between financial success and sustainability, suggesting that profitability and sustainable practices can coexist symbiotically. For stakeholders within the banking ecosystem, this study calls for a strategic realignment towards ESG imperatives, suggesting that such alignment not only meets regulatory and societal expectations but also fosters innovation in sustainable financial products and services. It also provides empirical evidence for regulators and policymakers to refine regulatory frameworks encouraging ESG integration, contributing to sustainable development and climate change mitigation goals.

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# 1. INTRODUCTION

ESG (Environmental, Social, and Governance) considerations and the broader discourse around ESG investing have captured substantial attention and public interest in recent years. This heightened focus reflects a global commitment to fostering a sustainable society, with an increasing number of policies and agreements shaping the landscape across various business sectors. The banking sector, as a crucial pillar of the economy, is not exempt from this transformative wave and is actively adapting to integrate ESG criteria and practices into its operational fabric.

A significant development in this context is the adjustment of credit rating methodologies by agencies to include ESG ratings. This evolution signifies a pivotal shift in evaluating the creditworthiness of banks, where a lower ESG score now holds the potential to exert a negative influence on the overall credit rating. This integration reflects a growing acknowledgment of the interdependence between financial robustness and adherence to environmental, social, and governance best practices.

The far-reaching impact of banks on society and the environment is increasingly apparent, manifesting through the composition of their loan portfolios. Loans directed toward industries with substantial environmental footprints, such as those in the oil and gas sector, carry implications for a bank's ESG ratings. This underscores the criticality for banks to navigate the delicate balance between financial imperatives and environmental considerations, particularly with regard to the "E Score" in their ESG metrics. Simultaneously, corporate finance activities, such as raising capital through equity or debt, are recognized as pivotal topics for exploration. ESG ratings, particularly their governance attributes, are intricately linked to stakeholders' satisfaction. This connection underscores the need for banks to take proactive measures that align with environmental and social factors while maintaining robust governance frameworks.

Considering what has been mentioned, the selection of ESG as a research area is motivated by its critical relevance in the contemporary banking industry. With increasing regulatory pressures and societal expectations, banks are compelled to adopt ESG practices to ensure sustainability and compliance. Understanding the implications of ESG integration in banking is essential for developing strategies that enhance financial performance while promoting social responsibility and environmental stewardship. This research aims to fill the knowledge gap by examining the intricate relationships between ESG scores and the financial and non-financial performance of banks, offering insights that are valuable for practitioners, policymakers, and academics alike.

Historically, however, the consideration of ESG and sustainability in banking is not a novel concept. Its roots can be traced back to the sixteenth century in Italy, where early banks functioned as intermediaries between those who could save money and those needing funding for regionally necessary businesses, such as construction-related trades. Unlike loan sharks who engaged in usury, these banks, connected to the Catholic Church, deemed usury unethical (Milano, 2011). They incorporated assessment criteria such as the work ethics of business owners, their responsibility, efficiency, and risk-taking capabilities (Weber & Feltmate, 2016). These early practices highlight the initial efforts to integrate ethical considerations into banking operations, a precursor to modern ESG criteria.

To bridge the historical context with contemporary relevance, it is crucial to examine the evolution of these ethical banking practices over time. In the mid-nineteenth century, the cooperative banking movement gained momentum in Germany, driven by the industrial revolution and the disbanding of the feudal system. Figures like Hermann Schulze-Delitzsch and Friedrich Raiffeisen laid the foundations of modern cooperative credit, aiming to defy usury and provide fair lending opportunities to low-income groups (Cornée et al., 2018; Guinnane, 1997). These cooperative banks were based on ethical principles, now often referred to as stakeholder management, which is associated with higher firm financial performance (Berman et al., 1999; Freeman, 1984; Scholtens & Zhou, 2008). Their ethical principles and regional focus helped them avoid significant losses during financial crises, such as the 2008 financial crisis, demonstrating the resilience of ESG-oriented business models (Li & van Rijn, 2022).

Building on these historical foundations, the 1960s saw the emergence of ethical banks that integrated ESG indicators into their core business models. Influenced by social movements and environmental concerns highlighted by works like Rachel Carson's "Silent Spring" (Carson, 2002), these banks focused on financing projects with positive societal impacts, such as organic farming. Networks like the Global Alliance for Banking on Values (GABV) promote using finance for the benefit of people and the planet. Despite their smaller market share, ethical banks have shown robust growth and resilience, particularly during financial downturns (Weber & Feltmate, 2016).

Transitioning from historical to modern practices, ESG criteria in commercial lending have evolved significantly in recent decades. Initially introduced to address environmentally induced credit risks and reduce credit defaults, these criteria have expanded to include social and governance factors. This evolution has been driven by environmental regulations such as the polluter pays principle, which introduced financial risks for lenders of polluters (Weber et al., 2008). Consequently, ESG risk assessment tools have been developed to manage these risks, incorporating environmental, social, and governance factors into the credit risk of commercial loans.

The contemporary landscape of ESG integration in banking cannot be fully understood without acknowledging the impact of recent global agreements. Since the COP21 meeting in Paris in 2015, climate change has been recognized as both a significant financial risk and an opportunity for banks. Climate finance, including the issuance of green bonds, has become a substantial part of green finance. These bonds offer a green premium and are attractive to investors seeking to reduce climate-related financial risks (Battiston et al., 2021). Banks now use ESG criteria in their credit assessment processes to mitigate these risks, linking ESG considerations directly to financial performance and firm value.

Extensive academic research supports the positive correlation between ESG performance and financial performance (Friede et al., 2015; Klassen & McLaughlin, 1996; Nakao et al., 2007; Weber, 2017). Theoretical explanations for this phenomenon include institutional theory, slack resources theory, and good management theory. Slack resources theory posits that firms use their financial revenues to invest in ESG performance reactively (Daniel et al., 2004). Good management theory suggests that ESG management is an integral part of effective management practices, thereby driving financial performance (McGuire et al., 1988). Institutional theory explains bi-directional causality, where firms are influenced by regulatory, normative, and competitive pressures to improve ESG performance (DiMaggio & Powell, 1983; Ameer & Othman, 2012).

To build on the theoretical foundations, this research aims to empirically assess the relationships between the ESG scores of banks, their non-financial performance ratios, and their financial performance. Using a sophisticated panel data regression model, the study analyzes a dataset encompassing ESG scores and key performance metrics from 51 European banks. The selected performance ratios, including the Risk-Weighted Assets to Total Assets ratio (RWA.TA), Non-Performing Loans to Total Loans ratio (NPL.TL), Return on Equity (ROE), and Number of Employees (NOEMP), serve as independent variables in the model.

The practical implications of this research are manifold. For banks, understanding the determinants of ESG scores and their impact on financial performance can inform strategic decision-making processes, risk assessment frameworks, and stakeholder engagement strategies. Policymakers can leverage the findings to design regulatory frameworks that promote transparency, accountability, and sustainability within the banking sector. Scientists and academic researchers can benefit from the empirical evidence provided, which can serve as a foundation for further studies exploring the causal relationships between ESG factors and financial outcomes. By bridging the gap between theory and practice, this research aims to foster a collaborative approach towards achieving sustainable development goals

As highlighted previously, there has been a recent surge in regulatory activities aimed at establishing a more solid framework for ESG implementation. ESG reporting, a form of non-financial disclosure, is evolving rapidly due to increasing regulatory pressure from initiatives like those of the European Commission and various Net Zero Initiatives. Nonetheless, although ESG will influence all sectors in the years to come, the data used in this research, spanning from 2017 to 2021, reflects still a lag in regulatory impact during that period. Consequently, this study primarily focuses on a literature review concerning the relationship between ESG and financial performance, as well as European regulatory frameworks. It is important to note that the findings based on the data from this period may differ in the future as European sustainable finance practices continue to evolve. Due to the above-mentioned factors, this thesis has given a comprehensive space for literature review, ESG methodologies and regulatory background in attempting to shed light on an emerging topic in the field of finance.

Central to this study is the hypothesis that higher ESG scores not only contribute to global sustainability but are also correlated with superior performance in the banking sector. However, recognizing the complexity of this relationship, the research unpacks individual hypotheses specific to each of the independent variables, which are listed below. This detailed exploration aims to unravel the nuanced connections and shed light on the evolving dynamics between ESG considerations and financial metrics in the contemporary banking landscape:

**Hypothesis 1: Impact of Risk Weighted Assets to Total Asset on ESG Scores**

- **H1a**: The ratio of Risk Weighted Assets to Total Asset positively impacts ESG scores.
- **H1b**: The ratio of Risk Weighted Assets to Total Asset negatively impacts ESG scores.
- **H0-1**: The ratio of Risk Weighted Assets to Total Asset does not impact ESG scores.

**Hypothesis 2: Effect of Non-Performing Loan to Total Loan on Environmental Scores**

- **H2a**: The ratio of Non-Performing Loan to Total Loan positively impacts Environmental scores.
- **H2b**: The ratio of Non-Performing Loan to Total Loan negatively impacts Environmental scores.
- **H0-2**: The ratio of Non-Performing Loan to Total Loan does not impact Environmental scores.

**Hypothesis 3: Influence of Number of Employees on Governance Scores**

- **H3a**: The number of employees positively influences Governance scores.
- **H3b**: The number of employees negatively influences Governance scores.
- **H0-3**: The number of employees does not influence Governance scores.

**Hypothesis 4: Relationship Between Return on Equity and Governance Scores**

- **H4a**: Return on Equity positively relates to Governance scores.
- **H4b**: Return on Equity negatively relates to Governance scores.
- **H0-4**: Return on Equity does not relate to Governance scores.

**Hypothesis 5: Impact of Number of Employees on Environmental Scores**

- **H5a**: The number of employees positively impacts Environmental scores.
- **H5b**: The number of employees negatively impacts Environmental scores.
- **H0-5**: The number of employees does not impact Environmental scores.

**Hypothesis 6: Effect of Risk Weighted Assets to Total Asset on Social Scores**

- **H6a**: The ratio of Risk Weighted Assets to Total Asset positively affects social scores.
- **H6b**: The ratio of Risk Weighted Assets to Total Asset negatively affects social scores.
- **H0-6**: The ratio of Risk Weighted Assets to Total Asset does not affect social scores.

The significance of this research extends beyond the confines of academia. As global stakeholders increasingly recognize the pivotal role of the banking sector in steering the course towards sustainability, insights from this study can inform strategic decisions. Banks, regulators, investors, and policymakers can benefit from a nuanced understanding of how ESG considerations and financial metrics intersect, guiding the formulation of policies, standards, and practices that promote both financial resilience and sustainable business practices. In essence, this research aspires to contribute to a paradigm where financial institutions are not only guardians of economic stability but also champions of environmental and social responsibility.

Through a meticulous examination of the complex interplay between ESG considerations and financial metrics, the aim is to provide a roadmap for banks to navigate the evolving landscape, where sustainability and financial prudence coalesce for a more resilient and responsible future.

Research Justification:

The importance of ESG (Environmental, Social, Governance) reporting is becoming increasingly apparent, driven by heightened global sustainability initiatives and regulatory measures. Entities like the European Commission and various Net Zero Initiatives have played a crucial role in defining ESG reporting norms. Although ESG's impact is expected to broaden across all sectors, research data from 2017 to 2021 shows a delayed regulatory effect. Nevertheless, recent times have witnessed a boost in regulatory efforts to forge a robust framework for ESG adherence. The European Commission has spearheaded these developments, promoting stricter ESG disclosure norms through tools like the EU Taxonomy, the Non-Financial Reporting Directive (NFRD), and the forthcoming Corporate Sustainability Reporting Directive (CSRD). These measures are crafted to enhance transparency and accountability in corporate sustainability operations. Even though these initiatives were still in their early stages between 2017 and 2021, there is a distinct movement toward more rigorous ESG reporting standards. This study primarily delves into the correlation between ESG factors and financial performance, along with European regulatory measures, through an extensive literature review. As already mentioned previously, it is essential to recognize that findings from the aforementioned period might evolve as sustainable finance practices in Europe advance. Considering this fact, as well as the dynamic nature of ESG regulations and their escalating influence, this thesis extensively explores literature, ESG methodologies, and regulatory frameworks. This research aims to illuminate an evolving finance topic, offering insights pertinent to the present and flexible enough for future shifts. By analyzing historical and current regulatory changes, the study contributes valuable perspectives on the interconnection between ESG elements and financial outcomes.

This research is organized as follows:

The first major section, the Literature Review and Theoretical Framework, provides a comprehensive overview of the key concepts underpinning the research. It explores foundational themes such as Sustainable Investing, Sustainable Development, and the evolution of Environmental, Social, and Governance (ESG) practices. This section also critically examines existing academic literature and theoretical contributions relevant to ESG and financial performance, as well as the regulatory context within the European Union.

Subsequent sections detail the definition of the study sample and outline the performance metrics employed as variables in the empirical analysis. The methodology is thoroughly explained, with particular emphasis on the data collection process and the statistical techniques applied—most notably regression and panel data analysis.

The final sections present the empirical findings and offer a discussion of the results in light of the initial hypotheses. The study concludes by summarizing key insights and suggesting directions for future research.

# 2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

This literature review embarks on a thorough exploration of the intricate nexus between Environmental, Social, and Governance (ESG) criteria and financial performance, unraveling the complex dynamics that govern this relationship. In the evolving global business environment, the integration of ESG considerations into corporate strategies has transcended ethical imperatives, positing itself as a pivotal determinant of financial viability. This scrutiny delves into an array of empirical studies, theoretical discourses, and practical case studies, aiming to distill the essence of how ESG adherence influences financial metrics, shapes stakeholder engagement, and fortifies long-term organizational resilience.

Drawing upon the insights of eminent scholars and comprehensive industry analyses, the review endeavors to map the current intellectual terrain, highlighting emergent trends, identifying lacunae in existing research, and proposing fertile directions for future inquiry. Amid this intellectual odyssey, the absence of unanimous ESG evaluation standards emerges as a significant impediment, fragmenting the ESG landscape with divergent scoring paradigms. Such a proliferation of assessment criteria not only muddies comparative analysis across various studies but also accentuates the importance of a discerning review of prior investigations.

The crux of this examination lies in acknowledging the diversity inherent in ESG scoring mechanisms, a factor that can markedly influence research outcomes. The variability encountered in ESG evaluations necessitates a judicious selection and interpretation of previous studies, recognizing that conclusions may vary based on the specific ESG metrics and financial data harnessed, alongside the analytical methodologies employed. Through this rigorous engagement with existing literature, the review aspires to navigate the ESG complexity, aiming to glean insights that both acknowledge and transcend the methodological constraints characteristic of the current ESG evaluative frameworks.

## 2.1. ACADEMIC STUDIES ON ESG AND FINANCIAL PERFORMANCE

The research conducted by Birindelli et al. (2018) delves into the influence of board composition, particularly gender diversity, on the Environmental, Social, and Governance (ESG) performance in the banking sector. This study is set within the context of increasing awareness of the impact that a firm's board of directors can have on its ESG outcomes, especially in an industry where the role of gender diversity has been relatively underexplored.

Birindelli and colleagues aim to bridge this gap by analyzing how the presence of female directors on bank board’s affects ESG performance. The study also considers other board characteristics, such as independence, size, frequency of meetings, and the presence of a Corporate Social Responsibility (CSR) committee. The research employs fixed effects panel regression models, examining data from 108 listed banks in Europe and the United States over the period from 2011 to 2016.

The findings present a nuanced view of the relationship between gender diversity and ESG performance. Contrary to the critical mass theory, which suggests that a certain number of women on the board leads to improved outcomes, Birindelli et al. discover that this relationship is an inverted U-shape. This indicates that gender-balanced boards, rather than those with just a critical mass of women, positively impact banks' sustainability performance.

Additionally, the study finds a positive association between ESG performance and both board size and the presence of a CSR committee, while the share of independent directors has a negative correlation with ESG performance.

Through this comprehensive analysis, Birindelli et al. underscore the pivotal role of corporate governance in enhancing banks' ESG performance. Their findings highlight the importance of gender diversity in board composition, not just for the sake of representation but as a strategic component in achieving sustainable and responsible banking practices. This research provides valuable insights for banks and supervisory authorities, emphasizing the need to integrate diverse perspectives into corporate governance frameworks to drive positive ESG outcomes.

The study by Taliento, Favino, and Netti in 2019 presents an in-depth analysis of the effects of ESG (Environmental, Social, and Governance) information disclosure on the economic performance of companies listed on major European indices. Recognizing the rising significance of ESG in the European market, the authors investigate how transparency in ESG practices can potentially offer a competitive edge to businesses.

The research stems from the context of the UN Agenda 2030 and Directive n. 2014/95/EU, both of which have propelled advancements in sustainability disclosure, particularly for larger companies. The study employs a novel approach that diverges from previous research, utilizing Partial Least Squares (PLS) and Structural Equation Modeling (SEM) methodologies. This approach is augmented by the study's unique consideration of absolute ESG scores and relative ESG performance (excess over industry averages).

Their findings are pivotal in redefining the concept of competitive advantage within the realm of sustainability. Their empirical analysis, situated within the frameworks of Stakeholder Theory and the Corporate Social Responsibility (CSR)–Corporate Social Performance (CSP) nexus, evaluates the financial materiality of ESG information from 2014 to 2017. The analysis reveals that while the absolute levels of individual ESG scores may not be significantly impactful, the relative ESG performance—a company's 'distance' from industry averages—holds considerable weight.

This distinction underscores the importance of 'excess' or 'abnormal' ESG performance in providing firms with a sustainability advantage. Companies that exceed the industry norm in ESG practices do not merely comply with standards; they set themselves apart, gaining a unique position in the eyes of investors and stakeholders who are increasingly prioritizing sustainability.

Furthermore, corporate size emerges as a significant variable in the study, acting as a proxy for slack resources that may enable larger firms to invest more in ESG practices. The implication here is that larger companies may have more capacity to excel in ESG performance due to available resources, thereby strengthening their competitive position.

In their study, Di Tommaso and Thornton (2020) analyze the relationship between Environmental, Social, and Governance (ESG) scores, risk-taking behavior, and the value of European banks. Their research delves into the nuances of how ESG considerations impact the strategic and financial dynamics within the banking sector.

The study uncovers that higher ESG scores correlate with a modest reduction in risk-taking behavior among banks, regardless of whether they are traditionally high or low risk-takers. This relationship is further influenced by the characteristics of the banks' executive boards. These findings align with the 'stakeholder' perspective on ESG activities, suggesting that banks with a stronger focus on ESG are more inclined to consider the interests of a broad array of stakeholders, thus potentially reducing risky behaviors.

However, the study also presents a complex picture of the relationship between ESG scores and bank value. Di Tommaso and Thornton observe that higher ESG scores are linked to a decrease in bank value. This finding supports the 'overinvestment' view of ESG, wherein resources might be allocated to ESG activities at the expense of other potentially profitable investments. The decline in bank value occurs despite a positive indirect influence of ESG scores on bank value via their impact on risk-taking.

The authors conclude that there is a discernible trade-off between reducing bank risk-taking (and thereby contributing to a more stable financial system) and maintaining or enhancing bank value. This trade-off is a critical consideration for banks as they navigate the integration of ESG factors into their operational and strategic decision-making processes.

This research provides valuable insights into the complexities surrounding ESG integration in banking, highlighting the balance that banks must strike between adhering to ESG standards and ensuring their financial performance and market valuation.

In his insightful study, Leins (2020) explores the integration of Environmental, Social, and Governance (ESG) factors into the investment decision-making processes of financial analysts at a global bank. This work sheds light on the evolving role of ESG in financial analysis, marking its transition from a normative ethical concept to a critical component in speculative valuation and investment strategies.

Leins' research, rooted in ethnographic data, captures the growing acceptance and implementation of ESG considerations among financial analysts. He delves into how these professionals have begun to perceive ESG factors not just as ethical indicators but as valuable market signals that inform their investment narratives. This shift signifies a profound change in the landscape of financial analysis, where ESG elements are increasingly recognized for their impact on corporate performance and long-term investment potential.

The study presents ESG as a valuation technique that transcends traditional financial metrics, incorporating a broader spectrum of factors into the analysis. Leins argues that the application of ESG has fundamentally transformed the notion of 'responsible investment'. Rather than being solely a mechanism to enhance the morality of investing, ESG has emerged as a sophisticated practice of valuation. This approach allows financial analysts to capitalize on social issues and the crises of capitalism, thereby aligning ethical considerations with profit generation.

Leins' conclusions underscore the dynamic nature of financial markets and the critical role ESG factors play in shaping modern investment strategies. His work illustrates the pivotal role of ESG in redefining 'responsible investment', highlighting its significance in the post-crisis ethical order of the finance industry.

In the scholarly work of Ng et al. (2020), the intricate relationship between financial development and Environmental, Social, and Governance (ESG) performance in Asian economies is critically examined. The study postulates that a robust financial system is a cornerstone in bolstering ESG initiatives, suggesting that as financial institutions and markets evolve, they begin to reward and prioritize firms exhibiting strong ESG adherence. This recognition paves the way for a synergistic relationship where financial growth and sustainability initiatives reinforce one another, promoting a cycle of positive reinforcement.

Amidst the rapid development that has led to environmental degradation and habitat loss, raising the specter of natural disasters, financial development has been lauded for its potential to mitigate these risks by funneling resources into the development of green technologies. However, the empirical relationship between financial development and ESG—which stands at the core of sustainability management—remains underexplored.

Ng et al. endeavor to bridge this knowledge gap by scrutinizing the correlation between financial development and ESG performance within the Asian context. Utilizing a comprehensive dataset covering the period from 2013 to 2017, the study employs a variety of econometric tools, including pooled ordinary least squares, fixed effects regression models, two-stage least squares methods, and the system Generalised Method of Moments estimators. The analysis yields a positive association between financial development and ESG performance.

Moreover, the study conducts additional robustness checks by dissecting the components of the financial sector, namely financial markets and financial institutions, and confirms the findings' consistency across different model specifications. The collective evidence presented by Ng et al. underscores the pivotal role of financial development as an impetus for advancing ESG performance in Asian countries.

Similarly, the study by De Lucia, Pazienza, and Bartlett (2020) significantly contributes to the discourse on ESG practices in the public sector. By demonstrating a clear positive impact of ESG integration on financial performance, the research underscores the value of these practices beyond compliance and ethical considerations. It advocates for a strategic approach to ESG integration, where public enterprises can align their operations with sustainability and social responsibility objectives while simultaneously enhancing their financial performance.

The research conducted by Bătae, Dragomir, and Feleagă (2020) delves into the intricate relationship between Environmental, Social, and Governance (ESG) factors and financial performance in European banks. This study scrutinizes the multifaceted influence of ESG dimensions on financial metrics across various classifications of European banks. It underscores substantial regional disparities in the impact of ESG on financial performance, thereby presenting nuanced insights for investors and policymakers alike. This research underscores the imperative for tailored, region-specific ESG strategies within the banking sector to optimize financial outcomes.

The primary research question in focus is: How do ESG and financial performance indicators vary according to different classifications of European banks? The motivation for their study arises from the persistent interest among researchers and practitioners in understanding the complex interplay between banks' ESG performance and their financial performance. The existing literature offers diverse findings, ranging from positive correlations to negative or neutral relationships.

The study introduces novelty by statistically comparing variables that gauge ESG and financial performance in European banks, based on three distinct classifications: geographical regions of Europe, functional currencies, and cluster analysis using GDP and population data for European countries.

The significance of their research is two-fold. Firstly, it extends Thomson Reuters' categorization of banks (Emerging and Developed Europe) with three additional classifications, shedding light on regional variations in ESG and financial performance. Secondly, it offers practical insights by identifying regions in Europe that contain banks with both the highest and lowest values of ESG and financial performance, along with insights into controversies and audit fees. Consequently, the study serves as a valuable resource for investors, policymakers, regulatory bodies, bank executives, and auditors seeking to comprehend and address significant differences within the European banking landscape. Such insights can inform measures aimed at enhancing both the financial and sustainability performance of banks.

The data for their study is derived from multiple sources, including Thomson Reuters Eikon, World Bank statistics, and EuroVoc, encompassing a sample of 108 European banks (81 from Developed Europe and 27 from Emerging Europe) for the year 2018, representing the latest available data. The analytical tools employed include cluster analysis involving macroeconomic variables, such as GDP per capita and population, alongside group tests and the ANOVA test to analyze the results.

Building on the comprehensive findings of De Lucia, Pazienza, and Bartlett's 2020 study, it becomes evident that the integration of Environmental, Social, and Governance (ESG) practices is not only a matter of ethical or regulatory compliance but also a strategic tool for enhancing financial performance in public European enterprises. The study focus on critical financial indicators such as Return on Equity (ROE) and Return on Assets (ROA) provides a clear metric for understanding the impact of ESG practices on the financial health of these entities.

The positive correlation established between ESG practices and financial performance is particularly illuminating. It suggests that public enterprises that adopt and effectively implement ESG criteria are likely to see improvements in their financial metrics. This correlation is especially significant in the public sector, where ESG practices often align with broader societal and governmental objectives, indicating a synergy between ethical governance and financial viability.

Furthermore, the research illuminates the role of ESG practices in shaping financial outcomes in the public sector. By using advanced machine learning techniques and logistic regression models, the study delves into a detailed analysis of the data from public enterprises, offering a nuanced understanding of the complex dynamics between ESG practices and financial performance. This methodological approach enhances the reliability of the findings and provides a robust framework for evaluating the impact of ESG initiatives.

One of the key insights from this study is the identification of specific areas within ESG practices that are particularly influential. Investments in environmental innovation, employment productivity, and diversity and equal opportunity policies stand out as significant contributors to improved financial performance. This finding is crucial for policy formulation and strategic planning, as it highlights specific areas where public enterprises can focus their ESG efforts for maximum financial and societal benefit.

The 2021 study by Buallay et al. presents a thorough investigation into the nexus between sustainability reporting and the performance of banks and financial services across multiple regions, with a notable focus on Europe. This expansive research utilizes a dataset encompassing 4,458 observations from 60 countries over a decade (2008–2017) to explore how Environmental, Social, and Governance (ESG) scores and their individual pillars affect the operational, financial, and market performance of banks.

One of the key discoveries of the study is the identification of a negative relationship between ESG scores and various performance metrics, including Return on Assets (ROA), Return on Equity (ROE), and Tobin's Q (TQ). This finding stands in contrast to the often-presumed positive impact of ESG practices on financial outcomes and suggests a more intricate interplay between sustainability reporting and company performance.

The study also delves into the distinct influences of the environmental, social, and governance pillars of ESG, uncovering how each component affects bank performance differently across various regions. This nuanced analysis provides a more granular understanding of how specific ESG initiatives can lead to divergent outcomes in the banking and financial services sector.

Adding to the novelty of their research is the consideration of diverse political and economic contexts, which enriches the analysis and provides broader theoretical implications for policymakers and academics internationally. The findings suggest a need for banks and financial services to reassess the connection between ESG practices and their performance, acknowledging the gaps that exist in effectively linking sustainability reporting to positive economic outcomes.

In conclusion, the study by Buallay et al. contributes to a growing body of literature that calls for a more customized approach to sustainability practices in the banking and financial services industry. It highlights the complexity of the relationship between ESG initiatives and performance, emphasizing the importance of regional specificity and the multifaceted nature of ESG components. The research offers valuable insights for both the management of financial institutions and policymakers, advocating for a strategic reevaluation of how sustainability is reported and integrated into business practices for more effective outcomes.

The study by Murè et al. (2021) focuses on the strategic use of Environmental, Social, and Governance (ESG) practices by Italian banks in response to reputational challenges stemming from financial penalties. This research extends the understanding of ESG beyond mere compliance and ethical considerations, highlighting its role in reputation management for banks.

The primary objective of the study is to explore whether the adoption of ESG practices serves as a mechanism for Italian banks to mitigate reputational damage following financial sanctions. To achieve this, Murè and colleagues built upon previous research, integrating ESG scores as a determinant of the likelihood of receiving sanctions. Their econometric analysis is based on data from 13 Italian banks covering the years 2008 to 2018, with ESG scores sourced from Thomson Reuters and Bloomberg.

The findings reveal a positive correlation between ESG scores and the probability of sanctions. However, the study clarifies the causal direction of this relationship: Banks that receive financial penalties experience reputational harm, necessitating efforts to enhance their

reputation through improved ESG practices. This suggests that banks proactively engage in ESG initiatives as a strategy to rebuild and enhance their reputational standing post-sanction.

Murè et al.'s research underscores the strategic dimension of ESG in the banking sector, particularly in reputation management. It indicates that the bank's view ESG not only as a compliance tool but also as a crucial component in maintaining and restoring their reputation in the aftermath of financial penalties. This perspective adds a new dimension to the understanding of ESG in banking, emphasizing its importance in corporate strategy and crisis management.

The scholarly endeavor by Chams et al. (2021) investigates the nuanced dynamics between financial performance and ESG scores, particularly under the moderating lens of Total Quality Management (TQM). Their research posits the provocative thesis that financial performance may precede and predict ESG engagement, an assertion that inverts traditional perceptions of the ESG-financial performance relationship. This study navigates the complexities of this interplay within the context of multinational corporations spanning diverse industrial sectors.

In an era where the corporate focus is pivoting from short-term profitability to sustainable longevity, the salience of ESG practices has become increasingly pronounced. Chams et al. grapple with the perennial debate: Does financial prowess fuel ESG endeavors, or is ESG commitment a precursor to financial success? Their inquiry is firmly rooted in the Slack Resources Theory and synthesizes insights from three distinct strands of management literature, leveraging a rich six-year panel dataset of multinationals.

Utilizing a distributed lag regression model, the researchers delve into the effects of financial performance metrics, such as Free Cash Flow (FCF), on ESG scores. Their findings unveil a stimulating effect where financial robustness affords firms the capacity to channel resources towards elevating their ESG stature.

Yet, it is the interplay with TQM where the study's novelty shines. Chams et al. reveal that while TQM's interaction with FCF exhibits a counterintuitive negative influence on ESG scores, its interaction with Tobin's Q—a measure of corporate market valuation—correlates positively with ESG. This dichotomy suggests that TQM's efficacy in aligning financial performance with ESG commitment is nuanced and multifaceted.

Through this analytical lens, Chams et al. offer profound insights for both academia and industry, contributing significantly to the discourse on sustainability management and its operationalization within the corporate sphere.

In their seminal paper, Tóth et al. (2021) provide a rigorous analysis of how Environmental, Social, and Governance (ESG) performance is intertwined with the financial stability of European banks. This research addresses a significant gap in understanding the concrete benefits of ESG factors within the banking sector, particularly their influence on the reduction of non-performing loans and the bolstering of regulatory capital.

The necessity for economic actors to disclose sustainability-related information is becoming increasingly recognized. For banks, this is particularly crucial due to their far-reaching impact on multiple industries via their investment and lending activities. It is within this vein that Tóth et al. scrutinize the correlation between ESG performance and financial stability, a relationship that has substantial repercussions for the banking industry.

Utilizing a comprehensive dataset of 243 banks listed in the European Union (EU) and the European Free Trade Association (EFTA), the researchers applied panel regression methods to dissect this relationship meticulously. Their findings shed new light on the instrumental role of ESG performance in enhancing the financial stability of banks, revealing a notable decrease in the ratio of non-performing loans in institutions with higher ESG scores.

The study goes further to confirm the advantageous impact of regulatory capital, which, when combined with strong ESG performance, contributes to the financial solidity of banks. Such empirical evidence provides a robust foundation to argue that the various dimensions of ESG performance—economic, social, and governance—are integral to financial stability.

For investors and regulators alike, the insights from Tóth et al.'s research are invaluable. They highlight the importance of including ESG performance data in the assessment of a bank's financial stability, which could have far-reaching implications for investment strategies and regulatory frameworks. This perspective advocates for a broader adoption of ESG considerations as not just ethical or compliance measures but as foundational components of financial analysis and decision-making in the banking sector.

In their pivotal study, Hwang et al. (2021) investigate the buffering effect of Environmental, Social, and Governance (ESG) activities on the financial performance of Korean companies during the economic turbulence instigated by the COVID-19 pandemic. Their research highlights the resilience of firms with robust ESG frameworks, indicating that such practices could serve as financial safe havens during times of crisis.

The onset of the COVID-19 pandemic in early 2020 brought forth a wave of business disruptions and financial setbacks, particularly for Korean firms. This period of profound uncertainty paved the way for Hwang et al. to explore the potential of ESG activities as a mitigating factor against the pandemic's detrimental economic impacts.

Their empirical analysis, grounded in rigorous research methodologies, reveals a significant correlation between ESG performance and financial robustness during the first quarter of 2020—a period marked by the peak of the pandemic's financial shockwaves. The researchers discovered that firms with a pronounced commitment to ESG practices experienced a less severe decline in earnings compared to their peers with less emphasis on ESG.

This finding is indicative of the protective qualities of ESG activities, which appear to shield firms from the full brunt of economic crises. The study posits that the trust and strong relationships cultivated between ESG-focused firms and their stakeholders, fostered through consistent investments in social capital, yield tangible rewards under market stress. Furthermore, Hwang et al. elucidate that the performance of nonfinancial activities – such as ESG initiatives – serves as a critical information source for stakeholders, aiding their decision-making amidst uncertainty.

The research undertaken by La Torre et al. (2021) delves into the intricate and multifaceted relationship between Environmental, Social, and Governance (ESG) performance and conventional financial benchmarks within the context of European banks. While extant literature has traditionally explored the connection between a bank's ESG performance (referred to as ESGP) and traditional financial metrics, commonly denoted as Corporate Financial Performance (CFP), this chapter adopts a comprehensive and nuanced approach. Their study pivots on the critical role of ESG factors in shaping the financial paradigms of the banking

sector, highlighting a transformative shift toward ESG-centric models in response to market and regulatory stimuli.

This paper transcends the conventional analysis of the correlation between a bank's ESG performance (ESGP) and its corporate financial performance (CFP). It seeks to decipher whether market reactions provide adequate incentives for banks to voluntarily integrate ESG practices into their operations. La Torre et al. employ panel estimation methods to dissect the interaction between ESG factors and a suite of financial performance metrics, encompassing both account-based (ROA and ROE) and market-based (Capitalization to Book Value, Tobin's Q) dimensions, in addition to utilizing Value-Based Management (EVA Spread), a metric not previously considered in this context.

The research encompasses an extensive array of European banks listed on the STOXX Europe 600 index over an eleven-year period, from 2008 to 2019. By evaluating multiple facets of financial performance concurrently, the study provides a holistic view of how ESG performance interrelates with the financial health and market valuation of banks.

La Torre et al.'s findings endorse the prevailing regulatory perspective that emphasizes the importance of recognizing and managing ESG risks within the banking industry. The results suggest that, in the current transitional phase towards sustainability, regulatory pressures rather than market incentives are the primary forces propelling banks towards the adoption of ESG-conscious business models. This revelation is particularly relevant as it indicates that, despite the potential for ESG initiatives to contribute to long-term value creation, immediate financial incentives may not be sufficient to spur spontaneous action by banks.

Building upon insights gleaned from their previous pilot study, which focused on a limited selection of European listed banks, the same authors (La Torre et al., 2023) extend their analysis to encompass the entirety of available listed European banks spanning a substantial temporal range from 2008 to 2020. The primary objective was to delve deeper into the intricate relationship between ESGP and CFP, considering diverse dimensions of financial performance. These encompass accounting-based parameters such as Return on Assets (ROA) and Return on Equity (ROE), in addition to market-based indicators including Capitalization to Book Value and Tobin's Q. Furthermore, the study introduces the concept of Value-Based Management (VBM), with specific emphasis on the EVA Spread, an aspect that has received relatively less scholarly attention.

It is noteworthy that, in contrast to their earlier pilot study, the authors opt to employ the individual Pillar Scores, each representing Environmental, Social, and Governance facets, as distinct measures of ESGP, as opposed to a composite ESG Score. This methodological refinement facilitates a more granular and discerning analysis of the particular dimensions of ESG performance.

The implications of this research are profound, carrying relevance for both the academic community and practitioners within the banking sector. The findings prompt critical inquiry into the role of market-driven incentives as catalysts for banks' voluntary integration of ESG practices. Moreover, they underscore the imperative for a more holistic and integrated approach to the incorporation of ESG considerations into the fabric of banking operations and regulatory paradigms. In summation, this chapter contributes a valuable layer of depth to the ongoing discourse surrounding the intricate interplay between ESG factors and financial performance within European banking institutions.

The research by Zumente and Lāce in 2021 provides an insightful analysis of the role of ESG ratings in the financial market, particularly focusing on European companies. Their study examines the variation in ESG ratings given by different rating agencies and the consequent effects on trading volume and stock returns, highlighting the growing impact of ESG considerations in investment choices.

As responsible investing becomes more prevalent, the demand for ESG data has surged. However, the ESG scores from various rating agencies often present conflicting evaluations of a company's sustainability performance. Zumente and Lāce's article first investigates the methodologies behind these divergent ESG ratings. The study then assesses the availability and consistency of these ratings for companies listed on European stock exchanges.

A key part of the research involves an independent t-test analysis that looks at the Central and Eastern Europe (CEE) region, evaluating whether the absence of an ESG rating has a detrimental effect on a stock's trading volume and returns. The findings indicate significant discrepancies in the ESG ratings awarded to European companies, which suggests that companies need to be aware of the rating agencies' methodologies to ensure their sustainability efforts are accurately reflected. Meanwhile, investors should consider the moderate correlation coefficient of 0.58 found between the two most popular ESG ratings.

The investigation into the CEE region is particularly telling, revealing that stocks with ESG ratings exhibit notably higher trading volumes compared to those without, which underscores the importance of ESG scores not just for investors but also for the companies themselves.
This implies that ESG ratings can influence investor interest and potentially affect market performance.

Zumente and Lāce's study points out that while ESG ratings are becoming a necessity for informed investment decisions, the inconsistency across different ratings can lead to confusion and misrepresentation. For companies, the necessity to obtain an ESG rating is twofold: it serves as a benchmark for their sustainability performance and as a tool to attract investors by signaling compliance with ESG criteria.

Ahmad, Mobarek, and Roni (2021) delve into the relationship between ESG (Environmental, Social, and Governance) integration and financial performance among UK firms, utilizing an extensive dataset from the FTSE350 over the period 2002–2018. Their study applies both static and dynamic panel data analysis techniques to provide an updated examination of how ESG factors influence corporate financial outcomes.

The research assesses the overall impact of total ESG performance as well as the individual dimensions of ESG on the financial performance of firms. An important dimension of the study is the investigation into the role of firm size as a moderating factor in the ESG-financial performance relationship. The findings from this nuanced analysis reveal a positive and significant correlation between ESG performance and financial performance, indicating that firms with robust ESG practices tend to achieve better financial results.

Notably, the impact of ESG on financial performance is not uniform across all dimensions of ESG; instead, the results are mixed when examining economic, environmental, social, and corporate governance performance separately. Despite this variation, the overarching

conclusion is that firms with higher ESG scores outperform those with lower ESG scores in financial terms.

The study also highlights that firm size plays a critical moderating role, with larger firms displaying a more marked benefit from high ESG scores compared to smaller firms. This size-dependency suggests that larger firms might be better positioned to leverage ESG for financial gain, possibly due to greater resources, more established reputations, or more significant stakeholder scrutiny.

The scholarly work of Pisani and Russo (2021) presents a meticulously executed analysis of sustainable investment funds amid the financial upheaval triggered by the COVID-19 pandemic. Their investigation sought to discern the performance dynamics of these funds, focusing on returns, volatility, and risk contagion throughout an era marked by substantial economic flux.

In pursuit of methodological rigor, Pisani and Russo selected a homogeneous sample of 30 sustainable investment funds, all benchmarked against the MSCI Europe index, to ensure comparability. This strategic choice facilitated a reliable and focused analysis. They harnessed the Morningstar Sustainability ESG rating as a metric to evaluate the sustainability level of each fund, thus anchoring their assessment in a recognized standard.

The revelations of the study proved to be quite illuminating. It emerged that funds with superior ESG ratings demonstrated remarkable resilience, with a pronounced capacity to withstand the crisis's destabilizing effects. These funds not only endured the challenging climate with more robust performance but also surpassed their peers with lower ESG ratings in terms of returns.

Employing sophisticated financial modeling techniques, specifically GARCH models and event studies, Pisani and Russo were able to substantiate the advantageous impact of high ESG ratings on fund performance during the crisis. These methodological tools added robustness to their findings, reinforcing the link between ESG commitment and investment fund resilience.

The implications of Pisani and Russo's research are significant and multifaceted. It accentuates the critical role that sustainable finance plays in fostering systemic stability and mitigating risk, particularly in the face of profound economic disruptions. As the investment landscape evolves to integrate ESG considerations more deeply, the study provides persuasive evidence advocating for the inclusion of sustainability in the investment decision-making process. The research positions sustainable investment funds not merely as financial instruments but as pillars of risk protection and promoters of sustainable growth.

The study conducted by Kim and Li (2021) offers a nuanced exploration into how different Environmental, Social, and Governance (ESG) factors correlate with corporate financial performance. Their analysis sheds light on the multifaceted nature of ESG impacts, demonstrating that good corporate governance stands as a robust predictor of profitability and enhanced credit ratings. Simultaneously, they bring attention to the significant, albeit less expected, influence of social factors on credit ratings.

In an era where sustainable practices are increasingly under the corporate spotlight, Kim and Li's research meticulously parses out the individual contributions of ESG components to financial outcomes. They uncover a positive relationship between ESG factors overall and corporate profitability, noting that this association is more pronounced within larger firms.

Here, the governance aspect of ESG emerges as particularly impactful, especially in the context of firms that have historically exhibited weaker governance structures.

However, the study presents a more complex picture of the environmental dimension. Kim and Li observe a surprising negative impact of environmental scores on financial performance, which they suggest could be attributed to the substantial costs associated with implementing green practices – costs that may not yield immediate financial returns.

Crucially, while ESG variables generally exert a positive effect on credit ratings, it is the social component of ESG that appears most influential. This finding indicates that social factors, often overshadowed by the environmental aspect in public discourse, are critical in shaping perceptions of creditworthiness.

Through their research, Kim and Li provide a compelling case for the integration of ESG considerations into investment management and portfolio construction. They argue that a strategic emphasis on ESG can serve to maximize value and mitigate risk, offering valuable insights for investors and corporate managers alike who are navigating the evolving landscape of corporate sustainability.

Kalfaoglou (2021) provides a comprehensive analysis of the burgeoning significance of Environmental, Social, and Governance (ESG) risks in the banking sector. His study is a response to the increasing demand for the financial sector to support sustainable development initiatives politically. Kalfaoglou posits that ESG risks represent a novel category of risk for banks, necessitating a robust approach to their identification, evaluation, monitoring, and management.

The study is structured into three distinct parts. The first segment delves into the themes of ESG and examines the transmission channels through which these risks can impact traditional banking risks. This analysis is crucial for understanding how ESG factors intertwine with and influence established risk models in banking.

In the second part, Kalfaoglou focuses on the various initiatives that could facilitate the integration of ESG frameworks within the financial sector. This segment is particularly relevant in light of the growing regulatory and stakeholder emphasis on sustainable banking practices.

The final part of the study is devoted to exploring how banks can effectively incorporate ESG themes into their decision-making processes. Kalfaoglou emphasizes that embracing ESG considerations requires a paradigm shift within the financial sector. This shift is not just about compliance with a regulatory agenda; it's about aligning banking practices with the broader objective of financing sustainable transformation.

Kalfaoglou's research underscores the importance of ESG risks as a distinct and emerging risk category for banks. It advocates for the development and implementation of comprehensive risk management frameworks that are capable of accommodating these new challenges. His work is particularly timely and relevant, given the ambitious policy agenda surrounding sustainability and the imperative for the financial sector to adapt and contribute effectively to this global endeavor.

Liu, Wu, and Zhou (2022) conducted a pivotal study examining the impact of Environmental, Social, and Governance (ESG) factors on corporate financial performance in China's Yangtze

River Delta, a region at the forefront of China's economic development. Their research provides nuanced insights into the varying effects of individual ESG components on financial outcomes, reflecting the complex interplay between sustainability practices and economic benefits in a rapidly evolving economic landscape.

This study is particularly timely as China is in the early stages of developing and adopting ESG frameworks, with not socially approved ESG evaluation system firmly established yet. To address this gap, Liu et al. carefully selected variables and composite methods for the Environmental (E), Social (S), and Governance (G) components, integrating them into an ESG index that blends Western methodologies with the Chinese context.

The research employs panel regression analysis, analyzing data from 191 listed companies in the Yangtze River Delta from 2015 to 2020. The findings present a diverse picture of ESG's impact: Environmental factors are shown to have a significant negative effect on corporate financial performance, while Governance factors contribute positively. Interestingly, Social factors do not display a significant impact.

The study reveals that while governance measures might enhance organizational efficiency and boost investor confidence, environmental initiatives are perceived as cost drivers that may not translate into immediate financial gains. This dynamic highlight the need for a deeper understanding of the long-term financial implications of environmental practices.

Furthermore, the overall ESG performance is found to have a less significant impact on accounting-based financial performance and no significant impact on market-based financial performance. These findings offer crucial insights for businesses and policymakers in China, aiding in the understanding of ESG performance and promoting the adoption of ESG practices within the Chinese corporate context.

The study by Ersoy et al. (2022) delves into the complex interactions between Environmental, Social, and Governance (ESG) scores and the market value of U.S. commercial banks, contributing valuable insights to the evolving discourse on sustainable banking. This research stands out for its exploration of the nuanced effects of different ESG pillars on bank market value, using both linear and non-linear panel regression models over the period from 2016 to 2020.

In a sector where ESG considerations are becoming increasingly vital for investors and regulatory bodies, Ersoy and colleagues' study focuses on the banking industry, which has been relatively underrepresented in ESG-related research. By examining the impact of ESG scores and their individual components—Environmental Pillar Score (EPS), Social Pillar Score (SPS), and Governance Pillar Score—on bank market value, the research provides a detailed analysis of how these factors correlate with financial performance.

One of the key findings of the study is the discovery of an inverted U-shaped relationship between market value and both the overall ESG score and the SPS, and a U-shaped relationship between market value and the EPS. These intricate dynamics suggest that while ESG factors can positively influence bank market value, their impact is not straightforward and varies across different ESG dimensions.

This study is particularly significant for investment managers and policymakers looking to maximize bank market value while adhering to ESG standards. The findings underscore the

importance of a balanced approach to ESG integration, where the diverse impacts of environmental, social, and governance factors are carefully considered in the valuation and strategic decision-making processes within the banking sector.

The scholarly work by Zhang and Liu (2022) presents a meticulous exploration of the dynamic interplay between Environmental, Social, and Governance (ESG) performance and the financial agility of firms in the context of China's evolving corporate landscape. This research, grounded in a robust empirical framework, aims to elucidate the pivotal role that ESG practices play in bolstering a company's financial dexterity amidst the complexities of an increasingly uncertain and sustainability-driven business environment.

Engaging in a methodologically rigorous analysis, Zhang and Liu scrutinized an expansive dataset, meticulously compiled from A-share listed Chinese firms over a six-year period, from 2015 to 2020. Their analytical approach, which integrated advanced statistical techniques, was directed towards unraveling the nuanced implications of ESG performance on corporate financial flexibility.

The study's revelations are both profound and insightful. It establishes a significant positive correlation between the extent of a firm's engagement in ESG practices and its capacity for financial flexibility. This key finding illuminates the notion that companies with a pronounced commitment to ESG principles are more adept at circumnavigating financing constraints, thereby enhancing their strategic agility in financial management.

Delving deeper into the mechanics of this relationship, the same authors identified the degree of financing constraints as a critical mediating variable. Their analysis elucidates how robust ESG performance mitigates these constraints, effectively amplifying a firm’s financial adaptability. This aspect of the study underscores the transformative impact of ESG adherence in elevating a company's resilience against financial adversities.

Moreover, the research proffers nuanced insights into the contextual factors amplifying the ESG-financial flexibility nexus. In scenarios marked by heightened environmental uncertainty and intense market scrutiny, the study reveals an amplified positive effect of ESG performance on financial flexibility. This finding suggests that firms with strong ESG credentials are perceived as less risky and more adaptable by the market, particularly in periods of uncertainty.

In essence, the mentioned study offers an invaluable contribution to the academic discourse on sustainable corporate governance. It provides compelling evidence of the strategic benefits accruing from ESG commitment, extending beyond mere compliance to significantly influencing a firm's financial maneuverability in uncertain times.

The research undertaken by Hamdi et al. (2022) critically examines the interdependence between corporate financial performance and ESG initiatives in the context of U.S. firms.
This empirical study contributes to the discourse on the bidirectional influence that financial robustness and ESG practices exert on each other, a subject of increasing relevance to corporate stakeholders.

While the prevailing research has predominantly affirmed the positive repercussions of ESG on financial success, the work of Hamdi et al. pivots to investigate the influence of a firm's financial standing on its ESG actions. Utilizing a random-effects panel data model and scrutinizing an extensive dataset spanning two decades, they unveil a consistent positive

relationship between a firm's financial achievements and its ESG endeavors. The study reveals that firms with sound financial footing are more equipped and likely to bolster their ESG efforts, which in turn may foster further financial success.

In their investigation, they identify that during times of economic volatility, such as periods of significant policy uncertainty or oil price fluctuations, the impact of financial performance on ESG engagement demonstrates variability across the ESG spectrum. These insights, substantiated through robust and alternative econometric specifications, underscore the nuanced ways in which external economic conditions and internal corporate financial strategies interact to shape ESG investment and implementation.

The study is a seminal contribution that highlights the financial underpinnings of ESG practices, extending its significance to strategic corporate governance and investment decision-making. Their findings advocate for a deeper understanding of the financial-ESG nexus and its implications for sustainable corporate growth and resilience.

The study conducted by Serban, Mihaiu and Țichindelean (2022) delves into the intricate correlation between Environmental, Social, and Governance (ESG) scores and market capitalization within European companies. This research offers a nuanced perspective on how ESG considerations are intricately linked to a firm's market valuation, with notable variations discernible at the economic sector level.

To scrutinize this relationship, an extensive sample comprising 5557 companies representing various economic sectors across 78 countries and 6 regions was meticulously analyzed. This sample encompassed publicly traded companies, stratified by market capitalization ranging from small-cap to large-cap. Importantly, the analysis was grounded in data from the financial year 2019, precluding the influence of the COVID-19 pandemic.

Utilizing both multiple linear regression and complementary quantile regression methodologies, the study unveils a direct and significant correlation between ESG scores, value-added variables, and market capitalization. Notably, this research distinguishes itself by acknowledging the sectoral disparities in how ESG scores impact market capitalization. Furthermore, it is noteworthy that the influence of value-added variables on market capitalization remains relatively consistent across sectors.

The ramifications of this research are profound, underscoring the escalating importance of ESG considerations in the assessment of a company's market value. It serves as a compelling call to action for businesses to recognize the industry-specific intricacies at play and to tailor their ESG integration strategies accordingly. In essence, the study contributes invaluable insights into the complex interplay between ESG scores and market capitalization, providing a robust foundation for the development of more targeted and sector-specific approaches to sustainable business practices.

Another study authored by Zumente and Lāce, in 2022, endeavors to provide a meticulous evaluation of the influence exerted by Environmental, Social, and Governance (ESG) factors on the financial performance of corporations listed in the emerging economies of Central and Eastern Europe (CEE). While the importance of ESG considerations in global equity markets has been substantiated by a plethora of studies, this research situates its focus within the distinct milieu of CEE, where the adoption of sustainability measures has been comparatively gradual.

The analytical framework adopted in this investigation involves a quartile analysis, meticulously leveraging data derived from RobecoSAM ESG scores and Bloomberg ESG disclosure. In a noteworthy departure from conventional assumptions, the findings of this study challenge the prevailing notion positing a direct correlation between higher sustainability scores and commensurate enhancements in financial performance within the CEE region. Surprisingly, the research outcomes indicate that companies distinguished by commendable ESG performance in the CEE landscape do not necessarily realize corresponding increases in stock returns. Furthermore, the analysis fails to reveal any conspicuous trends linking ESG performance to corporate financial outcomes.

The implications stemming from this research hold notable significance, shedding light on the nuanced and multifaceted relationship between ESG factors and financial performance within the CEE context. The absence of a straightforward and direct correlation between ESG excellence and financial gains in this specific regional setting underscores the need for a more intricate and context-specific comprehension of how ESG considerations interface with financial results in diverse regional contexts.

In the larger academic discourse, this study contributes valuable insights, offering a refined perspective on the interplay between sustainability and financial performance. Particularly within emerging economies like CEE, where the dynamics of ESG integration may diverge from global trends, this research augments our understanding of the complex and evolving relationship between sustainability practices and corporate financial outcomes.

The 2022 study by Dragomir et al. provides a critical examination of how Environmental, Social, and Governance (ESG) factors influenced the financial performance of banks across Europe, America, and Asia during the Covid-19 pandemic. Spanning the years 2019 to 2021, the research utilizes data from the Refinitiv database to analyze the financial outcomes of 333 banks situated in 53 countries, thereby capturing a broad spectrum of the global banking sector's response to the pandemic.

A significant aspect of the study is its ability to establish causality relationships, particularly in how distinct ESG factors contributed to the financial resilience and performance of banks during an unprecedented global crisis. The findings from this analysis reveal that environmental performance in 2019 had a negative impact on banks' return on equity in 2020. This suggests that pre-pandemic investments or practices in environmental aspects may have been initially burdensome during the onset of the crisis. In contrast, no other ESG factors during this period showed a significant effect.

The study also uncovers those investments in social responsibility during 2020 positively affected bank profitability in 2021. This finding underscores the value of social initiatives during times of crisis and reflects a growing recognition that social responsibility can contribute to financial performance, particularly in the recovery phase.

Furthermore, the research highlights regional differences, with East Asian banks exhibiting higher stock market returns and earnings per share influenced by the quality of corporate governance from the previous year. This regional analysis offers a more nuanced understanding of how ESG factors play out across different banking environments and economic contexts.

Interestingly, the study points out that the environmental performance of banks in 2020 negatively influenced earnings per share in 2021, but this was observed only within the East

Asian sample. This could indicate region-specific challenges or opportunities in how environmental strategies are executed and perceived in the market.

In their analytical work, Koundouri, Pittis and Plataniotis (2022) delve into the empirical relationship between ESG (Environmental, Social, and Governance) performance and the financial health of leading European companies. This study is set against the backdrop of international climate goals, such as those outlined in the Paris Agreement, the United Nations Agenda 2030, and the European Green Deal, which call for concerted efforts from all societal sectors, including the business community.

The research assesses the influence of ESG criteria on the financial performance of top European enterprises, particularly in light of the legal obligations imposed by the Non-Financial Reporting Directive (NFRD—Directive 2014/95/EU) for large companies to disclose social and environmental information. The study's intent is to contribute to the ongoing discourse regarding the extent to which robust ESG performance can impact aspects of a company's financial health, such as profitability, valuation, capital efficiency, and risk.

To this end, the study scrutinizes the ESG reporting frameworks utilized by the top 50 European companies within the STOXX Europe ESG Leaders 50 Index, spanning a diverse array of sectors including Automobiles, Consumer Products, Energy, Financial Services, and Manufacturing. The analysis seeks to discern patterns of financial performance in these companies and compare them with other large European corporations.

The results of Koundouri, Pittis and Plataniotis' study reveal a discernible connection between ESG performance and financial condition, albeit this link is parameter specific. While for certain financial parameters, a strong ESG performance correlates with better financial health, for others, the evidence is not as compelling.

This study offers valuable insights into the heterogeneity of ESG impacts on financial outcomes, underscoring the need for companies to prioritize and tailor their ESG efforts strategically. The research provides a nuanced perspective on the implementation and effectiveness of ESG practices, guiding companies in optimizing their ESG initiatives to enhance corporate financial performance.

In summary, the work of Koundouri, Pittis and Plataniotis (2022) marks a significant contribution to the body of knowledge on ESG performance and its financial ramifications for corporations. The study not only affirms the importance of ESG criteria in the current business and regulatory climate but also highlights the complexities involved in translating ESG efforts into financial success, offering a foundation for future research and strategic corporate development in ESG practices.

In the study conducted by Răpan et al. in 2022, a detailed investigation into the value relevance of Environmental, Social, and Governance (ESG) scores and their effect on share prices in European stock exchanges is presented. The research delves into the impact of ESG scores on investor behavior within the equity markets of Italy, France, Germany, and Spain, over a five-year period from 2017 to 2021.

The study is framed within the broader context of the capital markets and the importance of disclosing financial information that adheres to global and quality standards like the

International Financial Reporting Standards (IFRS). Such disclosures are crucial for investors, banks, and other creditors as they base their investment decisions and risk assessments on this information. Răpan et al. note that while managers are concerned with overall company performance, investors focus on return on investment, and creditors on solvency.

The study acknowledges the evolving landscape of capital markets where, alongside traditional financial performance, non-financial information, particularly ESG performance, has become increasingly important in stakeholder decision-making. Using the Ohlson price model to analyze the association between ESG scores, other comprehensive income, and share prices, the research concludes that main ESG scores have a positive and significant influence on share prices, unlike other comprehensive income.

The findings highlight the importance of ESG scores as a determinant of a company's market valuation, implying that companies with higher ESG scores tend to attract more investor attention and investment. This trend reflects a growing awareness and valuation of ESG factors by the investment community, suggesting a shift towards more sustainable investment practices.

The study's implications are significant for companies and investors alike, underscoring the need for firms to improve their ESG performance and reporting if they wish to remain competitive and appealing to an increasingly sustainability-conscious investor base. For investors, the research provides evidence that ESG scores are not just a measure of corporate responsibility but also a critical component of investment analysis, influencing expectations of future financial performance.

Răpan et al.'s research contributes to the body of evidence that sustainable investments are not only ethically and environmentally preferable but also financially prudent. It underscores the value relevance of ESG scores in the investment decision-making process, indicating that companies that perform well on ESG criteria are more likely to experience positive market valuations.

In the study by Lupu, Hurduzeu, and Lupu (2022), the authors offer an analytical foray into the relationship between Environmental, Social, and Governance (ESG) scores and the overarching financial stability within the European banking sector. Their findings affirm that ESG considerations bear significant weight on financial stability, which is critical for the banking sector's resilience and long-term viability.

As ESG factors gain prominence in the assessment of risks and opportunities within the modern economic landscape, their influence on the banking sector, a pivotal artery of the economy, is of particular interest. This sector's role in credit facilitation and economic balance places it at the nexus of financial stability concerns. Motivated by the need to understand this dynamic, Lupu et al. pose a central question: Do ESG scores tangibly influence the financial stability of European banks?

Employing the sophisticated cross-quantilogram methodology, the researchers delve into the dependencies at all distribution levels between ESG scores and financial stability indicators. They apply robust systemic risk measurement tools, including the Marginal Expected Shortfall (MES), CoVaR, and ΔCoVaR, analyzing commercial banks listed on European stock exchanges. This approach provides a nuanced view of the interdependencies between financial stability and the ESG pillars, going beyond traditional analyses that focus solely on average levels of distribution.

The study's results reveal a substantive link between ESG scores and financial stability, highlighting that such a relationship may remain obscured by standard analytical methods. Furthermore, the authors document variations in the impact of different ESG pillars, pointing to the multifaceted nature of ESG factors and their diverse implications for financial stability.

This research contributes significantly to the discourse on sustainable finance, reinforcing the necessity for financial institutions and regulators to incorporate ESG metrics into their risk assessment frameworks. The insights garnered from Lupu et al.'s study advocate for a heightened integration of ESG considerations in the strategic planning and risk management protocols of European banks, suggesting that ESG performance is not only a measure of corporate responsibility but also a determinant of financial resilience.

The scholarly investigation by Chiaramonte et al. (2022) provides a detailed assessment of how Environmental, Social, and Governance (ESG) strategies contribute to bank stability, particularly during periods of financial distress in Europe. The study scrutinizes the individual and combined effects of ESG scores on reducing bank fragility, revealing that higher ESG ratings significantly fortify banks against financial instability.

This research takes a deep dive into the role of ESG factors in the banking sector, a timely analysis given the volatile financial landscape and the push for sustainable banking practices. Chiaramonte and colleagues analyze data from European banks spanning 21 countries over the period from 2005 to 2017. Their findings consistently demonstrate that banks with robust ESG scores—and their respective E, S, and G components—are less susceptible to fragility during financial downturns.

What sets this study apart is its exploration of the ramifications following the EU 2014 Non-Financial Reporting Directive (NFRD). A differences-in-differences (DID) analysis around this regulatory milestone underscores that enhanced non-financial disclosure, as mandated by the NFRD, correlates with increased bank stability. Furthermore, the study notes that the longevity of ESG disclosures is directly proportional to stability benefits during financial crises.

Chiaramonte et al. also elucidate that the relationship between ESG strategies and bank stability is not monolithic; it varies significantly across different banks' characteristics and operational contexts. The researchers address potential concerns of selection bias and endogeneity, ensuring the robustness of their conclusions.

Overall, the findings from this study strongly endorse the regulatory emphasis on non-financial disclosures and highlight the protective role of ESG strategies in the banking sector. The implications are clear: ESG factors are not merely ethical considerations but are crucial components in building resilience against financial crises.

In her insightful study, Kirschenmann (2022) examines the influence of the European Union (EU) Taxonomy on the banking sector, particularly in the context of bank lending to firms. The EU Taxonomy, a key component of the European Green Deal, aims to steer private sector investments towards environmentally sustainable economic activities. This study addresses the critical question of whether the EU Taxonomy, as a regulatory tool, effectively impacts banks' lending practices and, by extension, contributes to the greening of firms' activities.

Kirschenmann's research is situated within the broader sustainable finance strategy of the EU, which seeks to align private sector financing and investment decisions with sustainability-related non-financial factors. The EU Taxonomy, by providing a standardized definition and classification system for sustainable economic activities, forms the foundation for further legislative and regulatory measures. Given the pivotal role of banks as primary financiers in Europe, the study explores how the Taxonomy's requirements influence bank lending and whether these changes have a tangible impact on promoting sustainable practices among firms.

The study reveals that firms' Environmental, Social, and Governance (ESG) risks, profiles, and performances do indeed play a role in shaping their loan conditions. However, Kirschenmann points out an essential gap in the existing literature and the observed outcomes: it remains unclear if improved funding conditions under the EU Taxonomy framework led to actual reductions in carbon emissions or enhanced greener activities at the firm level.

By highlighting this uncertainty, Kirschenmann's study underscores the need for further assessment of the EU Taxonomy's effectiveness in fostering sustainable practices. It suggests that while regulatory changes may influence lending patterns based on ESG criteria, the direct impact of these changes on achieving tangible environmental outcomes is still an open question. This research contributes significantly to the ongoing discourse on sustainable finance, providing critical insights into the complexities and potential limitations of regulatory frameworks in driving environmental sustainability in the corporate sector.

The study conducted by Gurol and Lagasio (2022) offers valuable insights into how the composition of bank boards, particularly the inclusion of women and independent directors, influences Environmental, Social, and Governance (ESG) disclosure in the European banking sector. This research sheds light on the significant role that diversity and independence on boards play in enhancing the quality and transparency of ESG, environmental, and social disclosures.

The purpose of the study is to delve into the relationship between the structure of banks' boards and their sustainability performance. Gurol and Lagasio employed regression analysis techniques on a sample of 35 European banks listed on the EUROSTOXX 600, focusing on various board structure variables and their impact on ESG disclosure scores.

The findings of the study reveal a positive and significant correlation between the size of the board, the proportion of women on the board, and the ratio of independent directors with ESG, environmental, and social disclosure scores. Specifically, the presence of women and independent members on bank boards is associated with more comprehensive and thorough ESG disclosures. This suggests that diverse board compositions, particularly those with a higher ratio of women, contribute to better sustainability practices and reporting in banks.

Furthermore, the study also finds a relationship between ESG disclosure and bank profitability, highlighting the practical implications for policymakers, bankers, and investors.
The results suggest that larger banks and those with significant borrowing concerns are more attentive to sustainability, indicating that to access resources effectively, banks must excel in sustainability disclosure to their stakeholders.

The social implications of the study are significant, emphasizing that banks should take into account academic findings on corporate governance practices that lead to better ESG disclosure. The study's originality lies in its examination of the relationship between specific board

structure variables and their effects on ESG, environmental, and social scores separately. It also touches upon the broader impact of banks in terms of their fund transfer functions and credit decisions, underscoring the importance of adopting sustainability dimensions in their operations.

The investigation by Chen et al. (2023) explores the intricate relationship between Environmental, Social, and Governance (ESG) performance and Corporate Financial Performance (CFP) within a global context, drawing upon a vast dataset encompassing 3332 listed companies worldwide across various industries, over the decade spanning 2011 to 2020. Grounded in stakeholder theory, the research delves into how ESG considerations—encompassing environmental sustainability, social responsibility, and ethical governance—affect corporate success, investor confidence, and operational efficiency.

The study initiates its discourse by tracing the evolution of ESG as a concept, highlighting its roots in corporate social responsibility and its codification through initiatives such as the United Nations' Principles for Responsible Investment. It emphasizes the increasing global emphasis on ESG as a metric for assessing corporate commitment to addressing climate change, fostering social well-being, and ensuring ethical governance. The research underscores the growing trend of ESG investment, noting the surge in ESG assets and the positive correlation between ESG performance and lower capital costs, improved stock performance, and operational efficiency.

Methodologically, the study employs a panel regression model to analyze the association between ESG ratings—sourced from Refinitiv—and CFP. The analysis is nuanced, accounting for variables such as company size, industry, and exposure to risk, to elucidate the differential impact of ESG performance across various contexts. The empirical findings reveal a significant positive correlation between ESG performance and CFP for large-scale companies, particularly in high-risk environments, indicating that robust ESG practices can mitigate financial risk and enhance corporate value.

The article contributes to the academic discourse by providing a comprehensive analysis of ESG's role in promoting sustainable business practices and driving corporate success. It offers valuable insights for policymakers, investors, and corporate leaders on the benefits of integrating ESG criteria into investment decisions and corporate strategies. Moreover, the study advances the theoretical understanding of the stakeholder theory by demonstrating the tangible impacts of ESG performance on financial outcomes, thereby underscoring the economic imperative for sustainable development and responsible corporate governance.

In conclusion, this research substantiates the positive linkage between ESG performance and corporate financial success, advocating for the integration of ESG factors into corporate strategies as a pathway to sustainable growth, risk mitigation, and enhanced competitiveness. Through its rigorous empirical analysis and theoretical contributions, the study significantly enriches the existing literature on ESG investment and sustainability in business practice, offering a forward-looking perspective on the convergence of environmental stewardship, social responsibility, and governance excellence in driving corporate and economic prosperity.

In their empirical study, Bax, Bonaccolto and Paterlini (2023) address the critical question of whether companies with lower ESG (Environmental, Social, and Governance) ratings carry a higher systemic impact, particularly under the stress of events like the COVID-19 pandemic. Utilizing data from Europe and the United States, they quantify systemic risk using QL-CoVaR (Quantile Loss-CoVaR) and analyze data spanning from 2007 to 2021.

The study emerges in the context of the European Banking Authority's acknowledgment that ESG risks can have significant implications for the economic and financial systems. In light of this, understanding the correlation between a company's ESG standing and its contribution to systemic risk is vital for maintaining the stability of these systems.

Bax, Bonaccolto and Paterlini's findings demonstrate that companies with higher ESG scores are associated with lower values of QL-CoVaR, suggesting that these companies pose less systemic risk. This relationship is particularly evident during the period of the COVID-19 pandemic, affirming the notion that strong ESG practices can serve as a buffer against systemic financial risks during times of crisis.

Further analysis by the researchers, involving the clustering of individual companies into ESG portfolios, reinforces the evidence that a positive ESG score correlates with a mitigated systemic risk. The study also delves into insights from the individual ESG pillars, offering a more granular understanding of how each component of ESG may contribute to the overall systemic risk profile of a company.

This research is significant as it extends the discussion of ESG beyond corporate performance and investment risk to include systemic financial stability. The implications are substantial for investors, regulators, and policymakers who are interested in identifying and managing potential systemic risks within the financial system. It suggests that companies with lower ESG ratings could be more closely monitored and potentially regulated to prevent broader financial instability.

El Khoury, Nasrallah and Alareeni (2023) conducted an in-depth study analyzing the relationship between Environmental, Social, and Governance (ESG) factors and bank performance in the MENAT (Middle East, North Africa, and Turkey) region. This research uncovers a non-linear association between ESG initiatives and financial outcomes for banks, highlighting the varying degrees of influence that different ESG pillars have on bank performance.

The study encompasses a sample of 46 listed banks in the MENAT region from 2007 to 2019. Bank performance (FP) is assessed using both accounting measures (Return on Assets, Return on Equity) and market indicators (Tobin’s Q, Stock Return). A significant aspect of the study is the examination of the effect of ESG factors and their quadratic terms on FP, accounting for a range of bank-specific, macroeconomic, and financial development variables.

The results reveal a non-linear relationship between ESG factors and bank performance. The study finds that incremental investments in ESG are beneficial up to a certain inflection point. Beyond this point, the benefits of further ESG investments diminish. This finding is crucial for understanding the optimal level of ESG engagement for banks in the MENAT region.

Interestingly, the study also notes that while financial development variables are significant, the different ESG pillars exhibit diverse patterns in their impact on bank performance. The governance pillar demonstrates a concave relationship with accounting performance, whereas the environmental pillar shows a convex relationship with market return.

The research concludes that the ESG-FP relationship is contingent on several factors: the specific ESG pillars being considered, the measure of financial performance used, and the level

of ESG investment. For banks in the MENAT region, understanding these dynamics is essential to rationalize their ESG investments and maximize efficient returns. El Khoury, Nasrallah, and Alareeni's study thus provides valuable insights for banks in the region, suggesting that a balanced and strategic approach to ESG can enhance their financial performance.

**Final Remarks on Literature Review and Author's Contribution in ESG Integration within European Banking**

The scholarly landscape surrounding ESG integration and financial performance across the European banking sector presents a tapestry of ongoing challenges and evolving methodologies, as highlighted by various academic studies. One of the prevalent issues identified in the literature is the limited generalizability of findings, often constrained by narrow geographic or sectoral focus. Studies such as those by Zhang and Liu (2022) and Hamdi et al. (2022) demonstrate robust empirical frameworks but often do not extend their insights to encapsulate diverse banking environments or the varying impacts in underrepresented regions. This limitation points to a critical need for research that comprehensively covers different geographic contexts and the unique challenges they face in ESG integration.

Another significant theme emerging from literature is the imperative for more advanced or hybrid research methodologies that can capture the complex dynamics of financial markets. For example, the research by Chen et al. (2023) and Chams et al. (2021) underscores the benefits of traditional econometric techniques. However, they also suggest that blending these methodologies with cutting-edge data analysis tools can provide deeper insights and more robust predictive models. These hybrid approaches are essential in a financial landscape marked by non-linear and rapidly evolving market conditions.

Moreover, the translation of theoretical ESG models into practical, actionable insights remains a complex challenge. The studies by Bătae et al. (2020) and La Torre et al. (2021) discuss the real-world applicability of ESG models but also highlight difficulties in applying these models within operational banking frameworks. Future research might focus on frameworks that are not only predictive but also interpretable and readily implementable in real banking systems—a gap that my thesis aims to address by effectively linking historical ESG practices with contemporary financial performance metrics.

A more detailed analysis and comparison of the literature work cited in this chapter can be found in Appendix A at the end of this thesis.

**Key Contributions of My Study to Academic Literature:**

**Comprehensive Analytical Framework:** My research transcends previous studies by offering a detailed examination of the interplay between a wide array of ESG factors and multiple dimensions of banking performance. Unlike earlier research that often isolates specific ESG factors or limited financial metrics, my thesis employs a comprehensive analytical approach that integrates diverse ESG components with a broad spectrum of performance indicators.

**Historical Depth and Contextualization:** Building on historical analysis similar to that of Serban et al. (2022), my thesis enriches the current understanding of ESG integration by tracing the evolution of these practices within the banking sector. This historical perspective provides a deeper context that is often lacking in the cross-sectional analysis predominant in the field,

such as the studies conducted by Hwang et al. (2021) and Zumente and Lāce (2022), which focus predominantly on contemporary data sets.

**Advanced Methodological Application:** My work extends the methodological rigor seen in studies by Tóth et al. (2021) and Koundouri et al. (2022), employing sophisticated panel data regression models. This methodology ensures a detailed exploration of ESG factors' strengths and limitations, offering new insights into the evaluative frameworks currently used within the banking sector.

**Real-World Applicability:** Echoing the practical focus of studies like those by Buallay et al. (2021) and Gurol and Lagasio (2022), my research underscores the operational implications of ESG integration. By demonstrating how these practices enhance governance structures and operational efficiency, my thesis bridges the academic-practical implementation gap, offering actionable insights for the banking industry.

**Predictive Power of ESG Integration:** My findings confirm the assertions of studies such as those by Ersoy et al. (2022) and Murè et al. (2021), demonstrating that comprehensive ESG integration correlates positively with enhanced financial stability and operational efficiency. This supports the growing consensus on the benefits of robust ESG practices and highlights the potential for comprehensive ESG criteria to significantly improve banking performance.

In conclusion, my research significantly contributes to the academic community by providing a comprehensive and detailed examination of ESG integration in European banking. It not only predicts and enhances banking performance but also provides a framework for practical application and theoretical exploration. By addressing and filling the critical gaps highlighted in the existing literature, my study sets the groundwork for future research to build on these foundational insights, paving the way for more sophisticated and applicable ESG integration strategies in the banking sector.

## 2.2. SUSTAINABLE DEVELOPMENT AND SUSTAINABLE INVESTMENTS

The concept of sustainable development began to be officially discussed for the first time in the UN in 1980. It was further deepened in the World Commission on Environment and Development (WCED), in its report entitled Our Common Future, of 1987, better known as the Brundtland Report, due to the President of this Commission, the former Norwegian Prime Minister Gro Harlem Brundtland. According to this report, sustainable development is defined as development that meets the needs of the present without compromising the ability of future generations to meet theirs (Fernández, 2015).

Sustainable development would make it possible, on the one hand, to eradicate poverty in developing countries, and on the other, to create a new balance between the wealth of developed countries and care for the Ecological system.

The European Council of Gothenburg incorporates sustainable development in the long-term objectives of the European Union in the proposal "Strategy of the European Union for sustainable development" where it is stated that economic growth, social equality and protection of the environment must go hand in hand. One of the measures of this strategy was the Directive 2014/95/EU of the European Parliament and of the Council, of October 22, 2014, by which all companies with a workforce of at least 500 employees must publish a non-

financial report, which measures their results in economic, environmental and social matters (Fernández, 2015).

Furthermore, the 2030 Agenda for Sustainable Development, with its emphasis on holistic and integrated approaches, requires significant financial resources and investment strategies that align with its goals. Banks are increasingly recognizing their critical role in this regard. By channeling investments into projects and businesses that support the Sustainable Development Goals (SDGs), banks can contribute to global efforts in addressing complex development challenges (Le Blanc, 2015; Sachs, 2015).

In the realm of Sustainable Investing, banks have a unique position to influence corporate behavior through their investment and lending policies. The integration of environmental, social, and governance (ESG) criteria into investment decisions by banks is not only a reflection of a societal shift towards sustainability but also a strategic business decision. Studies have indicated that investments and loans directed towards companies with strong ESG credentials not only foster sustainable business practices but can also lead to better financial performance and reduced risk profiles (Schueth, 2003; Clark et al., 2015).

Furthermore, banks are increasingly facing pressure from stakeholders – including investors, regulators, and customers – to demonstrate their commitment to sustainability. This includes developing frameworks for sustainable financing, enhancing transparency in reporting ESG metrics, and actively engaging in initiatives that support environmental and social objectives (Eccles and Klimenko, 2019).

However, the banking sector also faces challenges in this transition, such as the need for robust methodologies to assess the sustainability impact of their investments and loans and aligning short-term financial objectives with long-term sustainable goals. The complexities involved in accurately measuring and implementing ESG criteria present both opportunities and challenges for banks in their pursuit of sustainable development (Fukuda-Parr, 2016).

In conclusion, banks are integral to the advancement of Sustainable Development and Sustainable Investing. Their role in financing sustainable projects, influencing corporate behavior through investment decisions, and responding to stakeholder demands for greater sustainability commitment positions them as key players in the transition towards a more sustainable global economy. The integration of sustainability into banking practices is not only a moral imperative but also an evolving business necessity to address the multifaceted challenges of modern sustainability.

## 2.3. THE ROLE OF BANKS IN THE GREEN ECONOMY AND ESG

In the contemporary economic sphere, commercial banking stands as a pivotal element, fundamentally engaging in activities that include managing deposits, extending loans, and offering a spectrum of financial services to both individual and corporate clients. This critical sector serves as the backbone of financial systems globally, and this discussion endeavors to illuminate the scope, relevance, and operational dynamics of commercial banking.

The primary function of commercial banks is their role as intermediaries in the financial system. They accumulate savings from various entities, providing security and interest, and these funds are subsequently channeled into loans for a diverse array of borrowers, encompassing individuals, businesses, and even governments. This circulation of financial

resources is crucial for economic functionality, catering to both personal and corporate financial needs.

Commercial banks present an extensive array of products and services, including but not limited to, savings and checking accounts, mortgage financing, personal loans, and business credit facilities. These offerings are integral to the seamless functioning of the economy, fostering investment, consumption, and operational activities of businesses. Furthermore, these institutions are instrumental in the payment and settlement systems, ensuring efficient and secure financial transactions for both individuals and enterprises.

In the realm of commercial banking, risk management is paramount. This involves a thorough assessment and management of risks linked with lending and investment activities. Banks are tasked with evaluating borrower creditworthiness, navigating interest rate and market risks, and adhering to regulatory mandates, all with the aim of preserving financial stability and safeguarding the interests of depositors and stakeholders.

Post-global financial crisis, the regulatory framework supervising commercial banks has intensified, with regulatory bodies imposing stringent standards to guarantee the solvency and liquidity of these institutions, protect depositor funds, and uphold the overall financial stability. A notable trend in recent years is the integration of Environmental, Social, and Governance (ESG) considerations into banking practices, particularly in the context of credit risk assessment. Recognizing the profound impact of ESG issues on financial stability and creditworthiness, this approach underscores the pertinence of these factors in determining borrower risk profiles. ESG concerns encompass climate-related risks, social responsibility, and corporate governance, influencing company performance, regulatory compliance, and overall resilience. Ineffective management of these aspects can lead to increased financial risks, reputational harm, and operational challenges, thereby affecting creditworthiness.

The integration process of ESG factors into credit risk frameworks involves identifying pertinent ESG risk elements and evaluating their materiality. This process is enhanced through scoring based on impact and likelihood, utilizing data from entities like the Network for Greening the Financial System (NGFS) and ESG data providers. The determination of relevant metrics for managing these exposures is crucial, as is the verification of outcomes with experts in portfolio and credit risk.

Moreover, the focus has expanded to how ESG factors influence loan origination, pricing, and collateral selection. For instance, loans to entities in environmentally detrimental sectors or those lacking robust climate change strategies may attract higher interest rates. Conversely, firms exhibiting strong ESG credentials may gain access to more favorable credit terms.

However, integrating ESG factors into credit risk presents challenges, including the potential for double counting. For example, ESG factors like energy efficiency or flood risk might already be reflected in asset valuations and, thus, in existing Loss Given Default (LGD) models. Additionally, the banking sector faces a need for further research and guidance on effectively incorporating ESG factors into credit risk models without causing distortions.

In summary, the banking industry is progressively recognizing the significance of ESG factors in credit risk analysis, a shift propelled by regulatory pressures, investor preferences, and an increasing awareness of the long-term financial impacts of ESG issues. As the industry evolves,

ESG considerations are poised to become a fundamental component of credit risk assessment and management, significantly shaping the future trajectory of banking practices.

Financial institutions, principally known as credit entities, are central to the mechanism of money creation within economies. They undertake a transformative role by channeling savings into investments, primarily through aggregating funds from clients via deposits and subsequently converting these into asset forms, predominantly loans or credits, as elucidated by Fernández (2015).

Consequently, the banking sector, a pivotal component of the financial system, facilitates the redistribution of capital from surplus to deficit regions. In this traditional intermediation role, banks receive deposits from surplus entities, predominantly in the form of checking accounts, and transform these deposits into loans and credits, which finance deficit entities.

This intermediary function is critical for economic growth and development, as it allows for the mobilization of savings into investments, stimulating economic expansion and job creation. The absence of such banking intermediation would severely impede the ability of deficit entities to secure necessary investment funds for their productive endeavors.

As Fernández (2015) indicates, although banking functions have evolved, their most significant roles include:

- Financial intermediation between savers and borrowers, connecting surplus and deficit units.

- Provision of collection and payment services, economic advisement, and other value-added operations for clients.

- Transmission of national monetary policy, underpinned by the central bank's regulation of money creation through legal cash reserve ratios or coefficients.

Understanding these multifaceted roles is imperative for grasping the extensive influence of banking activities on societal advancement and economic stability. Transitioning to the environmental perspective, it is vital to acknowledge the environmental repercussions of banking operations, particularly in relation to greenhouse gas emissions.

The Greenhouse Gas Protocol delineates three emission scopes—Scope 1, 2, and 3—for evaluating an organization's carbon footprint. Within the banking context, Scope 1 covers direct emissions from owned sources, Scope 2 addresses indirect emissions from purchased electricity, and Scope 3 encompasses indirect emissions from bank-financed activities, including investments and loans (Greenhouse Gas Protocol, 2023).

This intersection of banking functions and environmental impact underscores the necessity of sustainable practices within the financial sector. Particularly, managing and mitigating Scope 3 emissions is crucial, highlighting the importance for banks to consider the environmental implications of their financed projects. Integrating sustainability into their core operations enables banks to contribute to economic development and environmental stewardship, aligning with global climate change mitigation and sustainability efforts (UNEP FI, 2023; IPCC, 2023).

Bateson and Saccardi (2020) in the Ceres report, investigating banks' climate-related financial risks and their exposure to a disorderly transition, note that climate-related events have inflicted substantial economic losses. The report underscores that inaction towards climate change could exacerbate economic losses. It also highlights the potential global GDP loss due to unmitigated climate change and the financial risks to the top public.

Furthermore, Bateson and Saccardi (2020) categorize climate risk into transition risks and physical risks, with the former related to the economic and financial risks of transitioning to a lower-carbon economy, and the latter pertaining to physical threats from climate-related natural events. Banks face significant concerns about both types of risks, particularly from transition risks which could broadly impact asset values across various sectors.

Banks and asset managers significantly influence climate change through their financing activities. A study by CDP (2020) reveals that the greenhouse gas emissions associated with financial institutions' investment and lending activities far exceed their direct emissions. This underscores the pivotal role of the financial sector in either facilitating or mitigating carbon-intensive activities.

The CDP's pioneering research on funded emissions indicates that the financial sector is crucial for achieving a net-zero carbon future. However, the report also highlights a lack of comprehensive data on funded emissions, suggesting a substantial underestimation of the financial sector's impact on climate change.

In conclusion, as Marsh (2021) articulates, banks are increasingly scrutinized for their role in climate change. Their financing activities have significant implications for the transition to a low-carbon economy, aligning with the objectives of the 2015 Paris climate agreement. The acknowledgment and management of climate-related risks by banks and asset managers are crucial for steering the global economy towards sustainable development.

Moreover, the collaborative research conducted in 2019 by KKS Advisors, the Global Alliance for Banking on Values (GABV), the European Investment Bank, and Deloitte, drawing on foundational work by Professor George Serafeim, delves into the relationship between ESG (Environmental, Social, and Governance) performance and financial returns in the commercial banking sector. This study is particularly pertinent in the context of a global shift towards sustainability practices among companies, driven by evolving challenges and stakeholder expectations within the ESG framework.

A principal finding from the seminal work is the substantial financial outperformance of firms that rate highly on material sustainability issues within their industries compared to those with poor ratings on the same issues. This research underscores the significance of distinguishing between material and immaterial ESG factors. Material factors, due to their potential impact on a company's financial health or operational efficiency, hold greater relevance for investors.

The GABV’s research, contrasting the financial profiles and performance of its members with the world's largest banks, supports the hypothesis that emphasizing ESG factors correlates with stable financial returns. Utilizing publicly available data on 100 banks, the study evaluates their engagement with both material and immaterial sustainability issues. Analysis of stock returns from 2007 to 2017 indicates that banks excelling in material ESG issues consistently yield higher risk-adjusted returns compared to those underperforming in these areas. Conversely, prioritizing immaterial ESG issues seems to correlate with decreased financial performance.

These findings advocate that a strategic concentration on material sustainability issues is congruent with enhanced financial returns, suggesting a synergistic interplay between strategic sustainability priorities and robust financial performance, often propelled by effective leadership within financial institutions. The results align with the GABV's stance that generating societal value is intrinsically linked to creating value for all stakeholders, including shareholders.

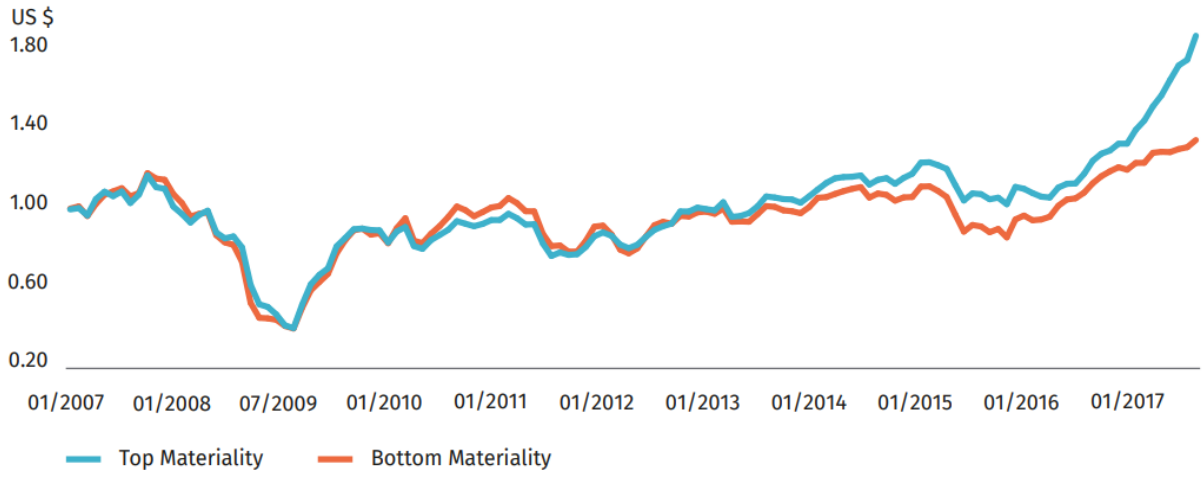


Figure 1. Top vs bottom 20 scoring material ESG banks' portfolio financial performances 2007-2017
Source: KKS Advisors et al., 2019.

## 2.4. UNDERSTANDING ESG

The acronym ESG stands for Environmental, Social and Governance and it has developed to be an important topic over the last years, especially when it comes to ESG investing. As highlighted in a study from Gaganis et al. (2023), in which they processed data through the 'max' normalization technique for comparability.

There was a remarkable evolution in the interest for the term 'ESG' in academic studies and press in the more recent years, as pointed out in Figure 2.

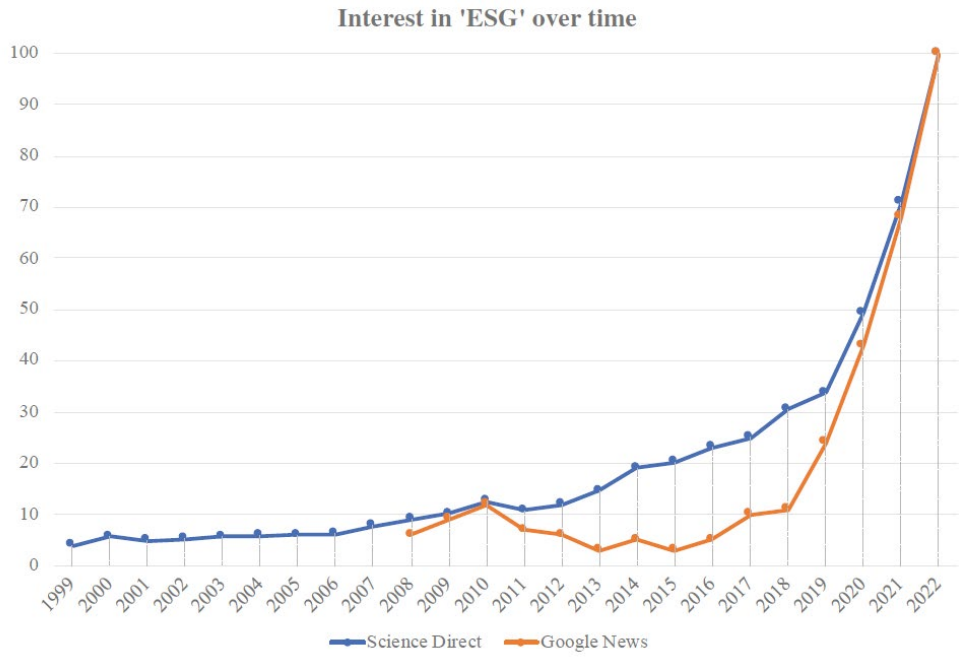


Figure 2. Google News and ScienceDirect research trends for "ESG" over the past years
Source: Gaganis et al., 2023.

The term covers the concept of using non-financial factors that incorporate the environmental impact (E), social impact (S) and governance attributes (G) of a corporation (Subramanian et al., 2019).

Each element of the ESG acronym, as outlined by Bertão (2022), encapsulates the following dimensions:

Environmental: This dimension encompasses the ecological practices and initiatives of an organization. Key areas include addressing global warming, managing emissions of pollutants like carbon and methane, tackling air and water pollution, forest conservation, effective waste management, enhancing energy efficiency, preserving biodiversity, and other related environmental concerns.

Social: This aspect pertains to the social responsibility of corporations and their impact on communities and society at large. It covers areas such as adherence to human rights and labor laws, workplace safety, equitable remuneration, embracing diversity in terms of gender, race, ethnicity, belief systems, safeguarding data privacy, customer satisfaction, social contributions, and engagement with local communities.

Governance: This facet is associated with the policies, procedures, strategies, and management principles of organizations. It involves aspects such as ethical corporate behavior, the composition and independence of the board, anti-corruption measures, mechanisms for reporting discrimination, harassment, and corruption, conducting internal and external audits, respecting the rights of consumers, suppliers, and investors, ensuring data transparency, executive compensation, and more. Governance is intrinsically connected to the Environmental and Social dimensions, as it encompasses the implementation, direction, oversight, and reporting of sustainable practices.

Collectively, ESG represents the efforts of companies and organizations towards achieving social responsibility, environmental sustainability, and sound governance. Increasingly, ESG is being adopted as a contemporary term for Sustainability in various forums, reports, and research.

The term ESG was first coined in 2004 in a report by the Global Compact, an initiative of the United Nations (UN) in collaboration with the World Bank, titled "Who Cares Wins". The report, initiated by then UN Secretary-General Kofi Annan, challenged leaders of major financial institutions to integrate social, environmental, and governance factors into capital markets.

Simultaneously, the Freshfield report, commissioned by the United Nations Environment Program Finance Initiative (UNEP FI) from a leading global law firm, Freshfields, was released. This report emphasized the significance of incorporating ESG factors in the financial valuation of companies.

ESG has evolved to symbolize social and environmental responsibility, reputation, and credibility for corporations. Moreover, ESG criteria align closely with the Sustainable Development Goals (SDGs) set by the UN, which encompass 17 broad topics addressing global challenges and vulnerabilities that need to be tackled by 2030 to foster global sustainable development.

According to the Global Compact, ESG is fundamentally corporate sustainability. A company adhering to ESG practices recognizes its impacts on society and strives to minimize negative effects while amplifying positive ones, balancing any caused damage.

Although ESG is a comprehensive concept, it can be dissected into numerous specific issues. In recent years, several international organizations have endeavored not only to detail ESG but also to develop indicators for measuring company commitment levels in various sectors.

For organizations to demonstrate their ESG practices, they must compile, measure, and disclose this predominantly non-financial information. A key challenge today is quantifying this impact and developing effective ESG practices.

Prominent frameworks, or sets of indicators, that aim to depict the level of ESG commitment include the Global Reporting Initiative (GRI), Task Force on Climate-related Financial Disclosures (TCFD), Climate Disclosure Standards Board (CDSB), Sustainability Accounting Standards Board (SASB), International Integrated Reporting Council (IIRC), International Organization for Standardization (ISO 14001), The Prince's Accounting for Sustainability (A4S), among others. Discussions are ongoing regarding the establishment of unified standardization.

### 2.4.1. ESG INTEGRATION IN THE FINANCIAL SECTOR

In a recent article, published by the Palgrave Macmillan Studies in Banking and Financial Institutions, Weber (2023) discusses the historical evolution and contemporary importance of ESG (Environmental, Social, Governance) considerations in the banking and financial industry, covering various aspects related to ESG, sustainability, and their impact on financial activities.

The author connects the historical roots of ESG in the banking industry back to Italian banks in the sixteenth century. These early banks, connected to the Catholic Church, were pioneers in applying ESG criteria by avoiding unethical practices like usury. They also assessed business owners' work ethics, responsibility, efficiency, and risk-taking, showcasing early ESG-influenced credit risk assessment.

Later in time, credit unions and cooperatives established in the 1850s in Germany were based on ethical principles, serving as examples of stakeholder management. These organizations prioritized the interests of their members and demonstrated strong ESG principles. They continue to exist today in various countries.

Weber (2023) also highlights that ESG criteria have been already integrated into credit risk assessment in the banking industry. By assessing environmentally induced credit risks, banks aim to reduce credit defaults, particularly in the face of increasing environmental regulations and market changes driven by shifting environmental and social attitudes.

In that same direction, climate change has become a significant financial risk and opportunity for banks since the COP21 meeting in 2015. Weber (2023) highlights the importance of climate finance and the issuance of green bonds as a way to address climate risks and promote sustainable investments.

In the investment sector, since the 1990s, ESG criteria have been used for selecting green, social, and sustainable investments. Studies suggest that ESG-related investments often perform similarly or even better than conventional investments, with their impact on financial performance proving stable. ESG-based mutual funds may outperform their peers during financial crises (Weber, 2023).

The incorporation of ESG criteria in commercial lending has demonstrated a positive correlation between ESG performance and financial performance, according to the author, who mentions as well that various theories have been used to explain this relationship:

- The slack resources theory (Daniel et al., 2004), states that a portion of available financial resources is channeled into enhancing ESG performance in response to specific needs. As a result, improved financial results are associated with enhanced ESG outcomes. Income serves as a catalyst for ESG performance.
- The Good management theory (McGuire et al., 1988), asserts that the incorporation of ESG management is an integral component of good management practices, which, by themselves, contribute to improved financial performance. In this scenario, ESG plays as a driver for financial success.
- The Resource-based view (Wernerfelt, 1984) shares a strong connection with the good management theory. It posits that Corporate Social Responsibility (CSR) can positively impact financial performance by mitigating environmental and social costs, meeting stakeholder demands, and enhancing a company's reputation (Lankoski, 2008; Deephouse et al., 2016). As a result, businesses strategically allocate resources to gain a competitive edge through their ESG performance.

In that sense, considering the ESG Integration in Financial Products and Services, ESG Investing has become mainstream, with ESG-based assets under management reaching significant levels. ESG investing aims to balance attractive financial returns with capital allocation to activities with positive social, environmental, or sustainability benefits. The

previously mentioned article also discusses the concept of Impact Investing, where creating positive impacts is a necessity alongside financial returns.

Investors are reconsidering investments in the fossil fuel industry, for example, due to both moral and financial reasons. Some studies suggest that fossil fuel investments pose financial risks due to stranded assets and political shifts toward a low-carbon economy (Green & Newman, 2017; Strauch et al., 2020).

Green lending, as well, motivated by the belief that green borrowers have a lower default probability, is experiencing renewed interest due to government policies and incentives. Lenders are increasingly using environmental credit risk assessment tools in commercial lending to reduce the likelihood of loan defaults (Weber et al., 2015).

In the same direction, green bonds, which raise capital for green projects and assets, have become a significant source of capital. They offer fixed financial returns and an additional green premium, making them attractive for institutional investors seeking both financial returns and sustainability goals.

We can say then, in summary, that ESG-related credit risk management is employed to manage credit risks, including environmental, societal, and climate-related risks, and that many studies suggest that integrating ESG criteria into credit risk assessment helps reduce ESG-related default risks.

**The 2008 Financial Crisis: Lessons and ESG Integration**

The 2008 financial crisis serves as a stark reminder of the consequences of neglecting comprehensive risk assessment and management. The crisis was primarily triggered by the collapse of the housing bubble in the United States, which led to a significant number of mortgage defaults. These high-risk mortgage loans were often bundled into complex financial products like mortgage-backed securities (MBS) and collateralized debt obligations (CDOs), which were then sold to investors worldwide. The interconnectedness of these financial instruments, coupled with the lack of transparency and inadequate risk management, resulted in a systemic financial meltdown.

One of the key issues leading to the 2008 crisis was the failure to consider long-term sustainability and ethical considerations in financial decision-making. Financial institutions prioritized short-term profits over long-term stability, often engaging in risky lending practices without adequately assessing the borrowers' ability to repay. Additionally, there was a significant lack of governance oversight, with many financial products being misrepresented or inadequately disclosed to investors.

Integrating ESG criteria into the financial sector could have mitigated some of the factors that contributed to the 2008 crisis. Here’s how:

1. **Enhanced Risk Management**: ESG integration emphasizes thorough risk assessment, including environmental and social risks that traditional financial analysis might overlook. By considering these broader risk factors, financial institutions could have identified the potential for widespread mortgage defaults earlier, potentially averting the collapse.
2. **Improved Governance**: Strong governance practices are a core component of ESG. If financial institutions had adhered to robust governance standards, including greater

transparency and accountability, the excessive risk-taking and lack of oversight that characterized the pre-crisis period could have been reduced.

3. **Ethical Lending Practices**: ESG integration promotes ethical business practices, including responsible lending. By avoiding high-risk lending practices and ensuring that borrowers had the financial stability to repay their loans, the financial sector could have maintained more sustainable growth, reducing the likelihood of a housing market collapse.
4. **Long-term Focus**: ESG encourages a long-term perspective in financial decision-making. This shift away from short-term profit maximization towards sustainable growth could have led to more prudent investment and lending practices, fostering a more resilient financial system.

In conclusion, the 2008 financial crisis highlighted significant deficiencies in risk management, governance, and ethical practices within the financial sector. The integration of ESG criteria into financial products and services represents a proactive approach to addressing these deficiencies. By prioritizing environmental sustainability, social responsibility, and strong governance, the financial sector can better manage risks, avoid future crises, and contribute to a more stable and sustainable global economy.

### 2.4.2. THE HISTORICAL BACKGROUND OF ESG INVESTING

The evolution of responsible investing has been marked by a significant shift from the traditional focus on avoiding harm to actively promoting good through Environmental, Social, and Governance (ESG) principles. This shift is well-documented in the literature, including comprehensive reviews, such as the one from Bradley (2021), detailed below and supplemented by insights from other authors as well:

**1900s and Earlier**: Socially Responsible Investing (SRI) has origins that trace back over a century, notably among religious groups who imposed ethical constraints on investments (Schueth, 2003). Early adopters such as the Methodists and Quakers set the groundwork for ethical investing principles that influenced later secular movements.

**1930s**: The economic turmoil of the Great Depression highlighted the need for improved governance and accountability in corporate practices, which later informed the broader responsible investing agenda (Richardson, 2009).

**1960s**: The civil rights movement and anti-war protests in the United States catalyzed the practice of shareholder advocacy, pushing for corporate responsibility on social and ethical grounds. Notably, Vietnam War protests prompted university endowments to reconsider investments in defense contractors.

**1980s**: The environmental disasters of the 1980s, including the Chernobyl nuclear accident and the Exxon Valdez oil spill, dramatically shifted public and investor awareness towards environmental issues and the long-term impacts of corporate activities.

**1987**: The Brundtland Commission report ("Our Common Future") emphasized human resource development, including poverty reduction and gender equity, as key to environmental conservation. It presented a widely accepted definition of sustainable development.

**1992**: The United Nations Earth Summit in Rio de Janeiro further formalized environmental concerns within the global investment community, leading to the establishment of the UN

Framework Convention on Climate Change (UNFCCC) and the Convention on Biological Diversity.

**1993**: Investors began pressuring fund managers to divest from South African companies due to the apartheid regime.

**1997**: The founding of the Global Reporting Initiative (GRI) aimed to establish accountability in corporate environmental conduct, later expanding to include social, economic, and governance issues.

With the 21st century, responsible investing has fully embraced ESG principles, focusing on global warming, diversity and inclusion, and corporate governance:

**2006**: The launch of the United Nations Principles for Responsible Investment (PRI) marked a significant development, offering a set of guidelines for incorporating ESG factors into investment decision-making, now widely endorsed by institutional investors worldwide (Richardson and Cragg, 2010).

**2009**: The Global Impact Investing Network (GIIN) was established to enhance the effectiveness of impact investing.

**2011-2020**: Recent years have seen a proliferation of initiatives aimed at enhancing the role of ESG factors in investment practices. Notable developments include the establishment of the Sustainability Accounting Standards Board (SASB) in 2011, which focuses on standardizing the reporting of financially material sustainability information, and the United Nations Sustainable Development Goals (SDGs) established along with the adoption of the Paris Agreement in 2015. In 2020, the European Union published the final report on EU taxonomy for sustainable finance. The COVID-19 crisis and Black Lives Matter demonstrations significantly influenced investor perceptions regarding social factors in ESG investing.

As we move further into the 21st century, responsible investing continues to evolve, incorporating sophisticated strategies that emphasize integration of ESG factors, impact investing, and sustainability-linked investing (Hebb, 2008).

### 2.4.3. REGULATORY BACKGROUND OF ESG AND SUSTAINABILITY IN THE EUROPEAN UNION AND RECENT DEVELOPMENTS

**European Emission Trading System**

The EU ETS, or European Union Emissions Trading System, is a cornerstone of the European Union's policy to combat climate change. It is the world's first and largest carbon market, established in 2005.

Emission Trading Systems (ETS), or cap and trade, were created as a ‘flexible mechanism’ to allow the countries to achieve their target greenhouse gas (GHG) emission values - established in the Kyoto Protocol - with the minimum possible economic impact (European Commission, 2023b). In general, these systems work in the way that the government regulator sets a cap on the total amount of emissions that can be released by installations covered by the system. This cap decreases over time to ensure a reduction in overall emissions. Within this cap, companies

receive or buy emission allowances, each representing the right to emit one ton of CO2 or its equivalent. If a company emits less than its allocated allowances, it can sell the surplus to another company, creating a market for emission allowances (Wood, 2018).

With the Paris Agreement, signed in 2015, coming into force, emissions trading has gained new significance worldwide with 21 systems in operation in 2018. Apart from the EU ETS, some of the most relevant systems are listed below:

1. California Cap-and-Trade Program: California has its own cap-and-trade program, which covers various sectors, including electricity generation and industrial facilities. While similar in concept to the EU ETS, there are differences in the coverage of sectors and the approach to allocation. California's system includes a price floor and ceiling to prevent extreme price volatility, a feature that is not present in the EU ETS (California Air Resources Board, 2023).

2. Regional Greenhouse Gas Initiative (RGGI): RGGI is a market-based program in the northeastern United States focused on the power sector. It sets a cap on CO2 emissions from power plants and uses auctions to distribute allowances. Unlike the EU ETS, RGGI is limited to the power sector and does not cover other industries (RGGI, 2023).

3. Chinese Emissions Trading Scheme (ETS): China has been developing its national ETS, covering multiple sectors. However, it is still in its early stages, with several pilot programs preceding the national rollout. China's ETS is expected to be the world's largest when fully implemented, potentially influencing global carbon markets (World Resources Institute, 2023).

Since its establishment in 2005, the EU ETS has gone through different phases, where the delineated rules have become stricter over time, to strengthen the system in its role to lead the European countries to meet the demands from the Paris Agreement. The evolutionary phases observed in the EU ETS are listed below (European Commission, 2023b):

- Phase I (2005-2007): The initial phase saw a learning period for the EU ETS. It covered emissions from sectors such as energy production, industry, and aviation. However, the cap was set too high, resulting in an oversupply of allowances and low carbon prices.

- Phase II (2008-2012): The EU ETS was revised for the second phase with a stricter cap and the introduction of auctioning allowances. Sectors were further expanded, and national allocation plans were replaced by EU-wide allocation rules.

- Phase III (2013-2020): This phase aimed to align the EU ETS with the EU's 2020 climate and energy package. The cap became even stricter, and the market stability reserve was introduced to address the oversupply issue.

- Phase IV (2021-2030): The EU ETS has undergone significant changes for the current phase. The cap will decline annually by 2.2%, and more sectors, including aviation, will be covered. There is also an Innovation Fund to support low-carbon technologies.

Nowadays, the EU ETS has gained increased relevance, as the EU has set ambitious climate goals, aiming to achieve climate neutrality by 2050. The evolving nature of the system can

have several implications for the businesses under its scope, including impacts on their credit risk. Some examples are listed below (European Commission, 2023b):

Compliance Costs: Companies under the EU ETS must purchase allowances to cover their emissions. The increasing stringency of the cap and the phasing out of free allowances may lead to higher compliance costs, affecting the financial health of some businesses.

Innovation and Investment: The EU ETS encourages innovation and investment in low-carbon technologies. Companies that fail to adapt and invest in cleaner technologies may face competitive disadvantages and higher credit risk.

Carbon Price Volatility: The carbon market's inherent volatility can pose risks to businesses. Sudden changes in carbon prices may affect operating costs and profitability, impacting creditworthiness.

This last point is well depicted in the graph below (Figure 3), showing the carbon price variations in Europe in the last five years, and demonstrating its rising trend:

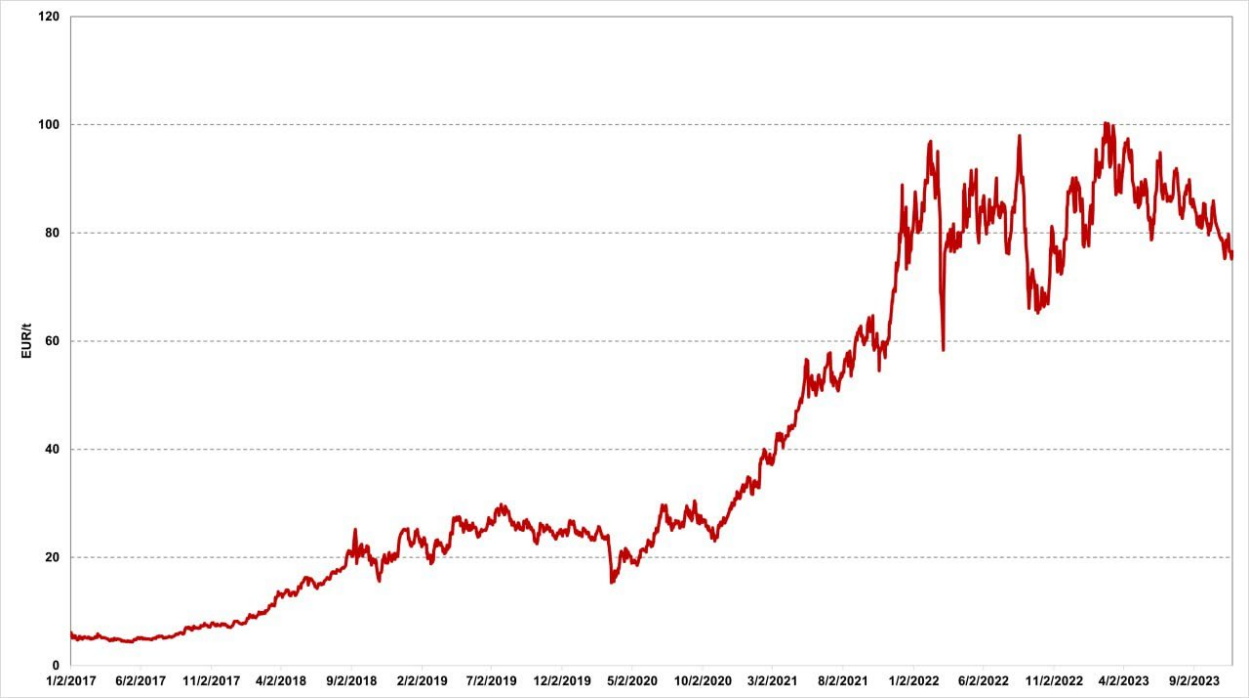


Figure 3. Carbon price volatility over the last 5 years
Source: Self-made, data retrieved from Reuters (2023)

**Carbon Border Adjustment Mechanism - CBAM**

In addition to the EU ETS, the European Union has recently implemented the Carbon Border Adjustment Mechanism (CBAM). The CBAM aims to address the risk of carbon leakage, where companies might relocate their production to regions with laxer emission reduction requirements. The CBAM imposes carbon costs on certain imports based on their embedded carbon content, ensuring that imported goods face a carbon price equivalent to that paid by EU industries (European Commission, 2023a).

The CBAM is highly relevant, and demands detailed attention from companies, as it aligns with the EU's commitment to achieving climate neutrality by 2050. For businesses, especially those in sectors exposed to international competition, the CBAM introduces additional considerations:

Competitive Landscape: Companies exporting to the EU will face additional costs if they do not meet the EU's environmental standards. This may impact the competitive landscape for businesses operating in industries susceptible to carbon leakage.

Supply Chain Adjustments: Businesses may need to adjust their supply chains to comply with the CBAM requirements. This could involve investing in cleaner technologies, securing low-carbon inputs, or assessing alternative markets to mitigate the impact on competitiveness.

Financial Implications: The CBAM introduces a new layer of financial considerations for businesses. Failure to align with EU carbon standards could result in increased costs, affecting profitability and potentially influencing creditworthiness.

**Corporate Sustainability Reporting Directive - CSRD**

In tandem with the dynamic landscape of carbon pricing mechanisms like the EU ETS and CBAM, the Corporate Sustainability Reporting Directive (CSRD) emerges as a pivotal component in shaping the future of ESG practices implementation within the European Union. The CSRD, proposed by the European Commission in April 2021, aims to enhance the consistency and comparability of sustainability information disclosed by companies, further aligning corporate reporting with the EU's sustainability objectives. The timeline of CSRD Implementation was drawn as shown below (Apiday, 2023):

- April 21, 2021: Proposal of the CSRD by the European Commission marks the initiation of a comprehensive framework for sustainability reporting, acknowledging the need for standardized and transparent disclosure of environmental, social, and governance (ESG) information.

- April 2022: The European Financial Reporting Advisory Group (EFRAG) issues its first set of EU sustainability reporting standards (ESRS) for public consultation. This represents a critical step in establishing a common framework for sustainability reporting.

- November 2022: EFRAG approves the final version of ESRS, providing companies with clarity on the standards that will shape their sustainability reporting practices.

- By June 2023: The European Commission was set to adopt the first set of 12 standards applicable to all companies, indicating a pivotal moment in the integration of sustainability reporting into the corporate landscape.

- From January 1st, 2024: Entry into force of the new CSRD reporting requirements for companies already subject to a non-financial reporting obligation under the Non-Financial Reporting Directive (NFRD), impacting large, listed companies with over 500 employees.

- By June 2024: Expectation of sector-specific standards, reflecting a nuanced approach to sustainability reporting that recognizes the diverse nature of industries.

- From January 1, 2025: Reporting requirements expand to all large companies meeting 2 of the following 3 criteria: 250 employees, €40 million in revenues, or €20 million in balance sheet. This broadens the scope of companies obligated to disclose comprehensive sustainability information.

- From January 1, 2026: Reporting requirements extend to listed SMEs (10 to 250 employees), with the option to defer reporting obligations for 3 years using a lighter standard.

- From January 1, 2028: Reporting obligations encompass European subsidiaries of non-European parent companies with a turnover of more than €150 million in Europe, reinforcing the extraterritorial reach of sustainability reporting standards.

In summary, the key aspects of the CSRD include obligatory sustainability information in management reports, mandatory external assurance, the introduction of European Sustainability Reporting Standards (ESRS), and potential exemptions for subsidiaries if included in a comprehensive consolidated report. Additionally, the CSRD requires reports to be digitally tagged to facilitate automated machine reading (PwC Hungary, 2024).

**Sustainable Finance Disclosure Regulation - SFRD**

The Disclosures Regulation, a component of the legislative framework for sustainable finance, establishes standardized transparency requirements for financial market participants and advisers. Its primary goal is to ensure that environmental, social, and governance (ESG) factors are integrally considered in investment decisions and financial advice, and to define the sustainability ambitions for both overall operations and specific financial products. This regulation aims to curtail greenwashing by demanding that claims of sustainability or climate-friendliness in financial products are substantiated in practice (European Parliament and Council, 2019)

The essence of the regulation is not only to mandate disclosures but also to drive financial market participants and advisers towards making strategic decisions aligned with ESG considerations, which must subsequently be disclosed. This introduces greater accountability and efficiency in financial markets, fostering competition within the rapidly evolving sustainable finance segment. It enhances the availability and comparability of sustainability performance-related information for investors and provides valuable data for policymakers, academics, and civil society.

By ensuring access to consistent and reliable information on the sustainability risks and impacts of investments, the regulation supports the financial system’s transition towards sustainability and backs already sustainable businesses.

Key Aspects:

• Sustainability Risks vs. Adverse Impacts: The regulation differentiates between "outside-in" sustainability risks (potential ESG events impacting investment value) and adverse impacts on sustainability factors (negative externalities affecting ESG conditions). It also highlights the potential positive impacts of sustainable investing.

• Transparency Requirements: Financial market participants and advisers are required to publish information on their websites about how they address the negative externalities of their operations and investment decisions on ESG sustainability or justify the absence of such impacts. Additionally, they must disclose how sustainability risks are integrated into their investment decision-making and advice processes and ensure their remuneration policies reflect the integration of sustainability risks.

• Financial Product Transparency: To address the diverse sustainability ambitions of financial products, the regulation specifies distinct transparency requirements for products promoting environmental or social characteristics versus those aiming for a positive environmental and societal impact. These products must be detailed in pre-contractual and periodic documents about how they intend to achieve and have achieved their ESG sustainability goals. Furthermore, all financial products are obliged to outline in pre-contractual documents the integration of sustainability risks and their potential impact on investment returns. Financial market participants recognizing principal adverse impacts on sustainability must disclose if and how their financial products consider these impacts.

**EU Taxonomy**

The European Union has taken a significant step towards fostering sustainable growth and investment within its financial sector through the adoption of a regulation aimed at providing investors with clear criteria to assess the environmental sustainability of economic activities. This initiative amends the existing Regulation (EU) 2019/2088, which focuses on sustainability-related disclosures in the financial sector, enhancing the framework with the introduction of the 'taxonomy' regulation (European Parliament and Council, 2020).

Central to the EU's action plan for sustainable growth, the taxonomy regulation is designed with three key objectives in mind. Firstly, it seeks to redirect capital flows towards sustainable investments, thereby supporting sustainable and inclusive growth across the continent. Secondly, it aims to mitigate the financial risks associated with climate change, environmental degradation, natural disasters, and social issues. Lastly, the regulation endeavors to promote transparency and encourage a long-term outlook in both financial and economic activities.

To determine whether an economic activity is environmentally sustainable, the regulation establishes a set of criteria that must be met. These criteria include making a substantial contribution to at least one of the specified environmental objectives without significantly harming any of them, adhering to the minimum safeguards outlined in the regulation, and complying with technical screening criteria as determined by the European Commission.

The regulation identifies six environmental objectives: mitigation of and adaptation to climate change, sustainable use and protection of water and marine resources, transition to a circular economy, pollution prevention and control, and the protection and restoration of biodiversity

and ecosystems. Economic activities must undergo evaluation against these objectives to qualify as environmentally sustainable.

The implementation of the regulation involves the creation of a list of environmentally sustainable activities, defined by technical screening criteria for each environmental objective. This task is accomplished through delegated acts by the Commission, notable among which are the Climate Delegated Act and the Disclosures Delegated Act, both effective from January 1, 2022. Furthermore, the Complementary Climate Delegated Act, effective from January 2023, expands the taxonomy to include specific nuclear and gas energy activities under strict conditions, aligning with the EU's broader climate and environmental goals.

Since July 12, 2020, the regulation has been applicable, marking a pivotal moment in the EU's efforts to integrate environmental sustainability into its financial system. This regulatory framework not only aims to guide investment towards more sustainable ventures but also sets a precedent for how financial markets can contribute to the global challenge of sustainability.

**Corporate Sustainability Due Diligence Directive - CSDD**

The European Commission's proposed Directive on corporate sustainability due diligence, introduced on February 23, 2022, aims to foster responsible corporate behavior by embedding human rights and environmental considerations into company operations and governance. This initiative primarily impacts corporations by establishing new obligations and enhancing transparency, thereby addressing the adverse impacts of their activities, including those within their value chains, both inside and outside Europe (European Commission, 2022).

The Directive introduces a comprehensive legal framework, creating legal certainty and ensuring a level playing field across the European Union. This harmonization is poised to benefit companies by fostering greater customer trust and enhancing employee commitment through clear and consistent sustainability expectations.

Corporations are required to undertake thorough due diligence processes. These processes involve identifying, addressing, and mitigating negative human rights and environmental impacts stemming from their business operations. This responsibility extends beyond their immediate operations to include their subsidiaries and entire value chains.

Moreover, the Directive mandates that certain large companies align their business strategies with global efforts to limit warming to 1.5 °C, in accordance with the Paris Agreement. This strategic alignment encourages corporations to contribute meaningfully to sustainability and climate change mitigation goals.

An essential aspect of the Directive is its emphasis on transparency. Companies must publicly disclose how they integrate sustainability risks into their decision-making processes and how their remuneration policies reflect the incorporation of sustainability risks. This move towards greater transparency aims to enhance companies' awareness of their environmental and human rights impacts, thereby improving risk management and adaptability.

Financially, the Directive is expected to increase companies' attractiveness to talent, sustainability-oriented investors, and public procurers. It highlights the role of innovation in achieving sustainability goals, potentially leading to better access to finance for companies that actively engage in sustainable practices.

In summary, the proposed Directive signifies a shift towards more sustainable and responsible corporate governance within the European Union, imposing new duties on companies to ensure they actively manage and mitigate their environmental and human rights impacts. This initiative is set to reshape how companies approach their sustainability ambitions, demanding a more integrated and transparent strategy that aligns with broader societal and environmental goals.

**Environmental, social and governance (ESG) ratings: Council and Parliament agreement**

The provisional agreement reached by the Council and the Parliament of the European Union (2024) represents a significant step in regulating the Environmental, Social, and Governance (ESG) ratings sector in Europe. Here is a comprehensive summary of the key points and their importance (Council of the European Union, 2024):

Key Points of the Provisional Agreement:

1. **Authorization and Supervision:** ESG rating providers will need authorization from the European Securities and Markets Authority (ESMA) and will be subject to its supervision.

2. **Transparency Requirements:** Providers must comply with transparency requirements, particularly regarding their rating methodologies and information sources.

3. **Scope Clarification:** The regulation clarifies which ESG ratings fall under its scope and defines operating within the EU.

4. **Marketing Communications:** Financial market participants or advisers disclosing ESG ratings in marketing must also provide methodological details on their websites.

5. **ESG Ratings Definition:** ESG ratings can encompass separate environmental, social, human rights, or governance factors, and if a single rating is given, the weighting of these factors must be explicit.

6. **Non-EU ESG Rating Providers:** Providers outside the EU wishing to operate within it must be endorsed by an EU-authorized provider or meet other specified criteria.

7. **Temporary Registration Regime:** A lighter, temporary, and optional registration regime for small ESG rating providers will be in place for three years.

8. **Organizational and Governance Principles:** Small providers under the lighter regime must adhere to certain principles and transparency, with oversight by ESMA.

9. **Exemptions:** In certain cases, ESMA may exempt an ESG rating provider from some requirements.

10. **Separation of Activities:** Providers must separate their business activities to avoid conflicts of interest, with certain exceptions.

**Importance of These Steps:**

- **Enhanced Credibility:** By establishing authorization and supervisory mechanisms, the EU aims to enhance the credibility and reliability of ESG ratings, which are increasingly influential in investment decisions and the functioning of capital markets.

- **Increased Transparency:** The transparency requirements for methodologies and sources aim to increase investor trust in ESG ratings and sustainable financial products.

- **Operational Clarity:** Defining the scope of ESG ratings and the conditions for operating in the EU market provides clarity for ESG rating providers and users.

- **Consumer Protection:** By ensuring that marketing communications include detailed methodologies, investors are better informed about the products they are considering.

- **Balanced Regulation:** The temporary registration regime for small providers aims to balance the need for oversight with the practicalities faced by smaller entities, allowing them to adapt to the new regulations over time.

- **Conflict of Interest Mitigation:** The measures to separate business activities are intended to prevent potential conflicts of interest, ensuring that ESG ratings are unbiased and independent.

The evolution of the European Union Emissions Trading System (EU ETS), alongside the introduction of the Carbon Border Adjustment Mechanism (CBAM), the implementation of the Corporate Sustainability Reporting Directive (CSRD), and the integration of other crucial regulations mentioned in this section, namely the Sustainable Finance Disclosure Regulation (SFDR), the EU Taxonomy, the Corporate Sustainability Due Diligence Directive (CSDD), and the recent provisional agreement, mentioned above, from the Council and the Parliament of the European Union, collectively demonstrate the EU's profound commitment to addressing climate change and fostering a sustainable future.

The EU ETS, as a pioneering cap-and-trade mechanism, has established a global benchmark for carbon pricing. Its phased approach, along with comparisons to other systems like California's and the Regional Greenhouse Gas Initiative (RGGI), underlines the complex nature of carbon markets, urging businesses to navigate through diverse regulatory landscapes. The integration of the CBAM and the CSRD further complements this framework, emphasizing transparency and accountability in corporate environmental reporting.

The extension into regulations like the SFDR, the EU Taxonomy, and the CSDD enriches this landscape by setting standards for sustainable investment, operational transparency, and corporate responsibility towards environmental and social issues. These regulations require businesses and financial institutions to disclose their sustainable practices and assess their impact on sustainability, thereby influencing investment decisions and corporate strategies towards a greener economy.

Moreover, the provisional agreement on regulating ESG ratings aims to enhance the reliability and transparency of ESG assessment, a critical element for investors and stakeholders in

understanding and managing sustainability-related risks and opportunities. This move is expected to standardize ESG rating practices across the EU, further integrating sustainability into the financial sector's core.

These mechanisms and regulations extend their relevance beyond environmental goals, directly impacting the financial sector. The costs of compliance with emissions trading, alongside the financial implications of the CBAM and adherence to the CSRD, SFDR, EU Taxonomy, and CSDD, introduce new dimensions to credit risk for businesses. As carbon pricing and sustainability criteria become integral to global business operations, financial institutions are tasked with reassessing the creditworthiness of companies in light of their environmental sustainability and adaptation strategies.

The competitive landscape is thus rapidly evolving, compelling businesses to incorporate carbon pricing and environmental standards into their strategic planning. Companies that proactively invest in low-carbon technologies and adapt their operations to meet stringent requirements not only enhance their long-term competitiveness but also align with the EU's vision for a sustainable future. Conversely, businesses lagging in these efforts may face increased costs and scrutiny, affecting their profitability and creditworthiness.

In conclusion, the interconnectedness of the EU ETS, CBAM, CSRD, SFDR, EU Taxonomy, CSDD, and the forthcoming ESG rating regulations with the financial sector is unmistakable. As these frameworks collectively shape the regulatory and business landscapes, they underscore the critical role of financial institutions in evaluating and managing credit risks associated with environmental sustainability. This integration of environmental considerations into financial risk assessments signifies a shift towards sustainable finance, recognizing climate-related risks as essential to prudent financial decision-making.

## 2.5. THEORETICAL BACKGROUND OF ESG RATING METHODOLOGY

In the ESG Rating Industry, numerous market leaders employ varied methodologies. This study will primarily focus on Bloomberg ESG Scores, providing an in-depth analysis of this approach. Additionally, other prominent ESG Rating methodologies will be evaluated within this section.

### 2.5.1. MSCI METHODOLOGY OF ESG RATING

The MSCI ESG Ratings are designed to objectively evaluate a company's management of financially relevant environmental, social, and governance (ESG) risks and opportunities. The ratings aim to provide an opinion on how well a company is positioned to manage these ESG risks and capitalize on opportunities, relative to its industry peers. Here's a detailed summary of the objective, key features, pillars, key issues, and the rating and scoring system (MSCI, 2024a):

**Objective**

- The primary objective is to assess companies' management of potential ESG risks and opportunities.
- The rating considers the company's exposure to ESG risks, the effectiveness of management systems and governance structures in mitigating these risks, and the

company's potential to provide products or services with positive environmental or social impacts.

**Key Features**

- **Industry-Relative Measures**: Ratings are determined at the company level, relative to industry peers.
- **Global Scale Ratings**: Ratings range from AAA (highest) to CCC (lowest) on a seven-band scale.
- **Focus on Key Issues**: Each company is evaluated on two to seven Environmental and Social Key Issues out of a total of 33, based on their relevance and the company's exposure to material ESG risks.
- **Governance Evaluation**: All companies are assessed on the Governance Pillar, focusing on six Key Issues under Corporate Governance and Corporate Behavior themes.
- **Consideration of Positive Contributions**: The rating includes an evaluation of a company's potential for positive environmental or social contributions.

**Pillars and Key Issues**

- **Environmental Pillar**: Includes Climate Change, Carbon Emissions, Natural Capital, Pollution & Waste, and Environmental Opportunities.
- **Social Pillar**: Encompasses Human Capital, Labor Management, Product Liability, Stakeholder Opposition, Community Relations, and Social Opportunities.
- **Governance Pillar**: Focuses on Corporate Governance (Board, Pay, Ownership & Control, Accounting) and Corporate Behavior (Business Ethics, Tax Transparency).

**Rating and Scores**

- **Final Industry-Adjusted Company Score**: Derived from the Industry-Adjusted Company Score, which is normalized based on the Weighted Average Key Issue Score (WAKIS) relative to the industry peer group.
- **Weighted Average Key Issue Score (WAKIS)**: Calculated based on the average scores of individual Environmental and Social Key Issues and the Governance Pillar Score.
- **Governance Pillar Score**: A 0-10 scale absolute assessment of a company's governance.
- **Key Issue Scores**: For both Environmental and Social Pillars, companies receive a score from 0 to 10 based on their exposure to ESG risks or opportunities and their ability to manage them.

The MSCI ESG Ratings system, with its focus on industry-relative measures and a comprehensive scoring system across multiple ESG key issues, offers a robust framework for understanding how companies manage ESG risks and opportunities relative to their peers. This helps investors make more informed decisions by comparing the ESG performance of companies within the same industry.

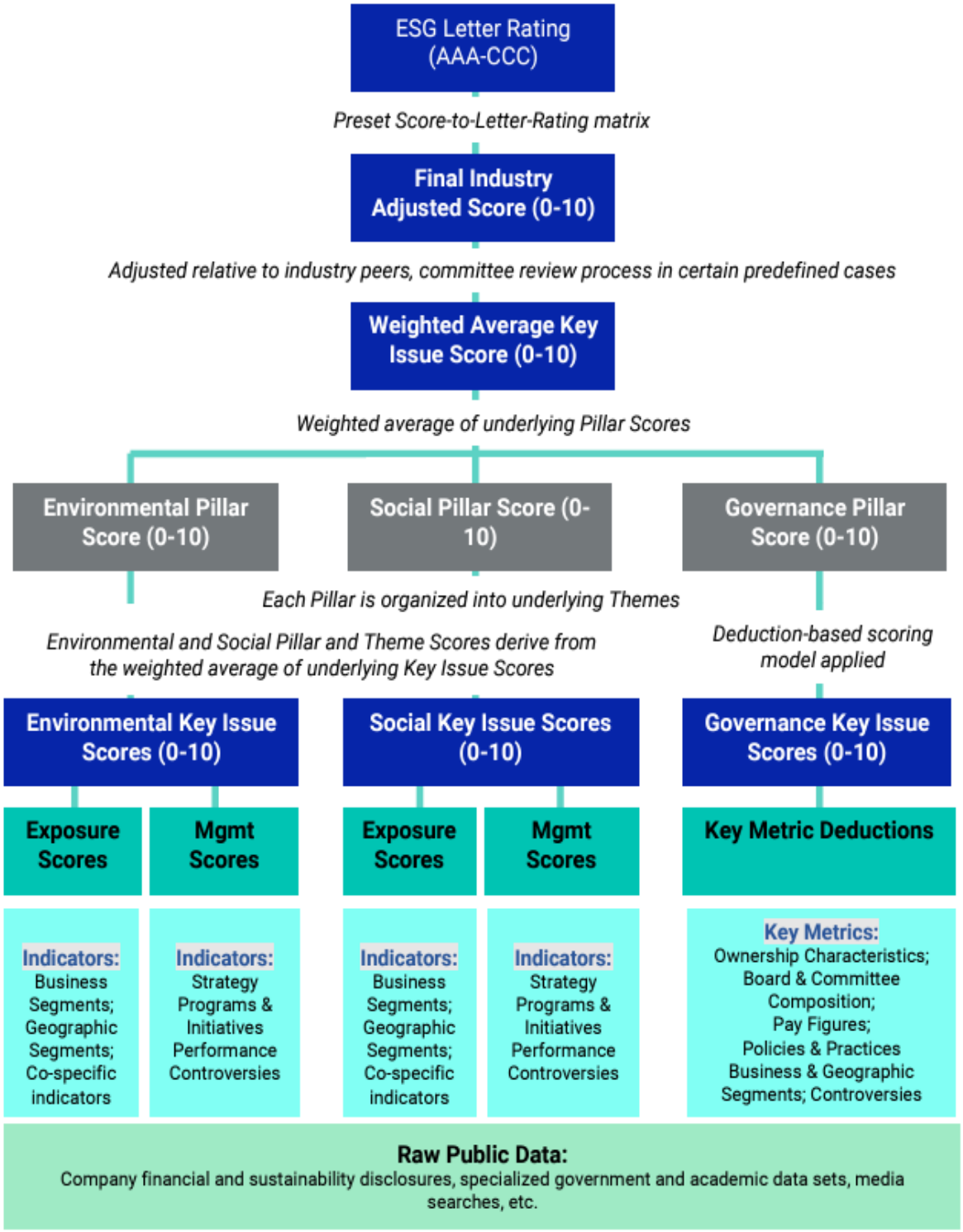


Figure 4. Hierarchy of ESG Scores
Source: MSCI, 2024a.

Raw Public Data: The foundation of the MSCI ESG Rating is raw public data, which includes company financial and sustainability disclosures, specialized government and academic data sets, and media searches. This information is critical as it provides the factual basis for all subsequent analysis.

Environmental, Social, and Governance (ESG) Key Issue Scores (0-10): For each ESG pillar, there are Key Issue Scores that are based on both exposure and management:

Exposure Scores evaluate a company's exposure to specific ESG risks or opportunities. Management Scores assess the company's ability to manage those risks through programs, initiatives, performance, and any related controversies. The Key Issue Scores are further broken down into indicators for each pillar:

Environmental indicators might include factors specific to business segments, geographic segments, or environmental impact specific to the company's industry.

Social indicators consider business and geographic segments and the company's social impact, like labor practices.

Governance indicators include ownership characteristics, board composition, pay figures, policies & practices, business segments, and controversies related to governance.

Pillar Scores (0-10): Each of the Environmental, Social, and Governance pillars is given a score based on the weighted average of the underlying Key Issue Scores. This suggests that not all issues are weighted equally, and some may have a more significant impact on the pillar score than others.

Weighted Average Key Issue Score (0-10): This is a composite score that takes the weighted average of the underlying Pillar Scores, which are adjusted for industry peer comparison and reviewed by a committee in certain cases.

Final Industry Adjusted Score (0-10): After adjustments and committee reviews, the final score represents the company's ESG performance relative to its industry peers, indicating its risk exposure and management effectiveness.

ESG Letter Rating (AAA-CCC): The final step in the rating process is translating the numerical industry-adjusted score into a letter rating using a preset score-to-letter-rating matrix. This letter rating provides a simplified and standardized indicator of the company's ESG performance. The MSCI ESG Rating system provides a comprehensive and detailed assessment of a company's sustainability practices. By breaking down the rating into specific issues and management strategies, it allows investors to understand where a company stands in terms of its ESG performance, both on an absolute basis and relative to its peers.

One key aspect of this rating system is its emphasis on both exposure to risks and management of those risks, acknowledging that risk alone does not tell the full story without considering a company’s management practices. However, this also means that a company's rating is dependent not only on its performance but also on the quality and transparency of its disclosures. The multi-tiered structure of the MSCI ESG Ratings facilitates a nuanced view of corporate sustainability performance, enabling investors to make more informed decisions based on a range of sustainability metrics.


Figure 5. ESG Ratings Key Issue Framework
Source: MSCI, 2024b.

**Strategic Analysis of ESG Score Components**

The MSCI ESG Score framework provides a comprehensive evaluation of companies' sustainability practices across the Environmental, Social, and Governance pillars. By strategically analyzing the chart, we can uncover critical insights and areas for improvement that can guide corporate strategies and investor decisions.

Environmental Pillar: Strategic Implications

Climate Change and Carbon Emissions: The emphasis on climate change and carbon emissions underscores the urgency for companies to adopt carbon reduction strategies. Firms with high carbon footprints must prioritize transitioning to renewable energy and enhancing energy efficiency. Investors should seek out companies that demonstrate a proactive approach to climate change, as regulatory pressures and market expectations are likely to increase.

Natural Capital and Biodiversity: The inclusion of natural capital and biodiversity highlights the need for sustainable resource management. Companies involved in high-risk sectors such as agriculture and mining should develop comprehensive biodiversity action plans to mitigate environmental impact. Strategic investments in technologies that enhance resource efficiency can offer competitive advantages and reduce long-term environmental liabilities.

Pollution & Waste Management: Companies are increasingly held accountable for their pollution and waste management practices. Effective strategies in this area not only improve regulatory compliance but also enhance corporate reputation. Firms that innovate in waste reduction and pollution control can achieve cost savings and attract environmentally conscious consumers and investors.

Social Pillar: Strategic Implications

Human Capital and Labor Management: The focus on human capital and labor management highlights the strategic importance of workforce well-being and development. Companies that invest in employee training, health, and safety are likely to see improvements in productivity and retention. Furthermore, strong labor practices can enhance a company’s brand and attractiveness as an employer, which is crucial in a competitive labor market.

Product Liability and Consumer Protection: Product liability and consumer protection are critical for maintaining consumer trust and avoiding costly legal issues. Companies should integrate robust quality control and consumer protection measures into their product development processes. Ensuring transparency and responsiveness in addressing consumer concerns can differentiate a company in markets where consumers are increasingly valuing ethical business practices.

Stakeholder Engagement and Community Relations: Effective stakeholder engagement and positive community relations are vital for securing social license to operate. Companies should engage in meaningful dialogue with local communities and stakeholders to address concerns and foster goodwill. Strategic community investment and corporate social responsibility initiatives can enhance brand loyalty and mitigate risks associated with social opposition.

Governance Pillar: Strategic Implications

Corporate Governance and Board Structure: Strong corporate governance practices are essential for ensuring accountability and strategic direction. Companies should ensure that their boards are diverse and independent, with the necessary expertise to oversee complex sustainability issues. Transparent and equitable executive compensation structures can also enhance stakeholder trust and align management incentives with long-term performance.

Corporate Behavior and Business Ethics: Business ethics and corporate behavior are foundational to maintaining investor confidence and regulatory compliance. Companies should establish and enforce rigorous ethical standards and anti-corruption policies. By fostering a culture of integrity and accountability, firms can reduce risks associated with unethical practices and enhance their long-term viability.

Tax Transparency: Tax transparency is increasingly scrutinized by regulators and the public. Companies that adopt transparent tax practices can avoid reputational damage and potential regulatory penalties. Strategic tax planning should balance legal tax efficiency with ethical considerations, ensuring that tax strategies do not undermine corporate sustainability commitments.

2.5.2. Sustainalytics' METHODOLOGY OF ESG RATING

Sustainalytics' ESG Risk Ratings are designed to measure the degree to which a company's economic value is affected by ESG factors. These ratings provide an in-depth analysis of how well a company is managing its ESG risks and leveraging ESG opportunities. Here is a detailed summary of the objective, key features, pillars, key issues, and the rating and scoring system of Sustainalytics' ESG Risk Ratings (Sustainalytics, 2024):

**Objective**

- The primary objective is to quantify the magnitude of a company’s unmanaged ESG risks.
- It aims to highlight how these unmanaged risks can impact the company’s financial profile and investment potential.
- The underlying premise is that the world is transitioning to a more sustainable economy, and effective ESG risk management is linked to superior long-term enterprise value.

**Key Features**

- **Quantitative Score and Risk Category**: The ratings comprise a quantitative score representing units of unmanaged ESG risk, with lower scores indicating less unmanaged risk.
- **Open-Ended Risk Scale**: The scale starts at zero (no risk) and typically maxes out below 50 for 95% of cases.
- **Five Risk Categories**: Companies are classified into one of five risk categories - negligible, low, medium, high, severe - based on their quantitative scores.
- **Absolute Risk Assessment**: The risk categories provide a comparable degree of unmanaged ESG risk across all subindustries.

- **Single Currency for ESG Risk**: The ratings offer a unified approach to understanding ESG risk across different industries.

**Pillars and Key Issues**

- **Corporate Governance**: This is a foundational element across all industries, addressing how poor governance can pose material risks. Governance risk typically contributes around 20% to a company's overall unmanaged risk score.
- **Material ESG Issues**: These are central to the ratings and include various topics like Human Capital, Occupational Health and Safety, which require specific management initiatives.
- **Idiosyncratic Issues**: These issues are unpredictable and unrelated to a company's specific subindustry. They become material if they pass a certain significant threshold (Category 4 or 5 events).

**Rating and Scores**

- **Three-Stage Scoring System**: The scoring process includes determining exposure, assessing management effectiveness, and calculating unmanaged risk.
- **Final ESG Risk Ratings Score**: This is the sum of individual material ESG issues' unmanaged risk scores, representing the overall unmanaged risk of a company.
- **E/S/G Cluster Scores**: Additional information is provided through E/S/G cluster scores, which are linear combinations of scores at the material ESG issue level. These scores offer insights into the environmental, social, or governance character of the risks.

The ESG Risk Ratings by Sustainalytics present a comprehensive framework for understanding and comparing the ESG performance of companies across different industries. This framework emphasizes the importance of effective ESG risk management in the context of a global shift towards a more sustainable economy. The ratings serve as a valuable tool for investors to assess the ESG risk profile of companies and make informed investment decisions based on a standardized measure of unmanaged ESG risk.

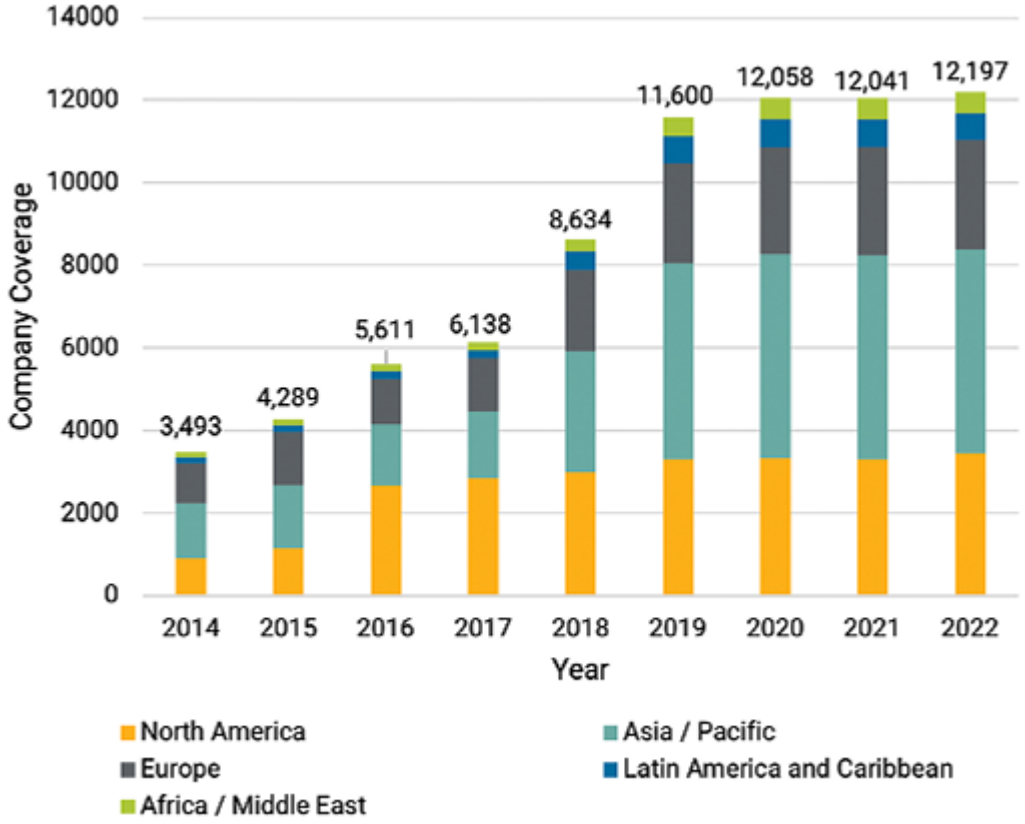


Figure 6. Number of Companies with ESG Risk Ratings Score Across Regions
Source: Sustainalytics, 2024.

From the data, there is a clear upward trend in the number of companies being evaluated for ESG performance across all regions. This increase reflects a growing global emphasis on sustainable practices and the importance of ESG factors in investment decisions. The chart indicates that company coverage has expanded significantly, particularly in Europe and North America, suggesting a heightened focus on sustainability in these markets.

The steady rise in company evaluations also suggests an increasing demand for ESG ratings, as investors seek to understand and mitigate the long-term risks associated with environmental, social, and governance issues. The expansion of coverage over the years shows the evolving landscape of ESG investing and the critical role of comprehensive ESG assessments in promoting sustainable business practices worldwide.

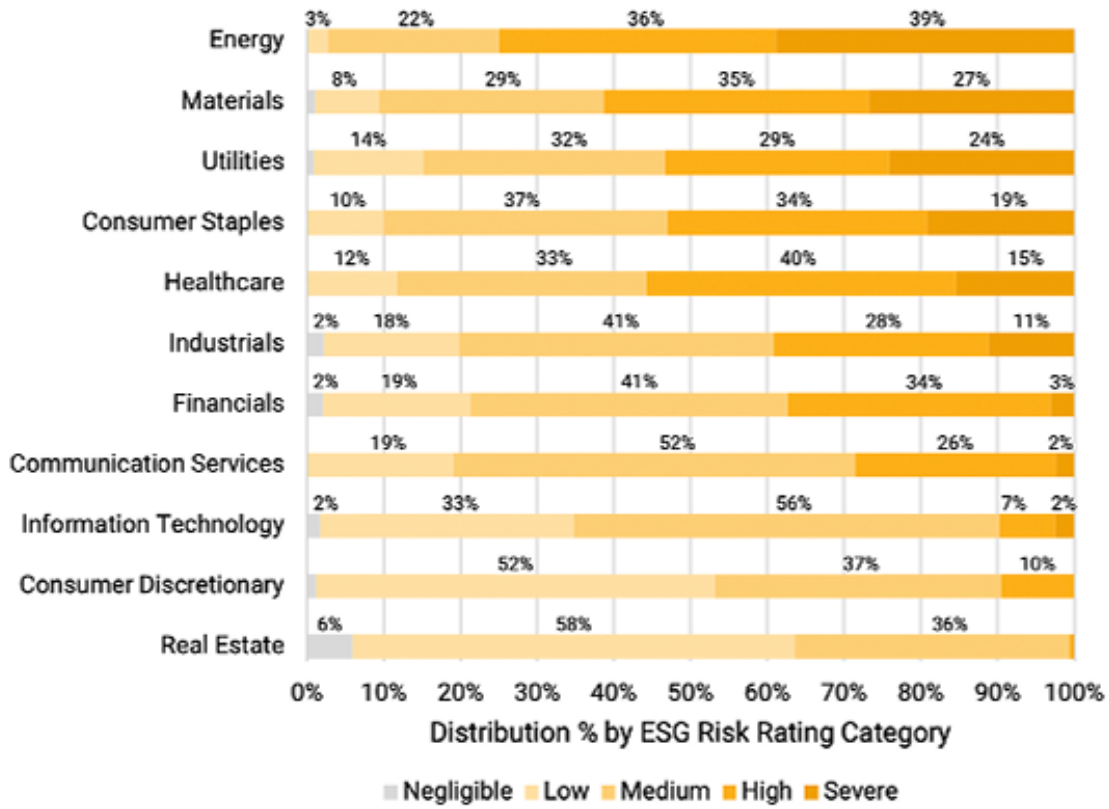


Figure 7. Distribution of ESG Risk Categories across Sectors
Source: Sustainalytics, 2024.

The industries are listed on the y-axis, and the x-axis likely shows the percentage distribution of ESG risk rating categories—ranging from 'Negligible' to 'Severe'—for each industry.

Industries typically associated with high environmental impact, like Energy, Materials, and Utilities, might be expected to have a larger portion of companies rated as 'High' or 'Severe' risk due to factors such as carbon emissions, resource extraction, and waste production.

Conversely, sectors like Information Technology and Financials might exhibit a larger distribution in the 'Low' to 'Medium' risk categories, as their direct environmental impact is typically less pronounced. However, governance issues, such as data privacy for IT and ethical lending for Financials, can also affect their ESG risk ratings.

Consumer-focused sectors like Consumer Staples and Consumer Discretionary could have varied risk profiles depending on a range of factors from supply chain management to labor practices.

Healthcare, a sector crucial for social well-being, might face risks related to access to medicines, pricing strategies, and ethical research practices, affecting its ESG risk rating.

Real Estate's ESG risks might revolve around sustainable building practices and the impact of developments on communities and the environment.

The distribution percentages provide insights into how widespread certain ESG risks are within each industry and can guide investors and stakeholders in understanding the ESG performance landscape. This information can be pivotal for making informed decisions aligned with sustainability goals.

### 2.5.3. BLOOMBERG METHODOLOGY OF ESG RATING

Bloomberg gathers corporate details that are consistent with the most significant sustainability matters, especially concerning corporate strategy, operations, and priorities. This data is then converted into a valuable resource for making investment choices and various analyses. The methodology approach is split between ES (Environmental and Social) Scores and Governance Scores, and it will be described below, according to the company's own published material called Methodology and Field Information (Bloomberg, 2020 and 2022).

In the realm of Environmental and Social Scores (ES Scores), Bloomberg employs a methodology predicated on the procurement of ESG information from voluntary disclosures, exclusively sourced from primary entities. This approach is meticulously designed to ensure the veracity and fidelity of the data, aligning it closely with the original corporate datasets. Primary sources for this information encompass a variety of corporate communications, including sustainability reports, annual reports, proxy statements, data on corporate governance, additional disclosures, and the official digital presence of the corporations.

Furthermore, Bloomberg undertakes the derivation of certain data fields from the company's self-disclosed information, with the objective of enhancing comparability and standardization across the board. The data pertinent to the ES Scores, which encapsulates environmental and social dimensions, undergoes an annual refreshment cycle, timed to coincide with the conclusion of the fiscal year.

In the construction of the ES Scores, Bloomberg's methodology does not inherently assign weightings to the various Issues. To address this, Bloomberg has instituted a tripartite evaluative framework to ascertain the priorities of these Issues:

1. **Probability Assessment**: Each Issue is assigned a ranking of high, medium, or low, indicative of the likelihood of the Issue, whether it be a cost or an opportunity, coming to fruition.
2. **Magnitude Evaluation**: The potential financial impact of each Issue, whether it be a cost or an opportunity, is assessed and categorized as high, medium, or low in terms of its extent.
3. **Temporal Classification**: The Issues are segmented based on the anticipated timeline of their financial consequences - short-term (within 2 years), medium-term (2-5 years), or long-term (5-10 years). The financial implications for medium and long-term Issues are potentially more susceptible to physical and regulatory transformations.

This comprehensive approach ensures a nuanced and detailed understanding of the environmental and social aspects of corporate performance as per Bloomberg's methodology.

In Bloomberg's Governance (G) Scoring, the methodology takes into account the age of a company to ensure that younger firms aren't unfairly judged against standards more typical of established companies. The scoring is based on a bottom-up approach, using self-reported data

from the companies. This process involves selecting relevant governance fields (like board structure or ethical practices) based on expert insights and then using statistical methods to score them. It also uses parametric methods to compare companies effectively by matching current data with historical trends.

ENVIRONMENTAL Scores

| | |
|---|---|
| Air Quality | GHG Emissions Management |
| Air Emissions | GHG Emissions |
| Air Emissions Policies | GHG Emissions Policies |
| | GHG Regulation |
| Climate Exposure | GHG Target |
| Transition Risk | |
| | Sustainable Product |
| Ecological Impact | Green Product |
| Ecosystem Protection | |
| Environmental Fines | Waste Management |
| Environmental Incidents | Hazardous Waste Generation |
| | Hazardous Waste Recycling |
| Energy Management | Waste Generation |
| Energy Consumption | Waste Recycling |
| Renewable Energy Use | |
| | Water Management |
| Environmental Supply Chain Management | Wastewater |
| Sustainable Sourcing | Water Use |
| | Water Use Policies |

Figure 8. Pillars, Issues and Sub-Issues Bloomberg's Environmental Scores
Source: Self-made, adapted from Bloomberg, 2020

Bloomberg Environmental Scores are primarily focused on above stated and below mentioned factors:

1. **Air and GHG Management**: These include measures like Air Quality, GHG Emissions Management, and Air Emissions Policies, focusing on a company's efforts to manage and reduce air pollution and greenhouse gas emissions.

2. **Climate and Ecological Impact**: Indicators such as Climate Exposure, GHG Regulation, and Ecological Impact assess a company's exposure to climate risks and its impact on ecosystems.

3. **Waste and Energy Management**: This encompasses Waste Management, Energy Consumption, and Renewable Energy Use, evaluating how efficiently a company manages waste and energy resources.

4. **Water Management**: Indicators like Water Use and Wastewater management reflect a company's efficiency and policies in using water resources.

SOCIAL Scores

| | |
|---|---|
| Community Rights & Relations | Occupational Health & Safety Management |
| Community & Human Rights | Fatalities |
| Community Relations | Health & Safety Fines |
| | Health & Safety Policies |
| Ethics & Compliance | Safety Incidents |
| Business Ethics | |
| Competitive Behavior | Operational Risk Management |
| Legal & Regulatory Management | Operational Incidents |
| | Operational Preparedness |
| Labor & Employment Practices | |
| Labor Actions | Product Quality Management |
| Organized Labor | Product Quality & Safety |
| Training | |
| | Social Supply Chain Management |
| | Supplier Social Compliance |

Figure 9. Pillars, Issues and Sub-Issues Bloomberg's Social Scores
Source: Self-made, adapted from Bloomberg, 2020

Bloomberg Social Scores are primarily focused on above stated and below mentioned factors:

1. **Community and Human Rights**: This includes Community Rights & Relations and Community Relations, focusing on a company's impact on the communities in which it operates and its commitment to human rights.

2. **Health & Safety Management**: These indicators, like Occupational Health & Safety Management and Safety Incidents, assess a company's policies and performance in ensuring the health and safety of its workforce.

3. **Labor and Employment Practices**: This includes Labor Actions and Organized Labor, which look at a company's labor relations and practices.

4. **Product Quality Management**: Indicators like Product Quality & Safety evaluate a company's commitment to maintaining high standards in its products and services.

GOVERNANCE Scores

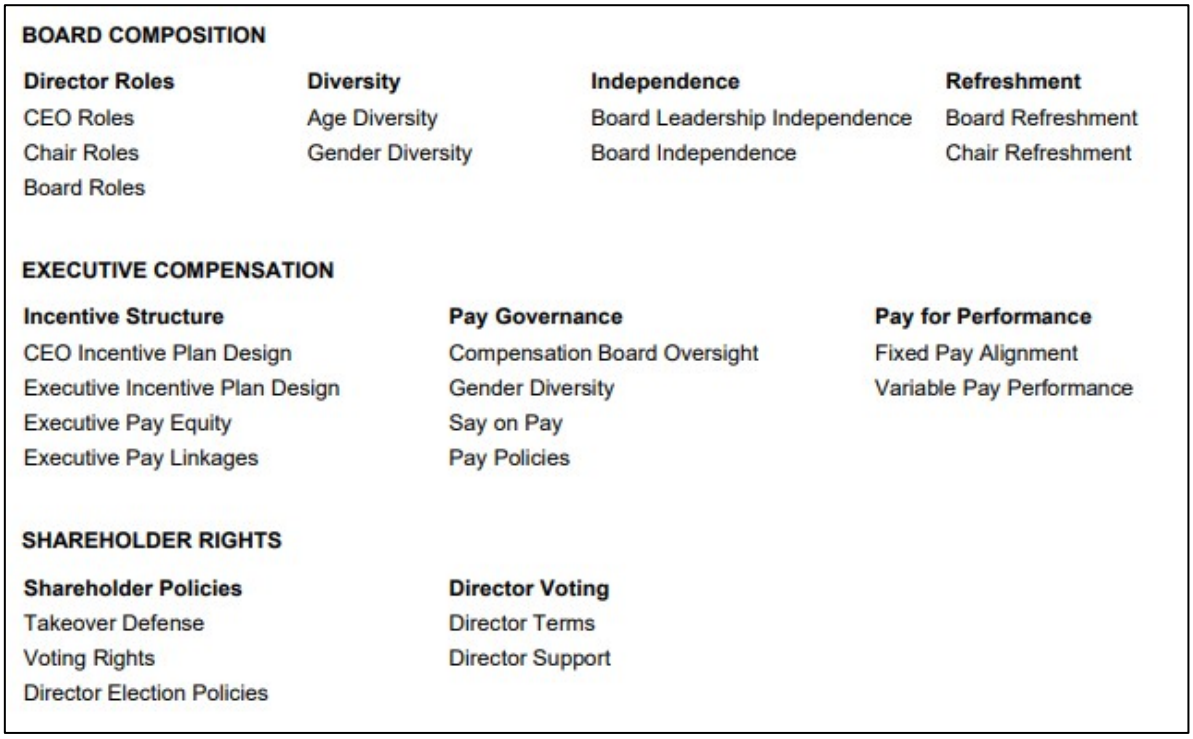


Figure 10. Themes, Issues, and Sub-Issues of Governance scores
Source: Bloomberg, 2022

1. **Board Structure and Diversity**: This category includes indicators such as Board Composition, Diversity, and Independence. It assesses how well a company's board is structured to ensure diverse perspectives and independent decision-making. This includes evaluating the proportion of independent directors, diversity in terms of gender, ethnicity, and experience, and the separation of CEO and chair roles.

2. **Executive Compensation and Alignment**: Indicators in this category, like Pay for Performance and Executive Pay Equity, examine how a company aligns executive compensation with its overall performance and fair pay practices. This includes assessing whether executive incentives are linked to long-term company goals and how executive pay compares within the company and with industry standards.

3. **Shareholder Rights and Engagement**: This involves assessing policies related to Shareholder Rights, Director Voting, and Say on Pay. These indicators evaluate the extent to which a company respects shareholder rights, including voting rights, engagement mechanisms, and the ability of shareholders to influence key governance decisions.

# 3. DEFINITION OF STUDY SAMPLE

This research was centered in the European landscape, due to ESG`s emerging importance in the region, and the study sample used for this assessment was a set of performance metrics of 51 European banks, chosen in accordance with the data availability in the Bloomberg platform. The complete list of banks with a brief introduction of each of them can be found in Appendix B at the end of this thesis.

The variables, or performance metrics, included in the analysis, along with the ESG Scores for each bank, are listed below, as well as their definitions:

**The Risk-Weighted Assets to Total Assets Ratio:** (RWA/TA) serves as a cornerstone in the domain of banking and financial analysis, offering a nuanced perspective on capital adequacy within financial institutions. This ratio, as elucidated by Schmaltz et al. (2014), underscores the importance of adjusting the value of assets held by banks to reflect their associated risk levels, thereby providing a more accurate measure of a bank's capital adequacy in relation to its asset portfolio. The fundamental premise behind the RWA/TA ratio is to ensure that banks maintain sufficient capital buffers to absorb potential losses, thereby safeguarding against solvency crises and enhancing overall financial stability (Bessis, 2015).

Its relevance to this research is corroborated by D'Amato et al. (2021), who sought to evaluate the influence of structural financial data, such as balance sheet and income statement items, on the ESG scores of publicly traded companies. By leveraging Bloomberg ESG scores, the study examines the impact of these structural variables through the application of a machine learning methodology, specifically the Random Forest algorithm. The research utilizes balance sheet data from a sample of companies listed on the Euro Stoxx 600 index over the past decade. The findings indicate that financial statement items are significant predictors of Bloomberg ESG ratings, underscoring the efficacy of financial data in explaining ESG performance. Given that the RWA/TA ratio is a fundamental component of the Basel regulatory framework, which aims to ensure that banks maintain adequate capital to cover potential losses, it was used in this thesis research to seek its impact on banks ESG Scores.

In the intricate landscape of financial risk management, the RWA/TA ratio embodies the principle of risk sensitivity. Different asset classes, such as residential mortgages, commercial loans, and corporate bonds, are assigned varying risk weights based on their probability of default and potential loss severity. This risk-weighting mechanism is pivotal in fostering a disciplined approach to capital allocation and risk-taking, encouraging banks to undertake a more cautious and informed stance towards investments and lending practices (Resti and Sironi, 2007).

Furthermore, the RWA/TA ratio is instrumental in the regulatory framework governing banks, particularly under the Basel Accords. These international regulatory standards advocate for the use of the RWA/TA ratio as a means to ensure that banks' capital reserves are proportionate to the risks they bear. By compelling banks to hold capital commensurate with the risk characteristics of their assets, the Basel guidelines aim to enhance the resilience of the global banking system to financial shocks and adverse economic conditions.

Academically, the RWA/TA ratio is subject to extensive scrutiny and debate, particularly concerning its effectiveness in mitigating systemic risk and its implications for financial market dynamics. Critics argue that the process of risk weighting can be susceptible to manipulation,

potentially leading to underestimation of risk exposure and inadequate capital buffers (Tarullo, 2014). Moreover, the complexity and opacity of risk-weighting models may obscure the true risk profile of banks, complicating regulatory oversight and market discipline (Haldane and Madouros, 2012).

In response to these challenges, there is a growing academic discourse on enhancing the RWA/TA ratio's robustness through more transparent and standardized risk-weighting methodologies, as well as complementing it with other financial stability measures. For instance, the introduction of the leverage ratio and stress testing has been advocated as a means to provide a more holistic assessment of banks' financial health and resilience to shocks (BCBS, 2011).

In conclusion, while the RWA/TA ratio remains a vital tool in assessing and managing banking risks, its academic examination reveals a complex interplay between regulatory objectives, financial stability considerations, and the practicalities of risk measurement, hence being selected as one of the metrics to be used in this thesis.

**The Non-Performing Loans to Total Loans Ratio (NPL/TL):** stands as a critical metric for gauging credit risk within banking institutions. As articulated by Louzis et al. (2012), this ratio elucidates the proportion of a bank's loan portfolio that has defaulted or is nearing default, serving as a pivotal indicator of the health and quality of the bank's lending activities. The essentiality of the NPL/TL ratio in evaluating a bank's credit risk management capabilities cannot be overstated, as it directly reflects the effectiveness of a bank's lending policies and its ability to manage and mitigate risk exposures (Berger and DeYoung, 1997).

An elevated NPL/TL ratio is often a harbinger of increased default risks, which could signify underlying financial instability or deficiencies in a bank's credit assessment and monitoring processes. Such a scenario not only affects the bank's profitability due to impaired asset values and heightened loan loss provisions but also has broader implications for financial stability and economic growth. As Salas and Saurina (2002) emphasize, a high NPL ratio can erode bank capital, restrict lending capacity, and, by extension, hamper economic development.

Furthermore, the NPL/TL ratio is instrumental for regulatory bodies and market participants in performing due diligence and in the formulation of macroprudential policies. It aids in the identification of systemic risks and the implementation of corrective measures to fortify the banking sector against potential crises. The ratio also serves as a benchmark for investors and analysts in assessing a bank's risk profile and operational efficiency, influencing investment decisions and market perceptions of the bank's financial health.

Academic discourse surrounding the NPL/TL ratio extends to its determinants and the effectiveness of strategies employed by banks to manage non-performing loans. Research endeavors have explored various factors contributing to loan performance, including macroeconomic conditions, lending standards, and the role of regulatory oversight in ensuring prudent lending practices (Rajan and Dhal, 2003; Keeton, 1999). Moreover, the impact of non-performing loans on bank liquidity, capital adequacy, and the wider financial system underscores the importance of robust risk management frameworks and proactive supervisory interventions to mitigate credit risk and safeguard financial stability.

In light of these considerations, the NPL/TL ratio emerges not only as a measure of credit risk but also as a catalyst for enhancing transparency, accountability, and resilience within the

banking sector. Ongoing scholarly analysis and regulatory attention to this ratio reflect its significance in maintaining the integrity and stability of financial institutions and markets.

Moreover, in this research, the inclusion of the Non-Performing Loans to Total Loans (NPL/TL) ratio was chosen to build on the findings of Ersoy (2021), who identified NPLs as a key indicator of loan quality influenced by both macroeconomic and bank-specific factors. While his study did not directly assess the impact of NPL/TL on bank value, it supports the relevance of this ratio in evaluating bank performance.

**The Return on Equity (ROE):** is a paramount metric that encapsulates the efficiency with which a banking institution leverages its equity base to accrue profits. As elucidated by Penman (2013), ROE is derived by dividing a bank's net income by its shareholder equity, offering a clear lens through which the effectiveness of a bank's operational and financial strategies can be assessed. This ratio is not merely a measure of profitability; it serves as a barometer of a bank's adeptness in utilizing its equity capital to foster sustainable growth and shareholder value (Brealey et al., 2006).

An elevated ROE is often interpreted as a signal of robust financial health, demonstrating a bank's prowess in generating earnings from its equity investments. However, it's crucial to discern that a higher ROE must be evaluated in conjunction with other financial metrics to ensure that the returns are not being achieved at the expense of excessive risk-taking. Damodaran (2012) highlights the importance of balancing profitability with risk management, as overly aggressive strategies to boost ROE might imperil the bank's solvency and long-term viability.

The strategic implications of ROE extend beyond mere profitability, influencing a bank's policy decisions regarding capital structure, dividend policies, and growth strategies. Banks with higher ROE are better positioned to attract investment, support expansion endeavors, and navigate through economic volatilities with resilience. Conversely, a persistently low ROE may necessitate a reassessment of operational efficiencies, cost structures, and the strategic direction to rectify underperformance and enhance value creation.

The academic and practical discourse surrounding ROE further involves its role in signaling the alignment of management's interests with those of shareholders. A consistent track record of strong ROE performance can foster investor confidence, underpinning the bank's reputation and market valuation. Moreover, in the context of regulatory compliance and capital adequacy standards, maintaining an optimal ROE is integral to fulfilling statutory requirements and ensuring financial stability.

ROE also serves as a critical benchmark in comparative analysis, enabling stakeholders to gauge a bank's performance relative to its peers and industry standards. This comparative insight is invaluable for investors, regulators, and management in identifying best practices, uncovering potential areas of vulnerability, and strategizing for competitive advantage.

In this thesis, the Return on Equity (ROE) was used as a key measure of performance, similar to Buallay (2019), who investigated the impact of ESG disclosures on bank performance using ROE. Buallay's study found a significant positive relationship between overall ESG scores and bank performance. However, the impact of individual ESG components varied: environmental disclosures positively influenced Return on Assets (ROA) and Tobin's Q (TQ), corporate social responsibility disclosures negatively impacted all three models (ROA, ROE, TQ), and

corporate governance disclosures had a negative effect on ROA and ROE but a positive effect on Tobin's Q. These findings highlight the nuanced effects of different ESG components on financial performance, supporting the relevance of using ROE in my analysis.

**The Number of Employees**: within a banking institution serves as a crucial metric, transcending beyond a mere headcount to signify the bank's operational scale and functional breadth. This indicator is reflective of the bank's capacity to manage and execute a comprehensive range of banking services, from intricate risk management frameworks and robust customer service operations to product innovation and market expansion initiatives. The size of a bank's workforce is directly proportional to its ability to diversify services, enhance customer engagement strategies, and maintain a competitive edge in the dynamic banking landscape.

A larger employee base is often indicative of a bank's expansive operational capabilities, suggesting a broad geographical presence and a diversified portfolio of banking services. This extensive manpower enables banks to cater to diverse customer needs, facilitate comprehensive risk assessment and mitigation processes, and effectively manage large-scale financial transactions. Furthermore, a substantial workforce allows for specialization within the bank, with dedicated teams focusing on areas such as investment banking, retail banking, asset management, and digital banking innovations.

Conversely, a smaller workforce might suggest a bank's strategic focus on niche markets or specialized banking services. Such institutions may leverage technology and automation to enhance efficiency and deliver specialized services, focusing on quality over quantity. A leaner operational model can facilitate agility and faster decision-making, enabling these banks to adapt swiftly to market changes and emerging customer needs. However, the scalability of operations and the breadth of services offered may be limited compared to their larger counterparts.

The number of employees also impacts on a bank's organizational culture, employee engagement, and operational efficiency. Banks with a large number of employees face the challenge of maintaining communication, cohesion, and a unified corporate culture across various departments and geographic locations. Conversely, smaller banks might benefit from closer employee interactions and a more cohesive corporate culture, potentially leading to higher employee satisfaction and productivity.

In the context of technological advancements and the digital transformation of the banking sector, the significance of the workforce size is evolving. Banks are increasingly adopting technology-driven solutions, such as artificial intelligence, machine learning, and blockchain, which could alter traditional staffing needs and operational structures. The emphasis shifts towards a workforce that is adept at managing and innovating with these new technologies, highlighting the importance of skills and expertise over sheer numbers.

Moreover, Savio et al. (2023) highlighted that governance practices in larger organizations, necessary for managing a large workforce, are critical for high ESG scores, especially in terms of transparency and ethical management, therefore I wanted to test the logic that bigger the bank, more allocated capital for sustainability and ESG targets.

## 4. METHODS OF DATA COLLECTION AND ANALYSIS

The data collection process for this study took place between 2020 and 2023, focusing on financial and non-financial metrics from banks for the period of 2017 to 2021. Due to the relatively recent emergence of ESG scores, it was not possible to include data from earlier years. Additionally, the lack of data transparency and significant data disruption posed challenges. As of the last review, many banks had not yet published their ESG scores for 2022, and including this incomplete data would have reduced the sample size of banks used in the research. Ensuring a larger sample size was crucial for the robustness of the study.

The performance metrics and ESG scores for the banks chosen for this analysis were sourced from the Bloomberg database. Although selecting global banks could have increased the number of banks included in the study, regional differences in business culture and other factors suggested that focusing on region-specific data would yield more meaningful insights. This approach aligns with other academic literature, which often prioritizes region-specific data over global data to maintain consistency and relevance within the studied context.

Python programming language, which is an open-source software, was used for the statistical analysis of this thesis.

A panel regression analysis was implemented to assess whether different ESG scores, set as the dependent variable, are correlated with banks performance metrics, which are the independent variables or predictors. Before implementing the model, all data was log-transformed to reduce data related issues, which also means that the results interpretation is in percentage terms. Furthermore, several indicators have been removed due to strong correlation.

Initially, random and fixed effect panel regression models were employed to the dataset, with the aim of doing a preliminary testing of it and to obtain the initial results to be used as base in the further steps for the adjustments of the model.

The Breusch-Pagan, White and The Durbin-Watson tests were performed to the dataset to check whether the model outcome would be disrupted due to the violation of any regression model assumption rules.

Considering that heteroskedasticity and positive autocorrelation were indicated in the dataset, the Clustered Standard Errors model, which will be defined in the upcoming chapter, was employed to treat both problems.

A secondary issue that needed to be addressed was to determine the most appropriate model to apply random or fixed effect panel regression model. To answer that question scientifically, the Hausman Test was employed, and results showed that the Random effect model would be preferred for the considered dataset.

Finally, the Random Effect panel regression model, modified with Clustered Standard Errors method, was used to treat the different problems within the dataset, and four different panel regression models were generated: three of them using separate E, S and G scores, respectively, as dependent variables, to assess which one contributed the most to the results; and a fourth model, where the combined ESG scores were used as dependent variables to define the final results.

In the following paragraphs, the description and theoretical background of the performed statistical analysis will be addressed.

## 4.1. REGRESSION ANALYSIS

Regression analysis involves a range of statistical methods for understanding the connections between a dependent variable (often labeled as x), also known as the outcome or response variable, and one or more independent variables (commonly referred to as y), which are also called predictors or explanatory variables. These regression techniques are crucial for determining the strength of the links between variables and for predicting how these relationships might develop in the future (Taylor, 2024).

The Linear Regression Model, which establishes a linear relationship between independent (explanatory) variables and dependent (parameter) variables, is one of the most established and extensively researched subjects in statistics. It is also the most commonly applied form of regression in various fields. For instance, linear regression can be used to explore how a specific health condition, like blood pressure, is influenced by several clinical factors such as cholesterol level, age, diet, among others. Despite their simplicity and ease of mathematical handling, linear models often offer a satisfactory and interpretable approximation of the relationship between these two types of variables (Angelini, 2019).

Linear regression analysis is based on six fundamental assumptions (Taylor, 2024):

-The dependent and independent variables show a linear relationship between the slope and the intercept.
-The independent variable is not random.
-The value of the residual (error) is zero.
-The value of the residual (error) is constant across all observations.
-The value of the residual (error) is not correlated across all observations. -
The residual (error) values follow the normal distribution.

Apart from that, linear regression can also be divided in different types (Taylor, 2024):

-Simple Linear Regression

Simple linear regression is a model that assesses the relationship between a dependent variable and an independent variable. Some examples of statistical relationships where a simple linear regression analysis can be used might include:

-Height and weight — as height increases, you'd expect weight to increase, but not perfectly. -
Alcohol consumed and blood alcohol content — as alcohol consumption increases, you'd expect one's blood alcohol content to increase, but not perfectly.
-Vital lung capacity and pack-years of smoking — as the amount of smoking increases (as quantified by the number of pack-years of smoking), you'd expect lung function (as quantified by vital lung capacity) to decrease, but not perfectly.
-Driving speed and gas mileage — as driving speed increases, you'd expect gas mileage to decrease, but not perfectly.

The simple linear model is expressed using the following equation:

$$Y = a + bX + \epsilon \quad (1)$$

Where:

Y – Dependent variable
X – Independent (explanatory) variable
a – Intercept
b – Slope
$\epsilon$ – Residual (error)

-Multiple Linear Regression

Multiple linear regression analysis is essentially similar to the simple linear model, with the exception that multiple independent variables are used in the model. The mathematical representation of multiple linear regression is:

$$Y = a + bX1 + cX2 + dX3 + \epsilon \quad (2)$$

Where:

Y – Dependent variable
X1, X2, X3 – Independent (explanatory) variables
a – Intercept
b, c, d – Slopes
$\epsilon$ – Residual (error)

Multiple linear regression follows the same conditions as the simple linear model. However, since there are several independent variables in multiple linear analysis, there is another mandatory condition for the model:

Non-collinearity: Independent variables should show a minimum correlation with each other. If the independent variables are highly correlated with each other, it will be difficult to assess the true relationships between the dependent and independent variables.

Another type of regression analysis worth mentioning is logistic regression, which can be defined as a process of modeling the probability of a discrete outcome given an input variable. The most common logistic regression models a binary outcome; something that can take two values such as true/false, yes/no, and so on. Multinomial logistic regression can model scenarios where there are more than two possible discrete outcomes. Logistic regression is a useful analysis method for classification problems, where you are trying to determine if a new sample fits best into a category (Edgar and Manz, 2017).

### 4.1.2. PANEL DATA ANALYSIS

Panel data (also known as longitudinal or cross-sectional time-series data) is a dataset in which the behavior of entities is observed across time (Reyna, 2007). These entities could be states, companies (e.g. banks, as in this study), individuals, countries etc., as shown in Figure 11.

| | | | Performance Metrics | | |
|---|---|---|---|---|---|
| Bank | Year | Y (ESG) | X1 | X2 | X3 |
| 1 | 2019 | 35 | 4.0 | 5.8 | 1.2 |
| 1 | 2020 | 32 | 2.6 | 7.9 | 7.7 |
| 1 | 2021 | 40 | 3.5 | 5.4 | 1.2 |
| 2 | 2019 | 25 | 6.1 | 6.7 | 4.3 |
| 2 | 2020 | 31 | 3.4 | 6.6 | 4.9 |
| 2 | 2021 | 35 | 6.8 | 0.4 | 7.1 |
| 3 | 2019 | 10 | 5.0 | 2.6 | 6.3 |
| 3 | 2020 | 18 | 5.5 | 3.2 | 6.4 |
| 3 | 2021 | 25 | 6.0 | 6.8 | 2.1 |

Figure 11. Example of a Panel data set
Source: Self-made, 2025

Panel data allows to control for variables you cannot observe or measure like cultural factors or differences in business practices across companies; or variables that change over time but not across entities (i.e.: national policies, federal regulations, international agreements, etc.). This is, it accounts for individual heterogeneity. With panel data you can include variables at different levels of analysis (i.e.: students, schools, districts, states) suitable for multilevel or hierarchical modeling.

Some drawbacks are data collection issues (i.e.: sampling design, coverage), non-response in the case of micro panels or cross-country dependency in the case of macro panels (i.e.: correlation between countries) (Reyna, 2007).

Panel regression, a cornerstone technique in econometric and social science research, stands as a critical method for analyzing data encompassing both temporal and entity-specific dimensions. This approach, alternatively termed longitudinal or cross-sectional time-series analysis, excels in its ability to examine multi-dimensional datasets, thereby enabling insights that are not achievable through either purely cross-sectional or time-series methods alone. Notably, panel regression is instrumental in addressing individual heterogeneity, a factor often overlooked in more traditional analytical approaches. The methodology primarily revolves around two core model types: Fixed Effects (FE) and Random Effects (RE).

The FE model, detailed by Baltagi (2005), posits that entity-specific traits, which affect the dependent variable, remain constant over time and are correlated with independent variables. In contrast, the RE model, as conceptualized in this domain, views such traits as random and uncorrelated with the independent variables.

In practical realms, the application of panel regression is widespread. Economists utilize this method for assessing the impact of policy changes over time across various countries, focusing on aspects like fiscal policy's influence on economic growth (Wooldridge, 2010). Sociologists apply panel regression to examine long-term social changes and their effects on individual behavior, such as the evolution of gender roles in response to societal shifts (Hsiao, 2003). Furthermore, in public health, panel regression models are crucial for evaluating the effectiveness of health policies on patient outcomes, incorporating both individual characteristics and the temporal effects of policies (Fitzmaurice et al., 2011).

However, the methodology is not without challenges. A significant issue is the potential for omitted variable bias and endogeneity, which can lead to biased and inconsistent estimates. This necessitates a careful selection between the FE and RE models, often guided by the data's nature and the research question. The Hausman test, introduced by Hausman (1978), is a commonly employed statistical tool in this decision-making process.

Future advancements in panel data analysis include the development of dynamic panel regression models, which incorporate lagged dependent variables as regressors (Arellano and Bond, 1991). Additionally, the integration of machine learning techniques in this field is notable, as it enables more sophisticated handling of large datasets and complex variable interactions (Breiman, 2001).

In summary, panel regression is a fundamental tool in statistical analysis, especially suited for longitudinal studies across various disciplines. Its capacity to handle data variability over time and across entities secures its ongoing relevance and evolution. The burgeoning availability of data and advancements in computational methods suggest a promising future for panel regression, offering increasingly sophisticated tools for researchers.

In the sphere of panel regression analysis, the FE and RE models, as extensively explored by Wooldridge (2010) and Baltagi (2005), are prominent for their adept handling of data that spans both time and entities. The FE model, particularly useful in scenarios requiring the analysis of time-varying variables within entities, operates on the premise that each entity has intrinsic, unchanging characteristics that may influence the outcome variables (Greene, 2003). This approach effectively controls time-invariant differences and is key in addressing omitted variable bias in longitudinal data analysis. However, as Wooldridge (2010) points out, its limitation lies in its inability to evaluate the impact of time-invariant factors due to their elimination in the model's differencing process.

On the other hand, the RE model, which considers individual-specific effects as part of the error term and assumes these effects to be randomly distributed and uncorrelated with explanatory variables (Cameron and Trivedi, 2005), offers a broader analytical perspective. Its ability to include time-invariant variables, contingent on the assumption of non-correlation, introduces flexibility but also potential bias, which is a concern in empirical research. The choice between FE and RE models often relies on the Hausman test (Hausman, 1978), a diagnostic tool for assessing the correlation between individual effects and regressors, thereby guiding researchers to the most appropriate model for their data.

Recent developments in panel regression, such as those discussed by Arellano and Bover (1995) and Pesaran and Smith (1995), extend the capabilities of traditional models to include dynamic elements and address structural changes within panel data. Furthermore, the integration of machine learning in panel data analysis, as explored by Belloni and Chernozhukov (2013), represents a significant evolution, offering sophisticated methods for handling high-dimensional data. This fusion of conventional econometric methodologies with advanced computational techniques exemplifies the dynamic and continually evolving nature of panel regression analysis.

Interpreting results in panel regression is a critical skill in econometrics and applied statistics, requiring a deep understanding of the output from statistical software and its translation into academic inferences. This interpretation process, as elucidated by Wooldridge (2010) and Baltagi (2005), necessitates a structured approach, particularly when dealing with FE and RE models. The coefficients in panel regression are interpreted as the average effect over time and across entities, representing the relationship between each independent variable and the dependent variable. These coefficients, depending on whether the FE or RE model is used, carry distinct implications. The FE model focuses on within-entity variation and excludes time-invariant variables, while the RE model encompasses both within-entity and between-entity variations, including the effects of time-varying and time-invariant variables.

The significance levels in regression outputs, often indicated by stars or p-values, are crucial in determining the statistical significance of the relationships between independent and dependent variables. A lower p-value, typically below 0.05, suggests a statistically significant relationship, as noted by Wooldridge (2010). However, caution is advised in interpreting the R-squared value, especially in FE models, where within-entity variation is a key factor (Baltagi, 2005).

In the FE model, coefficients reflect the impact of variables that change over time within the same entity, controlling for all time-invariant characteristics of the entities. Thus, these effects are not reported in the output. In the RE model, the analysis includes both time-varying and time-invariant variables, providing a more comprehensive scope. The variance components in the output of RE models give insights into the degree of heterogeneity across entities.

Contextualizing coefficients is essential for interpreting results. For example, in economic research, a coefficient on a policy variable can indicate the average effect of that policy over time and across entities. When comparing FE and RE models, the Hausman test (Hausman, 1978) is a critical tool to determine which model is more appropriate, based on the independence of effects and predictors.

Robustness checks, such as incorporating additional variables, varying model specifications, or applying alternative estimation techniques, are essential to validate the stability of the results. Researchers must also recognize the limitations of their interpretations, addressing potential concerns like omitted variable bias, measurement errors, or causality issues.

In summary, panel regression is a statistical method used to analyze data involving multiple entities over time, offering a blend of cross-sectional and time-series data. Its primary advantage lies in increasing the number of observations, thus enhancing the degrees of freedom and efficiency of estimates. Additionally, it controls individual heterogeneity by accounting for variables that differ across entities but remain constant over time, which helps reduce omitted variable bias. This method is particularly effective for examining dynamic changes, capturing lagged effects and long-term trends.

However, panel regression is complex, requiring sophisticated data handling techniques and careful management of missing data. There is also a risk of bias if the model is not correctly specified. When choosing between random effects (RE) and fixed effects (FE) models, the Hausman Test is commonly employed. The RE model is more efficient if the entity-specific error term is not correlated with the predictors, using both within and between entity variations. In contrast, the FE model is preferred when this correlation exists, controlling for all time-invariant differences between entities. To determine the appropriate model, the Hausman Test compares the coefficients of the RE and FE models: if the coefficients differ significantly, the FE model is preferred. Additionally, the Breusch-Pagan Lagrange Multiplier Test can help decide between a random effects model and a simple OLS regression.

The initial phase of this research entailed significant challenges in sourcing and restructuring data into a panel format. Equally difficult was the execution of diagnostic tests to validate the results, necessitating extensive time and experimental efforts to gain a comprehensive understanding. Nevertheless, the development of a clear comprehension of the procedural guidelines, coupled with an understanding of the implications of each result for subsequent analytical steps, facilitated a more streamlined process. By adhering to a systematic approach, grounded in established methodologies, the workflow was effectively transformed into an organized flowchart, thereby enabling a smooth completion of the testing phase.

**Primary issues in Regression Analysis**

Data Standardization in Panel Regression Analysis: In the process of panel regression analysis, handling unstructured data poses significant challenges. For instance, in my dissertation, I evaluate metrics such as the number of employees and the ratio of risk-weighted assets to total assets. To ensure the statistical robustness of the findings, it's crucial to preprocess the data. To this end, I employed the Log10 transformation technique, as outlined below, to standardize the data for analysis.

Log10 Transformation

The log10 transformation is a valuable statistical tool that addresses several challenges in data analysis, enhancing the suitability of data for linear regression and other statistical models. By mitigating skewness, the transformation normalizes data distributions, aligning them closer to the normal distribution assumed by many statistical models and thereby improving the accuracy of model estimates (Osborne, 2010).

It also stabilizes variance across data values, addressing issues of heteroscedasticity that can obscure the interpretation of regression analysis, ensuring the data meets the homoscedasticity assumption required for reliable statistical testing (Tabachnick and Fidell, 2013). Additionally, the log10 transformation facilitates the linearization of inherently nonlinear relationships between variables, making them amenable to analysis using linear regression models, which are notably easier to interpret (Draper and Smith, 1998).

This transformative process is not just about making data fit model assumptions; it also converts multiplicative relationships between variables into additive ones, proving particularly advantageous in econometric analyses focused on understanding elasticity—the percentage change in one variable in response to a 1% change in another—thereby broadening the interpretative power of econometric models (Wooldridge, 2012). Together, these benefits

underscore the log10 transformation's critical role in preparing data for analysis, ensuring that researchers can draw accurate, interpretable insights from their statistical models.

Multicollinearity

Multicollinearity occurs when two or more predictor variables in a regression model are highly correlated, leading to difficulties in estimating the relationship between each predictor and the dependent variable accurately. This condition inflates the variance of the coefficient estimates and makes them unstable and sensitive to changes in the model (Gujarati and Porter, 2009).

*Diagnostic Tests:* Variance inflation factors (VIFs) are commonly used to detect multicollinearity. A VIF value greater than 10 is typically considered indicative of serious multicollinearity (Kutner et al., 2004).

*Remedial Measures:* Solutions include removing highly correlated predictors, combining them into a single predictor, or applying ridge regression, which introduces a bias term to offset the variance inflation (Hoerl and Kennard, 1970).

Heteroscedasticity

Heteroscedasticity refers to the condition where the variance of the error terms in a regression model is not constant across all levels of the independent variables. This non-constant variance can lead to inefficient and biased estimates of the regression coefficients (White, 1980).

*Diagnostic Tests:* The Breusch-Pagan and White tests are commonly used to detect heteroscedasticity. These tests assess the presence of a systematic change in the variance of the error terms related to the levels of the independent variables (Breusch and Pagan, 1979; White, 1980).

*Remedial Measures:* Common approaches to address heteroscedasticity include transforming the dependent variable (e.g., using a log transformation), using robust standard errors, or employing generalized least squares (GLS) (Wooldridge, 2010).

Autocorrelation

Autocorrelation occurs when the residuals (error terms) in a regression model are correlated with each other, particularly in time series data. This correlation violates the assumption of independence of errors, leading to biased and inefficient coefficient estimates (Durbin & Watson, 1951).

*Diagnostic Tests:* The Durbin-Watson test is widely used to detect autocorrelation, especially first-order autocorrelation. The test statistics ranges from 0 to 4, with values around 2 indicating no autocorrelation and values deviating significantly from 2 suggesting the presence of autocorrelation (Durbin and Watson, 1951).

*Remedial Measures:* Remedies for autocorrelation include using time series specific models like ARIMA (autoregressive integrated moving average), adding lagged dependent variables to the model, or employing the Cochrane-Orcutt procedure to transform the data (Cochrane and Orcutt, 1949).

**Diagnosis of primary issues in regression analysis**

Breusch-Pagan Test

The Breusch-Pagan test is designed to detect the presence of heteroskedasticity in a regression model. Developed by Trevor Breusch and Adrian Pagan in 1979, this test is based on the premise that the variance of the errors is a linear function of one or more independent variables. The test involves regressing the squared residuals from the original regression model on the independent variables. If the independent variables significantly explain the variance in the squared residuals, heteroskedasticity is present (Breusch and Pagan, 1979).

White Test

The White test, introduced by Halbert White in 1980, is another method for detecting heteroskedasticity. This test does not require specifying a model of the structure of heteroskedasticity, making it a general test. The White test involves computing a test statistic from the sum of squared residuals of a model that regresses the original squared residuals on the independent variables, their squares, and their cross-products. A significant test statistic suggests the presence of heteroskedasticity (White, 1980).

Durbin-Watson Test

The Durbin-Watson test, developed by James Durbin and Geoffrey Watson in 1951, is a widely used test for detecting autocorrelation in the residuals of a regression, particularly first-order autocorrelation. The test calculates a statistic that ranges between 0 and 4, where a value of 2 indicates no autocorrelation. Values significantly less than 2 suggest positive autocorrelation, while values significantly greater than 2 indicate negative autocorrelation. The Durbin-Watson statistics are computed based on the sum of squared differences between adjacent residuals (Durbin and Watson, 1951).

Variance Inflation Factor (VIF)

The Variance Inflation Factor (VIF) is a diagnostic tool used to quantify the extent of multicollinearity in a regression analysis. Multicollinearity, a condition where predictor variables are highly correlated with each other, poses significant problems in regression analysis as it inflates the variances of the parameter estimates and undermines the statistical significance of the predictors (Kutner et al., 2004).

The VIF quantifies how much the variance of an estimated regression coefficient increases if predictors are correlated. If the predictors are orthogonal (i.e., uncorrelated), the VIF for each factor will be 1. As correlation among the predictors increases, so does VIF, indicating a higher level of multicollinearity and potentially less reliable coefficient estimates.

Hausman Test

The Hausman test compares Fixed Effects and Random Effects models. A significant test result indicates a preference for the Fixed Effects model, suggesting correlation between entity-specific effects and independent variables (Hausman, 1978).

**Interpretation of the results of a Panel Regression**

In academic literature, the applicability and emphasis on the coefficient of determination $R_2$ in panel data regression analysis are critically assessed, highlighting its limitations in reflecting the true explanatory power of the model within this context. The nuanced nature of panel data, encompassing both time-series and cross-sectional elements, necessitates a focus beyond the mere proportion of variance in the dependent variable that is predictable from the independent variables, as *R*2 suggests.

Focus on Causal Relationships: The academic pursuit in panel data analysis often gravitates towards uncovering and validating causal relationships rather than predictive accuracy. Baltagi (2005) underscores the importance of coefficient estimates over *R*2 in econometric analyses, arguing that the primary goal is to ascertain the significance and magnitude of the relationships between variables.

Inadequacy in Capturing Within and Between Variations: Panel data's intrinsic structure, incorporating both within-group and between-group variations, presents unique challenges. *R*2 fails to differentiate between these variations, making it an insufficient measure of model efficacy in panel studies. Wooldridge (2010) emphasizes that the key advantage of panel data is its ability to control unobserved heterogeneity, not necessarily to improve the fit of the model as *R*2 might suggest.

Fixed Effects and Random Effects Models Considerations: The usage of fixed effects and random effects models introduces additional complexity in interpreting *R*2. These models aim to account for unobserved heterogeneity across entities or time, which traditional *R*2 does not adequately capture. Rabe-Hesketh and Skrondal (2012) discuss how these models adjust for entity-specific characteristics, further diluting the relevance of *R*2 as a goodness-of-fit measure.

Alternative Metrics for Panel Data Analysis: Given the limitations of *R*2 in panel data analysis, researchers often resort to alternative metrics and diagnostic tests that are more aligned with the objectives of panel data studies. Cameron and Trivedi (2005) highlight the importance of employing diagnostics for autocorrelation, heteroskedasticity, and cross-sectional dependence, which directly tackle the intricacies of panel data, offering a more nuanced understanding than *R*2 could provide.

Conclusion: The academic discourse suggests a critical reevaluation of the reliance on *R*2 in panel data analysis, advocating for a methodology that prioritizes causal inference, accounts for the complex structure of panel data, and utilizes more appropriate metrics and tests. This approach aligns with the broader econometric principle that the essence of model evaluation transcends the explanatory power as traditionally measured by *R*2, especially in research designs where the primary interest lies in understanding the dynamics of variable interactions over time and across entities.

**Interpretation of Log10 transformed Results**

Halvorsen and Palmquist (1980) illustrate that when both dependent and independent variables are log-transformed, the regression coefficients can be interpreted as elasticities. This means the coefficient indicates the percentage change in the dependent variable resulting from a 1% change in the independent variable. This interpretation aids in understanding the proportional relationships between variables.

# 5. RESULTS AND ANALYSIS

This section presents the empirical findings of the study, which explores the relationship between ESG performance and financial and non-financial metrics in European banks. The analysis is conducted in two phases: a preliminary exploration using both fixed and random effects models to assess initial relationships and detect statistical anomalies, followed by a refined regression analysis using the most appropriate model specification. Throughout, clustered standard errors were applied to address heteroskedasticity and autocorrelation as identified by diagnostic tests.

Table 1. Descriptive Statistics of the Dataset

| Variable | Count | Mean | Standard Deviation | Min | 25% Quantile | Median | 75% Quantile | Max |
|---|---|---|---|---|---|---|---|---|
| ESG | 255 | 1.690 | 0.078 | 1.500 | 1.648 | 1.711 | 1.748 | 1.786 |
| RWA.TA | 255 | -0.366 | 0.157 | -0.672 | -0.472 | -0.354 | -0.241 | -0.121 |
| NPL.TL | 255 | -1.444 | 0.413 | -2.267 | -1.677 | -1.419 | -1.242 | -0.579 |
| ROE | 255 | -1.141 | 0.331 | -1.945 | -1.301 | -1.057 | -0.924 | -0.678 |
| NIM | 255 | 0.306 | 0.182 | -0.005 | 0.177 | 0.309 | 0.429 | 0.651 |
| PROV.TL | 255 | -0.440 | 0.579 | -1.645 | -0.817 | -0.320 | -0.048 | 0.455 |
| NOEMP | 255 | 4.111 | 0.406 | 3.349 | 3.890 | 4.101 | 4.387 | 4.800 |
| ENV | 255 | 1.516 | 0.169 | 1.052 | 1.460 | 1.564 | 1.620 | 1.727 |
| SOC | 255 | 1.542 | 0.098 | 1.361 | 1.470 | 1.542 | 1.614 | 1.697 |
| GOV | 255 | 1.884 | 0.097 | 1.607 | 1.862 | 1.922 | 1.943 | 1.983 |

Table 1 summarizes the descriptive statistics for the variables included in the analysis. ESG scores across the 255 observations have a mean of 1.690 and a relatively narrow standard deviation of 0.078, suggesting moderate and consistent ESG performance across the sample. Subcomponents of ESG—environmental (ENV), social (SOC), and governance (GOV)—also exhibit limited dispersion, reflecting uniformity in ESG disclosure and ratings across European banks.

Risk-related indicators such as Risk-Weighted Assets to Total Assets (RWA.TA) and Non-Performing Loans to Total Loans (NPL.TL) show greater variability, with RWA.TA ranging from -0.672 to -0.121 and NPL.TL from -2.267 to -0.579. The consistently negative scale values reflect data transformations applied during preprocessing to align variable directionality with interpretive expectations.

Return on Equity (ROE) exhibits moderate variation (mean: -1.141, SD: 0.331), while the Net Interest Margin (NIM) and Provisions to Total Loans (PROV.TL) reflect broader ranges, capturing profitability and credit risk management heterogeneity. The number of employees (NOEMP), a proxy for operational scale and capacity, shows a positive skew, with values ranging from 3.35 to 4.80 (log-transformed).

5.1. PRELIMINARY EXPERIMENTS

In the subsequent discourse, an analytical examination of both Random and Fixed Effects panel data regression models is conducted, employing Environmental, Social, Governance (individually) and comprehensive Environmental, Social, and Governance (ESG) scores as the dependent variables. This endeavor seeks to quantify the outcomes without resorting to additional model selection or clustering methodologies for rectifying statistical anomalies within the dataset. Hence, it can be posited that the ensuing analysis constitutes an application of raw data to unrefined models. This preliminary exploration serves as a foundation for subsequent sections, wherein more sophisticated techniques will be employed to address the challenges identified during these initial investigative phases.

**1. Regression Analysis Results – Dependent Variable: Governance Scores**

Table 2. Preliminary Test Results - Governance Scores

| Test | LM-Stat | LM p-val | F-Stat | F p-val | Result |
|---|---|---|---|---|---|
| White Test | 111.4684 | 2.9027e-17 | 13.3134 | 4.1048e-23 | |
| Breusch-Pagan Test | 74.6171 | 2.40098e-15 | 25.8537 | 6.0507e-18 | |
| Durbin-Watson Test | | | | | 0.5292 |

Table 3. Random Effects Estimation Summary - Governance Scores

| Parameter | Estimate | Std. Err. | T-stat | P-value | Lower CI | Upper CI |
|---|---|---|---|---|---|---|
| const | 1.4897 | 0.104 | 14.322 | 0.0 | 1.2848 | 1.6946 |
| RWA.TA | -0.1691 | 0.0392 | -4.3183 | 0.0 | -0.2462 | -0.092 |
| NPL.TL | -0.0313 | 0.0135 | -2.3113 | 0.0216 | -0.058 | -0.0046 |
| NOEMP | 0.0747 | 0.024 | 3.1052 | 0.0021 | 0.0273 | 0.122 |
| ROE | 0.0175 | 0.0083 | 2.1031 | 0.0365 | 0.0011 | 0.0339 |

Table 4. Fixed Effects Estimation Summary – Governance Scores

| Parameter | Estimate | Std. Err. | T-stat | P-value | Lower CI | Upper CI |
|---|---|---|---|---|---|---|
| const | 1.7048 | 0.1812 | 9.4072 | 0.0 | 1.3474 | 2.0621 |
| RWA.TA | -0.1849 | 0.0422 | -4.3765 | 0.0 | -0.2682 | -0.1016 |
| NPL.TL | -0.0423 | 0.0143 | -2.9488 | 0.0036 | -0.0705 | -0.014 |
| NOEMP | 0.018 | 0.0426 | 0.4232 | 0.6726 | -0.066 | 0.1021 |
| ROE | 0.0209 | 0.0083 | 2.5038 | 0.0131 | 0.0044 | 0.0373 |

The regression analysis, with Governance Scores as the dependent variable, incorporates both Random Effects and Fixed Effects models to elucidate the relationship between Governance Scores and the set of independent variables. This analysis is prefaced by diagnostic tests—namely, the White Test, Breusch-Pagan Test, and Durbin-Watson Test—to assess the presence of heteroskedasticity and autocorrelation within the model.

Diagnostic tests reveal significant heteroskedasticity in the model, as demonstrated by the White Test (LM-Stat: 111.4684, LM p-value: 2.9027e-17, F-Stat: 13.3134, F p-value: 4.1048e-23) and the Breusch-Pagan Test (LM-Stat: 74.6171, LM p-value: 2.40098e-15, F-Stat: 25.8537,

F p-value: 6.0507e-18). These results indicate that the variances of the error terms are not constant across observations, which may compromise the efficiency and reliability of the Ordinary Least Squares (OLS) estimations. Additionally, the Durbin-Watson Test results (0.5292) suggest the presence of positive autocorrelation among the residuals, which further challenges the validity of conventional OLS assumptions by implying that error terms in one period are correlated with error terms in another period.

In the Random Effects Estimation Summary, the model adjusts for unobserved heterogeneity within the cross-sectional units over time. The constant term is significantly positive (Estimate: 1.4897, P-value: 0.0), indicating a substantial baseline level of Governance Scores. RWA.TA and NPL.TL exhibit negative relationships with Governance Scores, suggesting that increases in these variables are associated with decreases in Governance Scores. Conversely, NOEMP shows a positive association, indicating that an increase in NOEMP correlates with an increase in Governance Scores. The relationship between ROE and Governance Scores is also positive, albeit smaller in magnitude.

The Fixed Effects Estimation Summary provides a closer examination of within-entity variations, discounting the effects of unobserved heterogeneity that do not change over time. Here, the constant term remains significantly positive, while RWA.TA and NPL.TL continue to display negative associations with Governance Scores. NOEMP's relationship with Governance Scores in the Fixed Effects model shows a notable variance in significance compared to the Random Effects model, presenting a non-significant positive relationship. This discrepancy might reflect the Fixed Effects model's sensitivity to within-entity variations over time. The relationship between ROE and Governance Scores remains positive, reinforcing the findings from the Random Effects model but with a slightly increased effect size.

In conclusion, the diagnostic tests underscore significant methodological concerns due to heteroskedasticity and autocorrelation, necessitating advanced estimation techniques or corrections. The estimations from both Random and Fixed Effects models reveal a nuanced understanding of the factors influencing Governance Scores. The consistency in the direction of relationships across both models affirms the robustness of the findings, although variations in magnitude and significance signal the critical role of model selection and the inherent complexity of analyzing Governance Scores. This comprehensive analysis not only highlights the importance of addressing statistical anomalies in regression models but also underscores the dynamic interplay between various independent variables and Governance Scores, offering valuable insights for further research in governance metrics.

**Regression Analysis Results – Dependent Variable: Environmental Scores**

Table 5. Preliminary Test Results – Environmental Scores

| Test | LM-Stat | LM p-val | F-Stat | F p-val | Result |
|---|---|---|---|---|---|
| White Test | 31.2835 | 0.005058 | 2.3972 | 0.003771 | |
| Breusch-Pagan Test | 21.3199 | 0.000274 | 5.7022 | 0.000208 | |
| Durbin-Watson Test | | | | | 0.9052 |

Table 6. Random Effects Estimation Summary – Environmental Scores

| Parameter | Estimate | Std. Err. | T-stat | P-value | Lower CI | Upper CI |
|---|---|---|---|---|---|---|
| const | 1.1507 | 0.1904 | 6.0435 | 0.0 | 0.7757 | 1.5257 |
| RWA.TA | -0.451 | 0.0994 | -4.5369 | 0.0 | -0.6468 | -0.2552 |
| NPL.TL | 0.1079 | 0.0357 | 3.0221 | 0.0028 | 0.0376 | 0.1783 |
| NOEMP | 0.0905 | 0.0431 | 2.1008 | 0.0367 | 0.0057 | 0.1753 |
| ROE | 0.0136 | 0.0243 | 0.5588 | 0.5768 | -0.0343 | 0.0614 |

Table 7. Fixed Effects Estimation Summary – Environmental Scores

| Parameter | Estimate | Std. Err. | T-stat | P-value | Lower CI | Upper CI |
|---|---|---|---|---|---|---|
| const | 2.8252 | 0.5333 | 5.2972 | 0.0 | 1.7735 | 3.8769 |
| RWA.TA | -0.6353 | 0.1243 | -5.1103 | 0.0 | -0.8805 | -0.3902 |
| NPL.TL | 0.0867 | 0.0422 | 2.0568 | 0.041 | 0.0036 | 0.1699 |
| NOEMP | -0.3373 | 0.1255 | -2.6879 | 0.0078 | -0.5847 | -0.0898 |
| ROE | 0.0259 | 0.0245 | 1.0546 | 0.2929 | -0.0225 | 0.0743 |

The regression analysis focused on Environmental Scores as the dependent variable offers a comprehensive overview through diagnostic tests and subsequent Random and Fixed Effects model estimations. The initial diagnostic phase encompasses the White Test, Breusch-Pagan Test, and Durbin-Watson Test, aiming to identify heteroskedasticity and autocorrelation within the regression framework.

Diagnostic evaluations reveal significant heteroskedasticity, as evidenced by the White Test (LM-Stat: 31.2835, LM p-value: 0.005058, F-Stat: 2.3972, F p-value: 0.003771) and the Breusch-Pagan Test (LM-Stat: 21.3199, LM p-value: 0.000274, F-Stat: 5.7022, F p-value: 0.000208). These findings indicate a non-constant variance in error terms across observations, raising concerns over the efficiency of standard estimation techniques such as Ordinary Least Squares (OLS). Additionally, the Durbin-Watson Test, yielding a statistic of 0.9052, signals positive autocorrelation among residuals, suggesting that errors in one period are predictably related to those in subsequent periods, which may affect the reliability of statistical inferences.

In the Random Effects Estimation Summary, the analysis transitions to examining the influence of various independent variables on Environmental Scores, taking into account both within and across-entity variability. The constant term exhibits a significant baseline effect on the dependent variable. The variable RWA.TA shows a marked negative impact on Environmental Scores, indicating that an increase in RWA.TA is associated with a decrease in these scores. Conversely, NPL.TL and NOEMP are found to positively influence Environmental Scores, suggesting their beneficial roles. ROE, however, demonstrates an insignificant relationship, indicating a minimal impact on Environmental Scores.

The Fixed Effects Estimation Summary narrows the focus to within-entity variations, revealing notable differences in the effects of the independent variables on Environmental Scores. The constant term again indicates a significant baseline effect, while RWA.TA continues to negatively impact Environmental Scores, albeit with a greater magnitude than in the Random Effects model. NPL.TL maintains its positive relationship, though NOEMP interestingly shifts to a negative impact, highlighting the model's sensitivity to within-entity dynamics. ROE remains statistically insignificant, reinforcing its minimal influence on Environmental Scores.

The culmination of diagnostic tests and model estimations suggests that heteroskedasticity and autocorrelation are pertinent concerns within the dataset, warranting the use of advanced estimation techniques to ensure the integrity of the regression analysis. The variance in the impact of independent variables between Random and Fixed Effects models underscores the complex relationship between these variables and Environmental Scores, emphasizing the necessity for careful model selection based on the specific analytical context. This detailed investigation not only identifies statistical challenges but also provides valuable insights into the determinants of Environmental Scores, laying a robust foundation for further research in this domain.

**Regression Analysis Results – Dependent Variable: Social Scores**

Table 8. Preliminary Test Results - Social Scores

| Test | LM-Stat | LM p-val | F-Stat | F p-val | Result |
|---|---|---|---|---|---|
| White Test | 31.6788 | 0.004449 | 2.4318 | 0.003268 | |
| Breusch-Pagan Test | 9.6631 | 0.046501 | 2.4617 | 0.045867 | |
| Durbin-Watson Test | | | | | 0.7064 |

Table 9. Random Effects Estimation Summary - Social Scores

| Parameter | Estimate | Std. Err. | T-stat | P-value | Lower CI | Upper CI |
|---|---|---|---|---|---|---|
| const | 1.3551 | 0.1185 | 11.434 | 0.0 | 1.1216 | 1.5885 |
| RWA.TA | -0.1994 | 0.0529 | -3.7664 | 0.0002 | -0.3037 | -0.0951 |
| NPL.TL | -0.0042 | 0.0186 | -0.2276 | 0.8201 | -0.0409 | 0.0324 |
| NOEMP | 0.0303 | 0.0272 | 1.115 | 0.2659 | -0.0232 | 0.0838 |
| ROE | 0.0145 | 0.0119 | 1.222 | 0.2229 | -0.0089 | 0.038 |

Table 10. Fixed Effects Estimation Summary - Social Scores

| Parameter | Estimate | Std. Err. | T-stat | P-value | Lower CI | Upper CI |
|---|---|---|---|---|---|---|
| const | 1.908 | 0.2601 | 7.3363 | 0.0 | 1.3952 | 2.4209 |
| RWA.TA | -0.2548 | 0.0606 | -4.2022 | 0.0 | -0.3743 | -0.1352 |
| NPL.TL | -0.0168 | 0.0206 | -0.8165 | 0.4152 | -0.0573 | 0.0238 |
| NOEMP | -0.1125 | 0.0612 | -1.838 | 0.0675 | -0.2331 | 0.0082 |
| ROE | 0.0184 | 0.012 | 1.5354 | 0.1263 | -0.0052 | 0.042 |

The regression analysis focusing on Social Scores as the dependent variable encompasses both preliminary diagnostic tests and detailed estimations through Random and Fixed Effects models, aimed at deciphering the relationship between Social Scores and a suite of independent variables.

Diagnostic evaluations commence with the White Test and Breusch-Pagan Test, both of which signal the presence of heteroskedasticity within the dataset (White Test LM-Stat: 31.6788, p-value: 0.004449; Breusch-Pagan Test LM-Stat: 9.6631, p-value: 0.046501). These findings indicate non-constant variances of error terms across observations, potentially challenging the reliability of standard estimation methodologies. Moreover, the Durbin-Watson Test, with a statistic of 0.7064, points towards positive autocorrelation among residuals, suggesting a predictable correlation of error terms across different periods, which could skew the accuracy of statistical inferences.

In the Random Effects Estimation Summary, the analysis elucidates the impacts of various predictors on Social Scores while accommodating for unobserved heterogeneity across entities over time. The constant term is significantly positive, establishing a baseline level for Social Scores. RWA.TA demonstrates a notable negative impact on Social Scores, implying that increases in RWA.TA correspond with decreases in Social Scores. Contrarily, NPL.TL and NOEMP do not exhibit statistically significant impacts, suggesting their limited influence on Social Scores within this model framework. ROE shows a positive but non-significant relationship, hinting at a potential but inconclusive positive influence on Social Scores.

Transitioning to the Fixed Effects Estimation Summary, which concentrates on within-entity variations over time, the analysis reveals a consistent significant positive effect of the constant term. RWA.TA maintains its negative association with Social Scores, albeit with a slightly increased magnitude compared to the Random Effects model, reinforcing the adverse impact of RWA.TA on Social Scores. Both NPL.TL and NOEMP, similar to the Random Effects findings, display non-significant impacts, with NOEMP notably switching to a negative relationship, although not reaching statistical significance. This shift underscores the model's sensitivity to within-entity dynamics. ROE, while still exhibiting a non-significant positive relationship, suggests a marginally more pronounced influence on Social Scores compared to the Random Effects model.

The confluence of diagnostic tests and model estimations highlights key statistical challenges within the dataset, including heteroskedasticity and autocorrelation, that necessitate sophisticated estimation corrections or techniques to ensure robust regression analysis. The distinctions between the Random and Fixed Effects model outcomes emphasize the nuanced influence of the examined variables on Social Scores, reflecting the complex dynamics at play. This analysis not only identifies critical statistical considerations but also offers valuable insights into the determinants of Social Scores, providing a solid foundation for further exploration in the realm of social metrics within governance research.

**Regression Analysis Results – Dependent Variable: ESG Scores**

Table 11. Preliminary Test Results – ESG Scores

| Test | LM-Stat | LM p-val | F-Stat | F p-val | Result |
|---|---|---|---|---|---|
| White Test | 55.2961 | 7.7007e-07 | 4.7467 | 1.1307e-07 | |
| Breusch-Pagan Test | 22.5323 | 0.000157 | 6.0579 | 0.000114 | |
| Durbin-Watson Test | | | | | 0.7943 |

Table 12. Random Effects Estimation Summary – ESG Scores

| Parameter | Estimate | Std. Err. | T-stat | P-value | Lower CI | Upper CI |
|---|---|---|---|---|---|---|
| const | 1.3908 | 0.084 | 16.557 | 0.0 | 1.2254 | 1.5563 |
| RWA.TA | -0.1977 | 0.0391 | -5.0585 | 0.0 | -0.2746 | -0.1207 |
| NPL.TL | 0.0017 | 0.0138 | 0.126 | 0.8998 | -0.0254 | 0.0289 |
| NOEMP | 0.0605 | 0.0192 | 3.1487 | 0.0018 | 0.0227 | 0.0983 |
| ROE | 0.0169 | 0.0089 | 1.8853 | 0.0605 | -0.0008 | 0.0345 |

Table 13. Fixed Effects Estimation Summary – ESG Scores

| Parameter | Estimate | Std. Err. | T-stat | P-value | Lower CI | Upper CI |
|---|---|---|---|---|---|---|
| const | 1.964 | 0.1906 | 10.302 | 0.0 | 1.588 | 2.3399 |
| RWA.TA | -0.2468 | 0.0444 | -5.5531 | 0.0 | -0.3344 | -0.1591 |
| NPL.TL | -0.0164 | 0.0151 | -1.0907 | 0.2767 | -0.0462 | 0.0133 |
| NOEMP | -0.088 | 0.0449 | -1.9613 | 0.0512 | -0.1764 | 0.0005 |
| ROE | 0.023 | 0.0088 | 2.623 | 0.0094 | 0.0057 | 0.0403 |

The regression analysis centered on the ESG (Environmental, Social, and Governance) Score as the dependent variable meticulously combines diagnostic tests with Random and Fixed Effects models to unravel the intricate relationships between the ESG Score and various independent variables.

Diagnostic tests initially lay the groundwork by identifying key statistical issues within the dataset. The White Test and the Breusch-Pagan Test both affirm the presence of heteroskedasticity (White Test LM-Stat: 55.2961, p-value: 7.7007e-07; Breusch-Pagan Test LM-Stat: 22.5323, p-value: 0.000157), indicating that the variance of error terms is not uniform across observations, which could potentially compromise the integrity of the analysis. Additionally, the Durbin-Watson Test, with a statistic of 0.7943, reveals positive autocorrelation among residuals, implying that the error terms in one period are systematically related to those in subsequent periods, thus questioning the assumption of independence among error terms.

In the Random Effects Estimation Summary, the model aims to account for variations both within and across entities over time. The constant term demonstrates a significant positive baseline effect on the ESG Score. The variable RWA.TA presents a pronounced negative influence on the ESG Score, suggesting that increases in RWA.TA are associated with decreases in the ESG Score. In contrast, NPL.TL shows an insignificant relationship, indicating a negligible effect on the ESG Score. NOEMP is positively associated with the ESG Score, suggesting that higher NOEMP values contribute positively to the ESG Score. ROE exhibits a marginal positive impact, albeit not reaching conventional levels of statistical significance.

Transitioning to the Fixed Effects Estimation Summary, which focuses on variations within entities, reveals a consistently significant positive effect of the constant term. RWA.TA maintains its negative association with the ESG Score, with an even greater magnitude than observed in the Random Effects model, reinforcing the variable's detrimental impact on the ESG Score. NPL.TL remains statistically insignificant, suggesting its limited influence within this analytical context. Interestingly, NOEMP transitions to a negative relationship, albeit narrowly missing statistical significance, indicating potential sensitivity to within-entity dynamics not captured by the Random Effects model. ROE, conversely, becomes statistically significant, showcasing a positive influence on the ESG Score and underscoring its potential as a positive determinant this score.

The integration of diagnostic tests and model estimations underscores the necessity for advanced statistical techniques to address heteroskedasticity and autocorrelation, ensuring the robustness of the regression analysis. The comparison between Random and Fixed Effects model outcomes illuminates the complex dynamics influencing the ESG Score, highlighting the critical importance of model selection based on the specific analytical requirements and the theoretical framework underpinning the study. This rigorous approach not only navigates

through statistical intricacies but also provides invaluable insights into the factors shaping ESG Scores, laying a foundational basis for future research in this increasingly relevant field.

**Decision making process regarding which Model should be used.**

Choosing between Pooled OLS and FE/RE: as mentioned previously, there are five assumptions for simple linear regression models that must be fulfilled, and two of them can help us in choosing between Pooled OLS and FE/RE models.

These assumptions are: (1) Linearity, (2) Exogeneity, (3a) Homoscedasticity and (3b) non-autocorrelation, (4) Independent variables are not Stochastic and (5) No Multicollinearity.

If assumption **(2)** or **(3)** (or both) are violated, then FE or RE might be more suitable.

*Choosing between FE and RE:* Answering this question depends on our assumption, if the individual, unobserved heterogeneity is a constant or random effect. However, this question can also be answered by performing the Hausman-Test, which has been mentioned previously in the methodology section.

Considering that in all above models obtained in our pre assessment, both white test and Breusch-Pagan-test results indicate heteroskedasticity, we have already the first violation of the listed assumptions. Furthermore, the Durbin Watson test results indicate positive autocorrelation, which means that one second assumption is also violated. Consequently, the fix-random effects models so far would be more suitable, and the Pooled OLS method should be excluded. This last method was already not originally employed in this thesis, considering the limitations of the model and the complexity of the dataset.

Finally, in order to see which model between FE and RE should be used, the Hausman test was implemented:

Hausman Test Results:

- Test Statistic: 13.4353
- Degrees of Freedom: 9
- p-value: 0.1439

Interpretation:

- The Hausman test statistic is 13.4353 with a p-value of 0.1439.
- Since the p-value is greater than the common significance level of 0.05, it does not provide strong evidence against the null hypothesis that the Random Effects model is consistent.
- Therefore, based on this test, the Random Effects model showed to be more appropriate for the data than the Fixed Effects model.

## 5.2. FINAL EXPERIMENTS

Initially, six independent variables—Risk-Weighted Assets to Total Assets (RWA.TA), Non-Performing Loans to Total Loans (NPL.TL), Return on Equity (ROE), Net Interest Margin (NIM), Provisions to Total Loans (PROV.TL), and Number of Employees (NOEMP)—were considered in the model. However, multicollinearity diagnostics using the Variance Inflation Factor (VIF) indicated strong collinearity, particularly between NIM and ROE, as well as with PROV.TL. Given the potential distortions this could introduced in coefficient estimation and significance testing, NIM and PROV.TL were excluded from the final model.

Furthermore, as confirmed in the preliminary experiments, the presence of heteroskedasticity (from White and Breusch-Pagan tests) and positive autocorrelation (Durbin-Watson statistic < 2 across models) necessitated the implementation of clustered standard errors to ensure the robustness of coefficient estimations.

In addition, based on the Hausman test results (p-value = 0.1439), the null hypothesis that the Random Effects model is consistent was not rejected. Therefore, the final model employs the Random Effects specification with clustered standard errors, utilizing the following four independent variables: RWA.TA, NPL.TL, ROE, and NOEMP.

Dependent Variable - ESG

Table 14. Final test results with ESG score as dependent variable

| Independent Variable | Coefficient | Standard Error | T-Statistic | P-Value |
|---|---|---|---|---|
| Constant | 1.3908 | 0.1016 | 13.689 | 0.0 |
| RWA.TA | -0.1977 | 0.0465 | -4.248 | 0.0 |
| NPL.TL | 0.0017 | 0.0184 | 0.095 | 0.9248 |
| NOEMP | 0.0605 | 0.0241 | 2.513 | 0.0126 |
| ROE | 0.0169 | 0.0124 | 1.362 | 0.1745 |

| |
|---|
| R-Squared: 0.1590 |
| R-Squared (Between): 0.2307 |
| R-Squared (Within): 0.1369 |
| R-Squared (Overall): 0.2134 |

The final regression analysis results with ESG (Environmental, Social, and Governance) as the dependent variable detail the influence of various independent variables on ESG performance. This comprehensive summary includes coefficients, standard errors, T-statistics, p-values, and different measures of R-squared to provide insights into the model's explanatory power and the significance of each predictor.

The constant term, representing the baseline ESG score in the absence of the influence from the independent variables, has a coefficient of 1.3908. This significant value, confirmed by a T-statistic of 13.689 and a p-value of 0.0, indicates a substantial positive baseline ESG performance.

The Risk-Weighted Assets to Total Assets (RWA.TA) ratio exhibits a negative impact on ESG (Environmental, Social, Governance) scores. This relationship is quantitatively supported by a statistically significant negative coefficient of -0.1977, accompanied by a T-statistic of -4.248

and a p-value of 0.0. The negative coefficient indicates that as the RWA.TA ratio increases, there is a corresponding decrease in ESG scores. This suggests that higher levels of risk-weighted assets, which reflect a bank's risk exposure and asset efficiency, may detract from its ESG performance. One possible explanation for this finding is that banks with higher RWA.TA ratios may prioritize managing financial risks over investing in sustainable and socially responsible initiatives.

Additionally, the perception of higher risk could lead stakeholders, including investors and regulators, to view these banks as less committed to ESG principles. Consequently, the allocation of resources towards risk mitigation might limit the bank's ability to engage in and fund ESG-related activities, ultimately leading to lower ESG scores. This finding underscores the complex relationship between financial stability and ESG performance, highlighting the need for banks to balance risk management with their commitments to sustainability and social responsibility.

The Non-Performing Loans to Total Loans (NPL/TL) ratio does not significantly impact ESG scores, as indicated by a p-value of 0.9248. This finding aligns with the conclusions of Ersoy et al. (2022), who observed that while the NPL/TL ratio is a critical measure of loan quality and expected to adversely affect bank value, the relationship was not statistically significant in most of their models. Including the NPL/TL ratio in this research, was aimed at validating these findings, and the current results similarly demonstrate that the proportion of non-performing loans to total loans has a negligible effect on ESG performance. This negligible impact suggests that, despite being an important indicator of credit risk, other factors play a more substantial role in determining a bank's ESG outcomes, highlighting the complexity of interactions between financial performance metrics and sustainability indicators.

The Number of Employees (NOEMP) demonstrates a significant positive relationship with ESG scores, evidenced by a coefficient of 0.0605, a T-statistic of 2.513, and a p-value of 0.0126. This suggests that larger workforce sizes are associated with better ESG outcomes, potentially reflecting the capacity for more comprehensive ESG initiatives or improved governance practices in larger organizations. This finding is consistent with the insights from Savio et al. (2023), who emphasized that governance practices necessary for managing a large workforce are critical for achieving high ESG scores, particularly regarding transparency and ethical management. Motivated by these insights, I aimed to test the hypothesis that larger banks, due to their greater resources, would allocate more capital towards sustainability and ESG targets. The results support this logic, indicating that a larger number of employees correlates with enhanced ESG performance, likely due to better resource allocation and more robust governance structures in larger banks.

Return on Equity (ROE), with a coefficient of 0.0169 and a T-statistic of 1.362, does not reach statistical significance (p-value of 0.1745), indicating an inconclusive relationship with ESG (Environmental, Social, Governance) scores. While the positive coefficient suggests a potential positive impact of financial performance on ESG, the lack of statistical significance warrants further investigation. In this thesis, the ROE was used as a key measure of performance, similar to Buallay (2019), who investigated the impact of ESG disclosures on bank performance using ROE. Buallay's study found a significant positive relationship between overall ESG scores and bank performance. However, the impact of individual ESG components varied: environmental disclosures positively influenced Return on Assets (ROA) and Tobin's Q (TQ), corporate social responsibility disclosures negatively impacted all three models (ROA, ROE, TQ), and

corporate governance disclosures had a negative effect on ROA and ROE but a positive effect on Tobin's Q.

These findings highlight the nuanced effects of different ESG components on financial performance, supporting the relevance of using ROE in this analysis. While Buallay's study showed mixed results, this research found no statistically significant relationship between ROE and ESG scores. This discrepancy could be due to several factors. Firstly, variations in data sets, methodologies, or time periods analyzed may account for the different findings. Secondly, the inconclusive relationship in this researche's results might be influenced by the specific sample of banks studied, which could have different dynamics compared to Buallay's broader sample. Additionally, the negative or insignificant impact of ROE on ESG scores in my study may reflect the complex interplay between financial performance and sustainability initiatives, where the pursuit of high financial returns does not always align with robust ESG practices. This highlights the need for further research to better understand the conditions under which financial performance and ESG initiatives can positively influence each other.

R-Squared (Overall) at 0.2134: This value indicates that approximately 21.34% of the variance in ESG scores is explained by the model. While this shows that the model captures a significant portion of the variance, it also suggests that a substantial portion of the variance (around 78.66%) is influenced by factors not included in the model. This aligns with the findings that certain financial metrics, such as the NPL/TL ratio, do not significantly impact ESG scores, indicating the presence of other influencing factors.

R-Squared (Between) at 0.2307: This higher value compared to the overall R-squared suggests that the model explains a slightly greater proportion of the variance between different entities. This means that differences in ESG scores between banks are somewhat better captured by the model. The positive and significant relationship of the Number of Employees (NOEMP) with ESG scores supports this, as larger workforce sizes in different banks seem to correlate with better ESG outcomes.

R-Squared (Within) at 0.1369: This value reflects the model's ability to explain variance within entities over time, highlighting the dynamics of ESG performance at the entity level. The relatively lower value suggests that within a given bank, the variance in ESG scores over time is less well explained by the model. This is consistent with the finding that the RWA/TL ratio has a significant but complex impact on ESG scores, possibly due to changing risk profiles and internal management practices over time.

R-Squared at 0.1590: This likely refers to the overall fit of the model and indicates that around 15.90% of the variance in ESG scores is explained without distinguishing between within and between variances. This relatively moderate value underscores the complexity of predicting ESG performance and suggests that while financial metrics are important, other qualitative factors related to governance practices, stakeholder engagement, and regulatory environments also play critical roles.

In conclusion, this regression analysis highlights key factors influencing ESG performance, including the negative impact of risk-weighted assets (RWA.TA) and the positive association with workforce size (NOEMP). The analysis shows that while non-performing loans (NPL/TL) and return on equity (ROE) had negligible and inconclusive effects respectively, workforce size positively influenced ESG scores. The varied R-squared values, with 21.34% overall variance explained, underscore the complexity of ESG scoring and the need for nuanced

approaches in assessing its determinants, reflecting the intricate interplay between financial metrics and ESG outcomes.

As mentioned previously, as a second phase of the final assessment, for more detailed results, the same analysis was performed to E, S and G scores particularly, using each of them as dependent variables, and the results can be seen below:

Table 15. Final test results with E, S and G scores used separately as dependent variables

| Variable | ESG Aspect | Coefficient | Significance (p-value) |
|---|---|---|---|
| RWA.TA | Environmental | -0.451 | 0.0037 |
| RWA.TA | Social | -0.1994 | 0.0002 |
| RWA.TA | Governance | -0.1691 | 0.0 |
| NPL.TL | Environmental | 0.1079 | 0.0348 |
| NPL.TL | Social | -0.0042 | 0.8492 |
| NPL.TL | Governance | -0.0313 | 0.1215 |
| NOEMP | Environmental | 0.0905 | 0.0837 |
| NOEMP | Social | 0.0303 | 0.2897 |
| NOEMP | Governance | 0.0747 | 0.0182 |
| ROE | Environmental | 0.0136 | 0.6653 |
| ROE | Social | 0.0145 | 0.3917 |
| ROE | Governance | 0.0175 | 0.0649 |

This table presents the results of regression analyses examining the impact of environmental, social, and governance (ESG) factors on various financial variables. The coefficients indicate the direction and magnitude of the relationships, while the p-values denote their statistical significance. Here's a detailed comparative and academic analysis:

### *1. Risk-Weighted Assets to Total Assets (RWA.TA)*

- **Environmental**: The coefficient of -0.451 suggests a strong negative relationship between environmental factors and RWA.TA, indicating that better environmental performance is associated with lower risk-weighted assets. The p-value of 0.0037 confirms that this relationship is statistically significant.
- **Social**: The coefficient of -0.1994 also shows a negative relationship, but less pronounced than environmental factors. With a p-value of 0.0002, this relationship is highly significant.
- **Governance**: The coefficient of -0.1691 indicates a negative relationship as well, and the p-value of 0.0 shows that this is highly significant.

**Analysis**: These results suggest that stronger ESG performance, particularly in environmental and social aspects, correlates with lower financial risk as measured by RWA.TA. The negative coefficients imply that firms with better ESG practices tend to have fewer risk-weighted assets relative to total assets, which could indicate more prudent risk management.

***2. Non-Performing Loans to Total Loans (NPL.TL)***

- **Environmental**: A positive coefficient of 0.1079 indicates a potential increase in non-performing loans with better environmental scores. However, the p-value of 0.0348, while significant, suggests a relatively weaker relationship.
- **Social**: The coefficient is -0.0042, implying a negligible relationship with a very high p-value of 0.8492, indicating no statistical significance.
- **Governance**: The negative coefficient of -0.0313 and a p-value of 0.1215 suggest a weak and statistically insignificant relationship.

**Analysis**: Environmental factors have a marginally significant positive relationship with non-performing loans, which may suggest some initial costs or risks associated with implementing environmental practices. However, social and governance factors do not have significant impacts on NPL.TL, indicating that these aspects may not directly influence loan performance.

***3. Number of Employees (NOEMP)***

- **Environmental**: The coefficient of 0.0905 suggests a positive relationship, but the p-value of 0.0837 indicates marginal significance.
- **Social**: The coefficient of 0.0303 and a high p-value of 0.2897 suggest a weak and insignificant relationship.
- **Governance**: A coefficient of 0.0747 with a p-value of 0.0182 indicates a positive and significant relationship.

**Analysis**: Governance factors positively correlate with the number of employees, possibly reflecting better-managed firms with stronger governance structures that can support larger workforces. Environmental factors show a weakly significant positive relationship, whereas social factors do not appear to significantly affect employment levels.

***4. Return on Equity (ROE)***

- **Environmental**: The coefficient of 0.0136 and a p-value of 0.6653 indicate an insignificant relationship.
- **Social**: The coefficient of 0.0145 also suggests an insignificant relationship, with a p-value of 0.3917.
- **Governance**: The coefficient of 0.0175 with a p-value of 0.0649 indicates a marginally significant positive relationship.

**Analysis**: Governance factors show a weakly significant positive relationship with ROE, suggesting that better governance can lead to higher returns on equity. However, environmental and social factors do not show significant impacts on ROE, indicating that these aspects might not directly influence profitability in the short term.

Conclusion:

This analysis highlights that:

- **Risk Management**: ESG factors, especially environmental and social, are significant in managing financial risks, as indicated by their strong negative relationship with RWA.TA.
- **Loan Performance**: ESG factors do not significantly affect non-performing loans, except for a weak positive relationship with environmental factors.
- **Employment**: Governance factors significantly correlate with higher employment levels, suggesting better management and resource allocation.
- **Profitability**: Governance has a marginally positive impact on profitability, while environmental and social factors do not significantly influence ROE.

The academic implication is that while ESG factors, particularly governance, have nuanced impacts on different financial metrics, their integration can provide broader strategic benefits in risk management, employment, and potentially long-term profitability.

**Hypothesis testing results:**

**Hypothesis 1: Impact of Risk Weighted Assets to Total Asset on ESG Scores**

- **H1a:** The ratio of Risk Weighted Assets to Total Asset positively impacts ESG scores.
- **H1b:** The ratio of Risk Weighted Assets to Total Asset negatively impacts ESG scores.
- **H0-1:** The ratio of Risk Weighted Assets to Total Asset does not impact ESG scores.

**Conclusion:** The analysis reveals a significant negative impact of the RWA.TA ratio on ESG scores (coefficient: -0.1977, p-value: 0.0). Therefore, H1b is accepted, and H0-1 is rejected. This indicates that banks with higher levels of risk-weighted assets tend to have lower ESG scores. One plausible explanation is that banks with higher risk exposure might focus more on financial stability and risk mitigation, potentially at the expense of investing in sustainable and socially responsible initiatives. This prioritization could lead to lower ESG scores as these banks may lack the resources or strategic focus needed to enhance their ESG performance. The finding underscores the importance of banks to balance risk management with their ESG commitments to improve their overall sustainability profile.

**Hypothesis 2: Effect of Non-Performing Loan to Total Loan on Environmental Scores**

- **H2a:** The ratio of Non-Performing Loan to Total Loan positively impacts Environmental scores.
- **H2b:** The ratio of Non-Performing Loan to Total Loan negatively impacts Environmental scores.
- **H0-2:** The ratio of Non-Performing Loan to Total Loan does not impact Environmental scores.

**Conclusion:** The NPL.TL ratio shows a weak positive impact on environmental scores (coefficient: 0.1079, p-value: 0.0348). Therefore, H2a is accepted, and H0-2 is rejected. This result may suggest that banks with higher levels of non-performing loans are possibly

enhancing their environmental initiatives or commitments as part of a broader strategy to manage risk, improve public perception, or align with evolving regulatory and market expectations that favor sustainability. This positive correlation might indicate a proactive approach by these banks to strengthen their environmental credentials, potentially to attract environmentally conscious investors, access green financing options, or mitigate the reputational risks associated with high levels of non-performing loans.

**Hypothesis 3: Influence of Number of Employees on Governance Scores**

- **H3a:** The number of employees positively influences Governance scores.
- **H3b:** The number of employees negatively influences Governance scores.
- **H0-3:** The number of employees does not influence Governance scores.

**Conclusion:** The number of employees significantly positively impacts governance scores (coefficient: 0.0605, p-value: 0.0126). Therefore, H3a is accepted, and H0-3 is rejected. This suggests that larger organizations, which typically employ more people, tend to have better governance practices. Larger workforce sizes may necessitate more robust governance structures to ensure transparency, accountability, and effective management. This positive relationship highlights the potential for larger banks to leverage their resources to implement comprehensive governance frameworks, thereby improving their governance scores. It also indicates that smaller banks might need to enhance their governance structures to achieve similar levels of ESG performance.

**Hypothesis 4: Relationship Between Return on Equity and Governance Scores**

- **H4a:** Return on Equity positively relates to Governance scores.
- **H4b:** Return on Equity negatively relates to Governance scores.
- **H0-4:** Return on Equity does not relate to Governance scores.

**Conclusion:** Return on Equity (ROE) does not significantly impact governance scores (coefficient: 0.0169, p-value: 0.1745). Therefore, H0-4 is accepted, and both H4a and H4b are rejected. While the positive coefficient suggests a potential positive relationship, the lack of statistical significance indicates that financial performance, as measured by ROE, does not have a clear influence on governance scores. This could be due to the fact that high financial returns do not necessarily correlate with strong governance practices. Banks may achieve high ROE through various strategies that do not directly involve improvements in governance. This finding suggests that while financial performance is important, it does not automatically translate to better governance practices. Banks should therefore not rely solely on financial performance metrics to gauge their governance quality.

**Hypothesis 5: Impact of Number of Employees on Environmental Scores**

- **H5a:** The number of employees positively impacts Environmental scores.
- **H5b:** The number of employees negatively impacts Environmental scores.
- **H0-5:** The number of employees does not impact Environmental scores.

**Conclusion:** The number of employees does not significantly impact environmental scores (coefficient: 0.0905, p-value: 0.0837). Therefore, H0-5 is accepted, and both H5a and H5b are

rejected. Although there is a positive coefficient suggesting a possible positive relationship, the marginal significance implies that workforce size is not a major determinant of a bank's environmental performance. This result indicates that while larger banks might have more resources to allocate towards environmental initiatives, simply having more employees does not necessarily translate into better environmental performance. It highlights the need for effective environmental policies and practices that go beyond workforce size, focusing on strategic environmental management and sustainability initiatives.

**Hypothesis 6: Effect of Risk Weighted Assets to Total Asset on Social Scores**

- **H6a:** The ratio of Risk Weighted Assets to Total Asset positively affects social scores.
- **H6b:** The ratio of Risk Weighted Assets to Total Asset negatively affects social scores.
- **H0-6:** The ratio of Risk Weighted Assets to Total Asset does not affect social scores.

**Conclusion:** The RWA.TA ratio has a significant negative impact on social scores (coefficient: -0.1994, p-value: 0.0002). Therefore, H6b is accepted, and H0-6 is rejected. This indicates that banks with higher risk-weight assets tend to have lower social scores. Similar to the overall ESG score analysis, this negative relationship suggests that banks focusing more on managing financial risks might have less capacity or willingness to engage in social responsibility initiatives. Higher risk-weighted assets may lead to a perception of instability or risk aversion, potentially detracting from a bank's social performance. Banks must balance their risk management practices with social initiatives to improve their social scores and overall ESG performance.

Table 16. Summary of the hypotheses and their conclusions

| Hypothesis | Hypothesis Statement | Null Hypothesis (H0) | Method | Conclusion |
|---|---|---|---|---|
| H1 | RWA.TA impacts ESG scores (H1a: positively, H1b: negatively) | RWA.TA does not impact ESG scores | Panel data regression analysis | Reject H0-1, accept H1b |
| H2 | NPL.TL impacts Environmental scores (H2a: positively, H2b: negatively) | NPL.TL does not impact Environmental scores | Panel data regression analysis | Reject H0-2, accept H2a |
| H3 | Number of Employees influences Governance scores (H3a: positively, H3b: negatively) | Number of Employees does not influence Governance scores | Panel data regression analysis | Reject H0-3, accept H3a |
| H4 | ROE relates to Governance scores (H4a: positively, H4b: negatively) | ROE does not relate to Governance scores | Panel data regression analysis | Accept H0-4 |
| H5 | Number of Employees impacts Environmental scores (H5a: positively, H5b: negatively) | Number of Employees does not impact Environmental scores | Panel data regression analysis | Accept H0-5 |
| H6 | RWA.TA affects social scores (H6a: positively, H6b: negatively) | RWA.TA does not affect social scores | Panel data regression analysis | Reject H0-6, accept H6b |

# 6. CONCLUSION

This chapter concludes the thesis by synthesizing the research findings, contextualizing them within the broader literature, and reflecting on the practical and theoretical implications of the study. The research aimed to investigate the relationship between Environmental, Social, and Governance (ESG) performance and key financial and non-financial metrics among European banks from 2017 to 2021. Through the application of panel data regression techniques, the study provided insight into how structural and performance-related variables shape ESG outcomes in the evolving regulatory environment of the European Union.

The conclusion begins by revisiting the research objectives and summarizing how they have been fulfilled. It then explores the key empirical findings and their implications, followed by a discussion of the study's limitations and suggestions for future research. This chapter closes with broader reflections on the current and future role of ESG in the financial system, particularly in light of intensifying sustainability regulation and stakeholder pressure.

## 6.1. REVISITING THE RESEARCH AIMS AND OBJECTIVES

The primary aim of this research was to examine the extent to which ESG scores are influenced by financial performance indicators and bank-specific structural characteristics. The research objectives were as follows:

1. To assess the relationship between ESG scores and selected bank performance indicators (RWA.TA, NPL.TL, ROE, NOEMP) using panel data regression models.

2. To determine whether traditional financial performance metrics serve as significant predictors of ESG outcomes.

3. To analyze the impact of each ESG pillar (Environmental, Social, Governance) separately, identifying the relative influence of the independent variables on each dimension.

4. To test multiple hypotheses regarding ESG–performance relationships and evaluate their statistical validity.

5. To provide insights for practitioners and policymakers regarding the integration of ESG into risk management and regulatory oversight.

These objectives were successfully addressed through a rigorous empirical approach, underpinned by robust econometric modelling and diagnostic testing. The study found that ESG performance is more strongly associated with structural and risk-based variables than with profitability metrics, contributing novel insights into the drivers of ESG alignment within the banking sector.

## 6.2. KEY FINDINGS AND CONTRIBUTIONS

This section summarizes the main empirical findings and outlines the contributions made to academic literature and banking practice.

1. RWA.TA as a consistent negative predictor of ESG performance. The Risk-Weighted Assets to Total Assets ratio emerged as a statistically significant and negative predictor of overall ESG scores and each ESG component individually. This result confirms that banks with greater financial risk are less likely to demonstrate strong ESG performance. It reinforces the notion that risk-averse banks are more capable of engaging with ESG frameworks, possibly due to their better capitalization and more prudent management structures.

2. NOEMP as a structural enabler of ESG implementation. The number of employees showed a significant positive relationship with ESG scores, particularly with the Governance component. This supports the argument that organizational capacity – through human capital, resources, and institutional maturity – enables the development and enforcement of ESG-aligned policies, especially those tied to governance quality and stakeholder engagement.

3. Limited explanatory power of profitability and credit quality metrics. ROE, a traditional profitability measure, exhibited a positive but statistically insignificant relationship with ESG outcomes. Similarly, the NPL.TL ratio did not demonstrate any significant impact on ESG scores, with the exception of a marginal effect on Environmental scores. These findings indicate that short-term financial performance may not be a reliable driver of ESG behavior during the study period.

4. Disaggregated analysis reveals divergent relationships. The separate regression models for E, S, and G dimensions revealed notable variation. RWA.TA consistently predicted poorer ESG outcomes, while NOEMP was only significantly related to Governance. ROE and NPL.TL, meanwhile, had little explanatory power across all components. These results underscore the complexity and multidimensionality of ESG, affirming the need to evaluate its subcomponents individually rather than as a monolithic index.

5. Model fit and explanatory scope. The $R^2$ (Overall) of 0.2134 indicates that approximately 21% of the variance in ESG scores is explained by the model, with better performance across entities than within. This suggests that inter-bank structural differences – rather than intra-bank variations over time – play a greater role in shaping ESG outcomes. It also implies that other factors, particularly qualitative or institutional, may account for much of the remaining unexplained variance.

## 6.3. THEORETICAL AND PRACTICAL IMPLICATIONS

The findings have implications for ESG theory, regulatory practice, and financial institutions:

- For theory, the results provide empirical support for institutional and stakeholder theories, which argue that organizational structure and legitimacy drive ESG integration. The insignificant relationship between ROE and ESG suggests that ESG is not yet embedded within performance-maximizing strategies but rather within broader

legitimacy and compliance frameworks.

- For regulators, the study highlights the importance of considering financial risk and organizational capacity when evaluating ESG alignment. As EU regulations evolve (e.g., CSRD, ESRS), supervisory bodies may consider integrating ESG into prudential assessments and governance audits.

- For banks and investors, the results encourage a shift from focusing purely on financial metrics toward evaluating structural resilience and ESG governance. Investments in staff training, sustainability governance, and ESG reporting infrastructure may yield long-term reputational and regulatory advantages.

## 6.4. LIMITATIONS OF THE STUDY

While the study presents robust findings, several limitations must be acknowledged:

- Temporal scope: The dataset covers 2017–2021, a period of initial ESG integration. Subsequent regulatory reforms, including the rollout of the EU Taxonomy and CSRD, are likely to deepen ESG impacts, which this study does not capture.

- ESG data comparability: Bloomberg ESG scores, while widely used, differ in methodology from other providers. The lack of standardization in ESG ratings may affect comparability across studies and contexts.

- Qualitative and external factors: Many key drivers of ESG performance—such as regulatory compliance behavior, stakeholder activism, and executive leadership—are qualitative and not captured in the dataset.

- Generalizability: The study focuses exclusively on European banks, limiting its applicability to regions with different regulatory and institutional settings.

## 6.5. DIRECTIONS FOR FUTURE RESEARCH

Building on the findings and limitations of this study, future research can advance the field in the following ways:

1. Post-2021 data and evolving ESG regulation: Future studies should incorporate data from 2022 onward to assess the impacts of the EU Taxonomy, SFDR, and CSRD. These frameworks are likely to amplify the financial consequences of ESG alignment.

2. Cross-country and cross-sector analysis: Comparative studies across regions or between financial sectors (e.g., insurance, asset management) could reveal institutional, cultural, or regulatory factors that shape ESG-financial linkages.

3. Integration of qualitative and unstructured data: Incorporating ESG disclosures, board statements, and sustainability reports using NLP techniques can capture qualitative dimensions that are currently missing.

4. Linking ESG with risk-adjusted performance metrics: Rather than ROE alone, future models could explore relationships with risk-adjusted indicators (e.g., Sharpe ratio, Z-

score) or cost of capital.

5. Causal inference and dynamic modelling: The use of dynamic panel models or structural equation modelling could strengthen causal claims and better capture ESG-performance feedback loops.

## 6.6. FINAL REFLECTIONS

This research arrives at a pivotal moment in the evolution of ESG in the banking sector. The data reveals early patterns in how structural and risk-based characteristics shape ESG performance, but it also highlights that ESG has not yet become a central determinant of bank success. The moderate explanatory power of the model and the insignificance of profitability metrics suggest that ESG is still in a formative stage.

Nevertheless, the signals are clear: ESG is gaining ground. Regulatory demands are increasing, stakeholder expectations are rising, and banks are under growing pressure to align financial performance with sustainability outcomes. As the EU accelerates its sustainable finance agenda, the link between ESG and financial metrics is likely to grow stronger.

This thesis thus provides both a snapshot and a foundation. It offers valuable empirical insight into the present state of ESG-financial relationships in European banking and sets the stage for future studies that will trace this relationship as it deepens. Ultimately, the integration of ESG into financial risk models, governance frameworks, and strategy development will define the next phase of sustainable finance in Europe—and this research contributes to understanding its early contours.

# REFERENCES


Ahmad, N., Mobarek, A. and Roni, N.N. (2021). Revisiting the impact of ESG on financial performance of FTSE350 UK firms: Static and dynamic panel data analysis. Cogent Business and Management, 8(1), Article 1900500.

Ameer, R., & Othman, R. (2012). Sustainability practices and corporate financial performance: A study based on the top global corporations. Journal of Business Ethics, 108(1), 61-79. https://doi.org/10.1007/s10551-011-1063-y

Angelini, C. (2019). Regression Analysis. In: Encyclopedia of Bioinformatics and Computational Biology. Amsterdam: Elsevier, pp.722-730.

Apiday. (2023). What is CSRD? [Online] Available at: https://www.apiday.com/glossaries-posts/csrd-what-is-csrd [Accessed 5 December 2023].

Arellano, M. and Bond, S. (1991). Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. The Review of Economic Studies, 58(2), pp.277-297.

Arellano, M. and Bover, O. (1995). Another Look at the Instrumental Variable Estimation of Error-Components Models. Journal of Econometrics, 68, pp.29-52.

Bătae , O.M., Dragomir, V.D. and Feleaga, L. (2020). Environmental, Social, Governance (ESG), And Financial Performance of European Banks. Journal of Accounting and Management Information Systems, 19(3), pp.480-501.

Baltagi, B.H. (2005). Econometric Analysis of Panel Data. 3rd ed. New York: John Wiley & Sons Inc.

Bateson, B. and Saccardi, D. (2020). Financing a Net-Zero Economy: Measuring and Addressing Climate Risk for Banks. [online] Ceres. Available at: https://www.ceres.org/resources/reports/financing-net-zero-economy-measuring-and-addressingclimate-risk-banks [Accessed 5 Dec. 2021].

Battiston, S., Monasterolo, I., Riahi, K., & van Ruijven, B. J. (2021). Accounting for finance is key for climate mitigation pathways. Science, eabf3877. https:// doi.org/10.1126/science.abf3877

Bax, K., Bonaccolto, G. and Paterlini, S. (2023). Do lower environmental, social, and governance (ESG) rated companies have higher systemic impact? Empirical evidence from Europe and the United States. Corporate Social Responsibility and Environmental Management, 30(3), pp.1406-1420.

BCBS. Basel Committee on Banking Supervision. (2011). Basel III: A Global Regulatory Framework for More Resilient Banks and Banking Systems-Revised Version June 2011. Basel: Bank for International Settlements.

Belloni, A. and Chernozhukov, V. (2013). Least Squares After Model Selection in High-dimensional Sparse Models. Bernoulli, 19(2), pp.521-547.

Berger, A.N. and DeYoung, R. (1997). Problem loans and cost efficiency in commercial banks. Journal of Banking & Finance, 21(6), pp.849-870.

Berman, S. L., Wicks, A. C., Kotha, S., & Jones, T. M. (1999). Does stakeholder orientation matter? The relationship between stakeholder management models and firm financial performance. The Academy of Management Journal, 42(5), 488-506. https://doi.org/10.2307/256972

Bertão, N. (2022). Entenda o que é ESG e por que a sigla é importante para as empresas. Valor Econômico. [online] 21 Feb. Available at: https://valor.globo.com/empresas/esg/noticia/2022/02/21/entenda-o-que-e-esg-e-por-que-a-siglaesta-em-alta-nas-empresas.ghtml [Accessed 2 Apr. 2022].

Bessis, J. (2015). Risk Management in Banking. 4th ed. Wiley. ISBN: 978-1-118-66021-8

Birindelli, G., Dell'Atti, S., Iannuzzi, A.P. and Savioli, M. (2018). Composition and Activity of the Board of Directors: Impact on ESG Performance in the Banking System. Sustainability, 10, 4699. https://doi.org/10.3390/su10124699

Bloomberg (2020). Environmental and Social Scores: Methodology and Field Information. Bloomberg Professional Services.

Bloomberg (2022). Governance Scores: Methodology and Field Information. Bloomberg Professional Services.

Bradley, B. (2021). ESG Investing for Dummies. Hoboken, New Jersey: John Wiley & Sons, Inc. ISBN: 978-1-119-77109-8

Brealey, R.A., Myers, S.C. and Allen, F. (2006). Principles of Corporate Finance. 8th ed. McGraw-Hill/Irwin. ISBN 0073130826, 9780073130828.

Breiman, L. (2001) Statistical Modeling: The Two Cultures. Statistical Science, 16, pp. 199-215. Available at: https://doi.org/10.1214/ss/1009213726

Breusch, T. S. and Pagan, A. R. (1979). A Simple Test for Heteroskedasticity and Random Coefficient Variation. Econometrica, 47(5), pp. 1287-1294. https://doi.org/10.2307/1911963

Buallay, A. (2019), "Is sustainability reporting (ESG) associated with performance? Evidence from the European banking sector", Management of Environmental Quality, Vol. 30 No. 1, pp. 98-115. https://doi.org/10.1108/MEQ-12-2017-0149

Buallay, A., Al Marri, M., Nasrallah, N., Hamdan, A., Barone, E. and Zureigat, Q. (2021). Sustainability reporting in banking and financial services sector: a regional analysis. Journal of Sustainable Finance & Investment, 13, pp. 1-26. https://doi.org/10.1080/20430795.2021.1978919

California Air Resources Board. (2023). Cap-and-Trade Program. Available at: https://ww2.arb.ca.gov/our-work/programs/cap-and-trade-program [Accessed 28 Nov. 2023].

Cameron, A. C. and Trivedi, P. K. (2005). Microeconometrics: Methods and Applications. Cambridge University Press, New York. https://doi.org/10.1017/CBO9780511811241

Carson, R. (2002). Silent spring. Houghton Mifflin Harcourt.

CDP. (2020). The Time to Green Finance: CDP Financial Services Disclosure Report 2020. Available at: https://www.cdp.net/en/research/global-reports/financial-services-disclosure-report-2020 [Accessed: date].

Chams, N., García-Blandón, J. and Hassan, K. (2021). Role Reversal! Financial Performance as an Antecedent of ESG: The Moderating Effect of Total Quality Management. Sustainability, 13, 7026. Available at: https://doi.org/10.3390/su13137026

Chen, S., Song, Y. and Gao, P. (2023). Environmental, social, and governance (ESG) performance and financial outcomes: Analyzing the impact of ESG on financial performance. Journal of Environmental Management, 345, 118829. https://doi.org/10.1016/j.jenvman.2023.118829

Chiaramonte, L., Dreassi, A., Girardone, C. and Piserà, S. (2022). Do ESG strategies enhance bank stability during financial turmoil? Evidence from Europe. The European Journal of Finance, 28(12), pp. 1173-1211. https://doi.org/10.1080/1351847X.2021.1964556

Clark, G. L., Feiner, A. and Viehs, M. (2015). From the Stockholder to the Stakeholder: How Sustainability Can Drive Financial Outperformance. Rochester, NY: Social Science Research Network. https://doi.org/10.2139/ssrn.2508281

Cochrane, D. and Orcutt, G. H. (1949). Application of Least Squares Regression to Relationships Containing Auto-Correlated Error Terms. Journal of the American Statistical Association, 44(245), pp. 32-61. https://doi.org/10.2307/2280349

Cornée, S., Fattobene, L., & Migliorelli M. (2018). An overview of coopera-tive banking in Europe. In M. Migliorelli (Eds.), New cooperative banking in Europe. Strategies for adapting the business model post crisis (pp. 1-27). Springer.

Council of the European Union (2024). Environmental, social and governance (ESG) ratings: Council and Parliament reach agreement. Available at: https://www.consilium.europa.eu/en/press/press-releases/2024/02/05/environmental-social-and-governance-esg-ratings-council-and-parliament-reach-agreement/ [Accessed: 27 February 2024]

D'Amato, V., D'Ecclesia, R., Levantesi, S. (2021). Fundamental ratios as predictors of ESG scores: a machine learning approach. Decisions in Economics and Finance. 44. 1-24. 10.1007/s10203-021-00364-5.

Damodaran, A. (2012). Investment Valuation: Tools and Techniques for Determining the Value of Any Asset. 3rd ed. John Wiley & Sons. ISBN 978-1-118-01152-2.

Daniel, F., Lohrke, F. T., Fornaciari, C. J. and Turner, R. A., Jr. (2004). Slack resources and firm performance: A meta-analysis. Journal of Business Research, 57(6), pp. 565-574.

De Lucia, C., Pazienza, P. and Bartlett, M. (2020). Does Good ESG Lead to Better Financial Performances by Firms? Machine Learning and Logistic Regression Models of Public Enterprises in Europe. Sustainability, 12, 5317. https://doi.org/10.3390/su12135317

Deephouse, D. L., Newburry, W. and Soleimani, A. (2016). The effects of institutional development and national culture on cross-national differences in corporate reputation. Journal of World Business, 51(3), pp. 463-473. https://doi.org/10.1016/j.jwb.2015.12.005

Di Tommaso, C. and Thornton, J. (2020). Do ESG scores affect bank risk taking and value? Evidence from European banks. Corporate Social Responsibility and Environmental Management, 27, pp. 2286-2298. https://doi.org/10.1002/csr.1964

DiMaggio, P. J., & Powell, W. W. (1983). The Iron Cage revisited: Institu-tional isomorphism and collective rationality in organizational fields. American Sociological Review, 48(2), 147-160.

Dragomir, V., Radu, O., Ionescu, B.-S. and Ionescu-Feleaga, L. (2022). The Influence of ESG Factors on Financial Performance in the Banking Sector during the Covid-19 Pandemic. Economic Computation and Economic Cybernetics Studies and Research, 56, pp. 71-88. https://doi.org/10.24818/18423264/56.4.22.05

Draper, N.R. and Smith, H. (1998). Applied Regression Analysis. 3rd ed. Wiley, New York. https://doi.org/10.1002/9781118625590

Durbin, J. and Watson, G. S. (1951). Testing for Serial Correlation in Least Squares Regression. Biometrika, 37(3/4), pp. 409-428. https://doi.org/10.1093/biomet/37.3-4.409

Eccles, G. R. and Klimenko, S. (2019). The Investor Revolution. Harvard Business Review, 97, pp. 106-116. Available at: https://hbr.org/2019/05/the-investor-revolution

Edgar, T.W. and Manz, D.O. (2017). Exploratory Study. In: Research Methods for Cyber Security, pp. 95-130. https://doi.org/10.1016/b978-0-12-805349-2.00004-2

El Khoury, R., Nasrallah, N. and Alareeni, B. (2023). ESG and financial performance of banks in the MENAT region: concavity-convexity patterns. Journal of Sustainable Finance & Investment, 13(1), pp. 406-430. https://doi.org/10.1080/20430795.2021.1929807

Ersoy, E., Swiecka, B., Grima, S., Özen, E. and Romanova, I. (2022). The Impact of ESG Scores on Bank Market Value? Evidence from the U.S. Banking Industry. Sustainability, 14, 9527. https://doi.org/10.3390/su14159527

Ersoy, Ersan. (2021). The Determinants of The Non-Performing Loans: The Case of Turkish Banking Sector. International Journal of Insurance and Finance, 1(2), 1-11. https://doi.org/10.52898/ijif.2021.6

European Commission. (2022). Corporate sustainability due diligence. Retrieved from https://commission.europa.eu/business-economy-euro/doing-business-eu/corporate-sustainability-due-diligence_en [Accessed: date].

European Commission. (2023a). Carbon Border Adjustment Mechanism (CBAM). Available at: https://ec.europa.eu/commission/presscorner/detail/en/ip_23_4685 [Accessed 28 Nov. 2023].

European Commission. (2023b). The EU Emissions Trading System (EU ETS). Available at: https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets_en [Accessed 28 Nov. 2023].

European Parliament and Council. (2019). Regulation (EU) 2019/2088 on sustainability-related disclosures in the financial services sector. Official Journal of the European Union. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32019R2088

European Parliament and Council. (2020). Regulation (EU) 2020/852 on the establishment of a framework to facilitate sustainable investment and amending Regulation (EU) 2019/2088. Official Journal of the European Union. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32020R0852

Fernández, E. A. (2015). Banca Sostenible: Un análisis sobre su viabilidad financiera. Ph.D. Universidad Rey Juan Carlos [Online]. Available at: https://burjcdigital.urjc.es/bitstream/handle/10115/13585/TESIS%20ELISA%20ARACIL%20jun%2715.pdf?sequence=1&isAllowed=y [Accessed: 15 November 2022].

Fitzmaurice, G. M., Laird, N. M. and Ware, J. H. (2011). Applied Longitudinal Analysis. John Wiley & Sons, Inc. Available at: https://doi.org/10.1002/9781119513469

Freeman, R. E. (1984). Strategic management: A stakeholder approach. Prentice-Hall.

Friede, G., Busch, T., & Bassen, A. (2015). ESG and financial performance: Aggregated evidence from more than 2000 empirical studies. Journal of Sustainable Finance & Investment, 5(4), 210-233. https://doi.org/10.1080/20430795.2015.1118917

Fukuda-Parr, S. (2016). From the Millennium Development Goals to the Sustainable Development Goals: shifts in purpose, concept, and politics of global goal setting for development. Gender & Development, 24(1), pp. 43-52. https://doi.org/10.1080/13552074.2016.1145895

Gaganis, C., Pasiouras, F. and Tasiou, M. (2023). ESG and Credit Risk. In: Gaganis, C., Pasiouras, F., Tasiou, M. and Zopounidis, C. (eds) Sustainable Finance and ESG. Palgrave Macmillan Studies in Banking and Financial Institutions. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-031-24283-0_6

Green, J. and Newman, P. (2017). Disruptive innovation, stranded assets and forecasting: The rise and rise of renewable energy. Journal of Sustainable Finance & Investment, 7(2), pp. 169-187. https://doi.org/10.1080/20430795.2016.1265410

Greene, W.H. (2003). Econometric Analysis. 5th ed. Prentice Hall, Upper Saddle River. ISBN 0-13-066189-9.

Greenhouse Gas Protocol. (2023). Available at: https://ghgprotocol.org/ [Accessed: 22 November 2023].

Guinnane, T. W. (1997). Regional organizations in the German cooperative banking system in the late 19th century. Research in Economics, 51(3), 251-274.

Gujarati, D. N. and Porter, D. C. (2009). Basic Econometrics. 5th ed. McGraw Hill Inc., New York. ISBN 0071276254, 9780071276252

Gurol, B. and Lagasio, V. (2022). Women board members' impact on ESG disclosure with environment and social dimensions: evidence from the European banking sector. Social Responsibility Journal, 19(1), pp. 211-228. https://doi.org/10.1108/SRJ-06-2021-0266

Haldane, A. and Madouros, V. (2012). The dog and the frisbee. Proceedings - Economic Policy Symposium - Jackson Hole, pp. 109-159. Available at: https://EconPapers.repec.org/RePEc:fip:fedkpr:y:2012:p:109-159

Halvorsen, R. and Palmquist, R. (1980). The interpretation of dummy variables in semilogarithmic equations. American Economic Review, 70(3), pp. 474-475.

Hamdi, K., Guenich, H. and Saada, M. B. (2022). Does corporate financial performance promote ESG: Evidence from US firms. Cogent Business & Management, 9(1). https://doi.org/10.1080/23311975.2022.2154053

Hausman, J. A. (1978). Specification Tests in Econometrics. Econometrica, 46(6), pp. 1251-1271. https://doi.org/10.2307/1913827

Hebb, T. (2008). No Small Change: Pension Funds and Corporate Engagement. Ithaca, NY: ILR Press. ISBN 978-0-8014-4696-2.

Hoerl, A. E. and Kennard, R. W. (1970). Ridge Regression: Biased Estimation for Nonorthogonal Problems. Technometrics, 12(1), pp. 55-67. https://doi.org/10.2307/1267351

Hsiao, C. (2003). Analysis of Panel Data. 2nd ed. Cambridge University Press. https://doi.org/10.1017/CBO9780511754203

Hwang, J., Kim, H. and Jung, D. (2021). The Effect of ESG Activities on Financial Performance during the COVID-19 Pandemic-Evidence from Korea. Sustainability, 13, 11362. https://doi.org/10.3390/su132011362

IPCC. (2023). The Intergovernmental Panel on Climate Change. Available at: https://www.ipcc.ch/ [Accessed: 22 November 2023].

Kalfaoglou, F. (2021). ESG Risks: A New Source of Risks for the Banking Sector. Bank of Greece Economic Bulletin, Issue 53, Article 5. https://doi.org/10.52903/econbull20215305. Available at SSRN: https://ssrn.com/abstract=4201732

Keeton, W.R. (1999). Does faster loan growth lead to higher loan losses? Economic Review-Federal Reserve Bank of Kansas City, 84(2), pp. 57-75.

Kim, S. and Li, Z. (2021). Understanding the Impact of ESG Practices on Corporate Finance. Sustainability, 13, 3746. https://doi.org/10.3390/su13073746

Kirschenmann, K. (2022). The EU Taxonomy's (Potential) Effects on the Banking Sector and Bank Lending to Firms. The Economists' Voice, 19(2), pp. 275-283. https://doi.org/10.1515/ev-2022-0027

KKS Advisors et al. (2019). Driving value creation through ESG practices. Deloitte. [online]. Available at: https://www2.deloitte.com/uk/en/pages/financial-services/articles/driving-value-creation-through-esg-practices.html [Accessed: 01 Jun. 2023].

Klassen, R. D., & McLaughlin, C. P. (1996). The impact of environmental management on firm performance. Management Science, 42(8), 1199-1214.

Koundouri, P., Pittis, N. and Plataniotis, A. (2022). The Impact of ESG Performance on the Financial Performance of European Area Companies: An Empirical Examination. Environ. Sci. Proc., 15, 13. https://doi.org/10.3390/environsciproc2022015013

Kutner, M. H., Nachtsheim, C. J., Neter, J. and Li, W. (2004). Applied Linear Statistical Models. 5th ed. McGraw-Hill Irwin, Boston. ISBN-13: 9780072386882

La Torre, M., Leo, S. and Panetta, I. C. (2021). Banks and environmental, social and governance drivers: Follow the market or the authorities? Corp Soc Responsib Environ Manag., 28, pp. 1620-1634. https://doi.org/10.1002/csr.2132

La Torre, M., Leo, S. and Panetta, I. C. (2023). 'Corporate financial performance and ESG performance: which one leads European banks?', in La Torre, M. and Leo, S. (eds.) *Contemporary issues in sustainable finance: exploring performance, impact measurement and financial inclusion*. [online] Available at: https://ssrn.com/abstract=4368497

Lankoski, L. (2008). Corporate responsibility activities and economic performance: A theory of why and how they are connected. Business Strategy and the Environment, 17(8), pp. 536-547. https://doi.org/10.1002/bse.582

Le Blanc, D. (2015). Towards integration at last? The Sustainable Development Goals as a network of targets. Sustainable Development, 23(3), pp. 176-187. https://doi.org/10.1002/sd.1582

Leins, S. (2020). Responsible investment: ESG and the post-crisis ethical order. Economy and Society, 49, pp. 1-21. https://doi.org/10.1080/03085147.2020.1702414

Li, K., & van Rijn, J. (2022). Credit union and bank subprime lending in the great recession. The Review of Corporate Finance Studies.

Liu, H., Wu, K. and Zhou, Q. (2022). Whether and How ESG Impacts on Corporate Financial Performance in the Yangtze River Delta of China. Sustainability, 14, 16584. https://doi.org/10.3390/su142416584

Louzis, D.P., Vouldis, A.T. and Metaxas, V.L. (2012). Macroeconomic and bank-specific determinants of non-performing loans in Greece: A comparative study of mortgage, business, and consumer loan portfolios. Journal of Banking & Finance, 36(4), pp. 1012-1027.

Lupu, I., Hurduzeu, G. and Lupu, R. (2022). How Is the ESG Reflected in European Financial Stability? Sustainability, 14, 10287. https://doi.org/10.3390/su141610287

Marsh, A. (2021). Banks Produce 700 Times More Emissions from Loans Than Offices. Bloomberg News. Available at: https://www.bloomberg.com/professional/blog/banks-produce-700-times-more-emissions-from-loans-than-offices/ [Accessed 24 Apr. 2024]

McGuire, J. B., Sundgren, A. and Schneeweis, T. (1988). Corporate social responsibility and firm financial performance. Academy of Management Journal, 31(4), pp. 854-872.

Milano, R. (2011). Social banking: A brief history. In O. Weber & S. Remer (Eds.), Social banks and the future of sustainable finance (pp. 15-47). Routledge.

MSCI. (2024a). MSCI ESG Ratings Methodology. Available at: https://www.msci.com/documents/1296102/34424357/MSCI+ESG+Ratings+Methodology.pdf [Accessed 29 February 2024].

MSCI. (2024b). ESG Ratings: MSCI ESG Ratings Key Issue Framework. Available at: https://www.msci.com/our-solutions/esg-investing/esg-ratings/esg-ratings-key-issue-framework [Accessed: 26 February 2024].

Murè, P., Spallone, M., Mango, F., Marzioni, S. and Bittucci, L. (2021). ESG and reputation: The case of sanctioned Italian banks. Corp Soc Responsib Environ Manag., 28, pp. 265-277. https://doi.org/10.1002/csr.2047

Nakao, Y., Amano, A., Matsumura, K., Genba, K., & Nakano, M. (2007). Relationship between environmental performance and financial performance: An empirical analysis of Japanese corporations. Business Strategy and the Environment, 16, 106-118.

Ng, T. H., Lye, C.-T., Chan, K. H., Lim, Y.-Z. and Lim, Y. S. (2020). Sustainability in Asia: The Roles of Financial Development in Environmental, Social and Governance (ESG) Performance. Social Indicators Research, 150. https://doi.org/10.1007/s11205-020-02288-w

Osborne, J. W. (2010). Improving your data transformations: Applying the Box-Cox transformation. Practical Assessment, Research, and Evaluation, 15(12). ISSN 1531-7714.

Penman, S.H. (2013). Financial Statement Analysis and Security Valuation. 5th ed. McGraw-Hill Higher Education. ISBN: 0078025311.

Pesaran, M. H. and Smith, R. (1995). Estimating Long-Run Relationships from Dynamic Heterogeneous Panels. Journal of Econometrics, 68, pp. 79-113. https://doi.org/10.1016/0304-4076(94)01644-F

Pisani, F. and Russo, G. (2021). Sustainable Finance and COVID-19: The Reaction of ESG Funds to the 2020 Crisis. Sustainability, 13, 13253. https://doi.org/10.3390/su132313253

PricewaterhouseCoopers (PwC). (2024). CSRD - vállalati fenntarthatósági jelentéstétel [Corporate Sustainability Reporting Directive]. PwC Hungary. Available at: https://www.pwc.com/hu/hu/szolgaltatasok/esg/nem_penzugyi_jelentestetel/csrd.html [Accessed: 29 March 2024].

Răpan, C., Costin, B. V., Manea, A. and Aridah, M. (2022). Value Relevance of ESG Scores: Evidence from European Stock Exchange Markets. Oblik i finansi, pp. 68-75. https://doi.org/10.33146/2307-9878-2022-2(96)-68-75

Rabe-Hesketh, S. and Skrondal, A. (2012). Multilevel and Longitudinal Modeling Using Stata, Volume I: Continuous Responses. 3rd ed. Stata Press. ISBN: 978-1-59718-108-2

Rajan, R.G. and Dhal, S.C. (2003). Non-performing Loans and Terms of Credit of Public Sector Banks in India: An Empirical Assessment. Reserve Bank of India Occasional Papers, 24(3), pp. 81-121.

Resti, A. and Sironi, A. (2007). Risk Management and Shareholders' Value in Banking: From Risk Measurement Models to Capital Allocation Policies. Wiley. ISBN 978-0-470-51073-5.

Reyna, O.T. (2007). Panel Data Analysis: Fixed and Random Effects using Stata. [online] Available at: https://www.princeton.edu/~otorres/Panel101.pdf [Accessed 3 Oct. 2021].

RGGI. (2023). Regional Greenhouse Gas Initiative Overview. Available at: https://www.rggi.org/program-overview-and-design/elements [Accessed 28 Nov. 2023].

Richardson, B.J. (2009). Keeping Ethical Investment Ethical: Regulatory Issues for Investing for Sustainability. Journal of Business Ethics, 87(4), pp. 555-572. https://doi.org/10.1007/s10551-008-9958-y

Richardson, B.J. and Cragg, W. (2010). Being Virtuous and Prosperous: SRI's Conflicting Goals. Journal of Business Ethics, 92(1), pp. 21-39. https://doi.org/10.1007/s10551-010-0632-9

Sachs, J.D. (2015). The Age of Sustainable Development. Columbia University Press, New York. https://doi.org/10.7312/sach17314.

Salas, V. and Saurina, J. (2002). Credit risk in two institutional regimes: Spanish commercial and savings banks. Journal of Financial Services Research, 22(3), pp. 203-224.

Savio, R., D'Andrassi, E. and Ventimiglia, F. (2023). A Systematic Literature Review on ESG during the COVID-19 Pandemic. Sustainability, 15, 2020. https://doi.org/10.3390/su15032020

Schmaltz, C., Heidorn, T. and Kühn, R. (2014). Risk-adjusted asset allocation and the diversification of risk. Journal of Banking & Finance, 41, pp. 87-96.

Scholtens, B., & Zhou, Y. (2008). Stakeholder relations and financial performance. Sustainable Development, 16(3), 213-232. https://doi.org/10.1002/ sd.364

Schueth, S. (2003). Socially Responsible Investing in the United States. Journal of Business Ethics, 43(3), pp. 189-194. https://doi.org/10.1023/A:1022981828869

Șerban, R. A., Mihaiu, D. M. and Tichindelean, M. (2022). Environment, Social, and Governance Score and Value-Added Impacts on Market Capitalization: A Sectoral-Based Approach. Sustainability, 14, 2069. https://doi.org/10.3390/su14042069

Strauch, Y., Dordi, T. and Carter, A. (2020). Constraining fossil fuels based on 2°C carbon budgets: The rapid adoption of a transformative concept in politics and finance. Climatic Change, 160(2), pp. 181-201. https://doi.org/10.1007/s10584-020-02695-5

Subramanian, S., Kabra, M., Chopra, S., Yeo, J., Strzelinska, P. and Huang, L. (2019). ESG Matters - Global: ESG from A to Z: a global primer. Bank of America Merrill Lynch. Available at: https://www.wlrk.com/docs/ESG_A_to_Z.pdf [Accessed 29 Mar. 2024].

Sustainalytics. (2024). Portfolio Methodology Report Series - ESG Risk Ratings: A 360° Review. Available at: https://connect.sustainalytics.com/inv-esg-risk-ratings-a-360-review-ebook [Accessed: 26 Feb. 2024].

Tabachnick, B. G. and Fidell, L. S. (2013). Using Multivariate Statistics. 6th ed. Boston, MA: Pearson.

Taliento, M., Favino, C. and Netti, A. (2019). Impact of Environmental, Social, and Governance Information on Economic Performance: Evidence of a Corporate 'Sustainability Advantage' from Europe. Sustainability, 11, 1738. https://doi.org/10.3390/su11061738

Tarullo, D. K. (2014). Rethinking the aims of prudential regulation: Remarks at the Federal Reserve Bank of Chicago Bank Structure Conference, Chicago, Illinois. In Statements and Speeches of Daniel K. Tarullo. Available at: https://fraser.stlouisfed.org/title/statements-speeches-daniel-k-tarullo-910/rethinking-aims-prudential-regulation-476715

Taylor, S. (2024) 'Regression Analysis', Corporate Finance Institute, March. Available at: https://corporatefinanceinstitute.com/resources/data-science/regression-analysis/ (Accessed: 14 July 2024).

Tóth, B., Lippai-Makra, E., Szládek, D. and Kis, G.D. (2021). The contribution of ESG information to the financial stability of European banks. Financial Review, 66(3). Available at: https://journals.lib.uni-corvinus.hu/index.php/penzugyyszemle/article/view/1233

UNEP FI. (2023). Principles for Responsible Banking: Shaping the future of banking. Available at: https://www.unepfi.org/banking/bankingprinciples/ [Accessed: 22 Nov. 2023]

Weber, O. (2017). Corporate sustainability and financial performance of Chinese banks. Sustainability Accounting, Management and Policy Journal, 8(3), 358- 385. https://doi.org/10.1108/SAMPJ-09-2016-0066

Weber, O. (2023). ESG Issues as Strategic Components of Long-term Success of Financial Institutions: Are There Differences in Financial Performance and Firm Value? In Sustainable Finance and ESG, Palgrave Macmillan Studies in Banking and Financial Institutions, C. Gaganis et al. (eds.), pp. 27-46. https://doi.org/10.1007/978-3-031-24283-0_2

Weber, O., & Feltmate, B. (2016). Sustainable banking: Managing the social and environmental impact of financial institutions. University of Toronto Press.

Weber, O., Fenchel, M., & Scholz, R. W. (2008). Empirical analysis of the integration of environmental risks into the credit risk management process of European banks. Business Strategy and the Environment, 17, 149-159. https://doi.org/10.1002/bse.507

Weber, O., Hoque, A. and Islam, A. M. (2015). Incorporating environmental criteria into credit risk management in Bangladeshi banks. Journal of Sustainable Finance & Investment, 5(1-2), pp. 1-15. https://doi.org/10.1080/20430795.2015.1008736

Wernerfelt, B. (1984). A resource-based view of the firm. Strategic Management Journal, 5(2), pp. 171-180. https://doi.org/10.2307/2486175

White, H. (1980). A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity. Econometrica, 48(4), pp. 817-838. https://doi.org/10.2307/1912934

Wood, J. (2018). The Pros and Cons of Carbon Taxes and Cap-and-Trade Systems. The School of Public Policy Publications, 11, pp. 1-19. Available at: https://doi.org/10.11575/sppp.v11i0.52974 [Accessed: 8 Dec. 2020].

Wooldridge, J. M. (2010). Econometric Analysis of Cross Section and Panel Data. The MIT Press. Available at: https://doi.org/10.2307/j.ctt5hhcfr

Wooldridge, J.M. (2012). Introductory Econometrics-A Modern Approach. 5th ed. Cengage Learning, Boston.

World Resources Institute. (2023). China's National Emissions Trading System: Implications for Carbon Markets and Trade. Available at: https://www.wri.org/research [Accessed: 28 Nov. 2023].

Zhang, D. and Liu, L. (2022). Does ESG Performance Enhance Financial Flexibility? Evidence from China. Sustainability, 14, 11324. https://doi.org/10.3390/su141811324

Zumente, I. and Lāce, N. (2021). ESG Rating-Necessity for the Investor or the Company? Sustainability, 13, 8940. https://doi.org/10.3390/su13168940

Zumente, I. and Lāce, N. (2022). Are We There Yet? The Evaluation of ESG Impact on Corporate Financial Performance in CEE. In 12th International Scientific Conference "Business and Management 2022" (pp. 1-7). Vilnius Tech. ISBN 978-609-476-288-8. e-ISBN 978-609-476-289-5. ISSN 2029-4441. e-ISSN 2029-929X. https://doi.org/10.3846/bm.2022.718

APPENDIX A: Comparison of the available literature on the ESG research topic

| Citation | Focus Area | Geographic Scope | Key Findings | Methodological Approach | Critiques/Opinions | Identified Gaps |
|---|---|---|---|---|---|---|
| Zumente & Lāce (2021) | ESG Ratings in Financial Markets | Europe | Significant discrepancies in ESG ratings impact trading volumes and stock returns. | Independent t-test analysis | Calls for standardization in ESG rating methodologies. | Standardization of ESG ratings |
| Răpan et al. (2022) | ESG Scores and Share Prices | European Stock Exchanges | ESG scores significantly influence share prices, enhancing company market valuation. | Ohlson price model | Validates the financial relevance of ESG scores. | Broader market comparisons |
| Ahmad, Mobarek, & Roni (2021) | ESG Integration and Financial Performance | UK | Positive correlation between ESG performance and financial performance, influenced by firm size. | Static and dynamic panel data analysis | Mixed results across different ESG dimensions. | Deeper analysis on dimension impacts |
| Bax, Bonaccolto, & Paterlini (2023) | ESG Ratings and Systemic Risk | Europe, USA | Higher ESG scores are associated with lower systemic risk, especially during COVID-19. | QL-CoVaR | Highlights ESG's role in reducing systemic risk but focuses on crisis periods. | Exploration beyond crisis periods |
| Pisani & Russo (2021) | Sustainable Investment Funds | Europe | Funds with higher ESG ratings performed better during economic turmoil. | GARCH models, event studies | Advocates for ESG integration in investment decisions. | Long-term performance analysis |
| La Torre, Leo, & Panetta (2021) | ESG Drivers and Financial Benchmarks in Banks | Europe | ESG factors significantly influence financial benchmarks; market reactions suggest insufficient incentives for voluntary ESG integration. | Panel estimation methods | Regulatory pressures drive ESG adoption more than market forces. | Effectiveness of market incentives |
| Ng et al. (2020) | Financial Development and ESG Performance | Asian Economies | Positive association between financial development and ESG performance. | Various econometric tools | Highlights a synergistic relationship but needs more regional data. | Regional and sector-specific studies |
| Lupu, Hurduzeu, & Lupu (2022) | ESG Scores and Financial | Europe | ESG scores significantly influence | Cross-quantilogram methodology | ESG impacts on financial stability are | Detailed analysis of ESG dimensions |

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| | Stability in Banks | | financial stability in banks. | | not uniform across distributions. | |
| Chiaramonte et al. (2022) | ESG Strategies and Bank Stability | Europe | Higher ESG scores enhance bank stability, especially during financial distress. | Differences-in-differences analysis | Strong link between ESG and stability; variability across banks noted. | Long-term stability analysis |
| Kim & Li (2021) | ESG Factors and Corporate Financial Performance | Not specified | Governance and social factors significantly impact profitability and credit ratings; environmental scores have a negative effect. | Not specified | Unique insights into ESG dimensions; calls for sector-specific analyses. | Sector and size-specific analyses |
| Kirschenmann (2022) | EU Taxonomy and Bank Lending | Europe | Unclear if EU Taxonomy influenced tangible environmental improvements despite changing lending practices. | Not specified | Questions the direct impact of regulatory changes on sustainability outcomes. | Assessment of long-term impacts |
| Birindelli et al. (2018) | Board Composition and ESG Performance in Banks | Europe, USA | Gender diversity and board characteristics significantly impact ESG performance. | Fixed effects panel regression | Highlights importance of balanced gender representation; more data needed on CSR impacts. | Broader industry analysis |
| Leins (2020) | ESG Integration in Financial Analysis | Global | ESG factors are increasingly incorporated into financial valuation and investment strategies. | Ethnographic data analysis | Shifts focus from ethical to valuation considerations in investment. | Longitudinal studies on impact |
| Kalfaoglou (2021) | ESG Risks in Banking | Not specified | Identifies ESG risks as a new risk category necessitating robust management frameworks. | Theoretical analysis | Urges for more comprehensive risk management strategies. | Implementation studies |
| Di Tommaso & Thornton (2020) | ESG Scores, Risk-Taking, and Bank Value | Europe | ESG scores correlate with reduced risk-taking but may decrease bank value. | Not specified | Highlights a trade-off between risk management and value creation. | More nuanced analysis of trade-offs |
| Liu, Wu, & Zhou (2022) | ESG Impact on Financial Performance in China | Yangtze River Delta | Varied impacts of ESG dimensions on financial performance; governance | Panel regression analysis | Suggests a need for a socially approved ESG framework in China. | Long-term impact studies |

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| | | | positive, environmental negative. | | | |
| Ersoy et al. (2022) | ESG Scores and Bank Market Value | U.S. | Complex relationships between ESG scores and market value, with inverted and U-shaped correlations identified. | Linear and non-linear panel regression models | Indicates non-linear impacts of ESG factors on financial performance. | Further studies on causation |
| Murè et al. (2021) | ESG Practices and Reputation Management in Banks | Italy | ESG scores influence reputational recovery post-financial sanctions. | Econometric analysis | Demonstrates proactive use of ESG for reputation management. | Studies on pre-sanction ESG levels |
| El Khoury, Nasrallah, & Alareeni (2023) | ESG and Bank Performance in MENAT | MENAT | Non-linear relationship between ESG initiatives and financial outcomes; diverse impacts of ESG pillars. | Regression analysis | Highlights the need for a balanced ESG strategy. | Broader cross-regional studies |
| Gurol & Lagasio (2022) | Board Structure and ESG Disclosure in Banks | Europe | Board diversity positively correlates with better ESG disclosure. | Regression analysis | Advocates for more diversity for improved sustainability practices. | Longitudinal impact studies |
| Zhang and Liu (2022) | ESG & Financial Flexibility | China | Positive correlation between ESG engagement and financial flexibility. | Advanced statistical techniques | Limited geographic scope; focuses only on China. | Expansion to other regions |
| Hamdi et al. (2022) | Financial Performance & ESG | U.S. | Bidirectional influence between financial robustness and ESG efforts. | Random-effects panel data model | Highlights financial-ESG interaction but lacks depth on ESG impacts across sectors. | Sector-specific analysis |
| Chams et al. (2021) | Financial Performance & ESG with TQM | Global Multinationals | Financial performance can predict ESG engagement; mixed effects of TQM. | Distributed lag regression model | Novel insights into TQM's role, yet complex interplays could be explored further. | Detailed industry comparisons |
| Chen et al. (2023) | ESG & Corporate Financial Performance | Global | Strong positive correlation between ESG performance and CFP, especially in high-risk contexts. | Panel regression model | Comprehensive and robust analysis but lacks granular methodological details. | Enhanced methodological clarity |
| Tóth et al. (2021) | ESG & Financial Stability in Banks | EU & EFTA | Higher ESG scores are linked to better financial stability and lower non- | Panel regression methods | Important for regulatory implications but limited by geographic focus on Europe. | Global analysis |

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| | | | performing loans. | | | |
| Hwang et al. (2021) | ESG & Financial Resilience during COVID-19 | Korea | ESG activities shield firms from severe economic downturns during the pandemic. | Empirical analysis | Strong context-specific insights but needs broader temporal scope. | Longer timeline analysis |
| Bătae et al. (2020) | ESG & Financial Performance in European Banks | Europe | Noted regional disparities in ESG impact on financial performance. | Cluster analysis, ANOVA test | Unique regional insights but year-specific data limits broader implications. | More recent data |
| La Torre et al. (2021) | ESGP and CFP in European Banks | Europe | Diverse impacts of ESG on different financial performance metrics. | Panel data analysis | Highlights need for integrated ESG practices but focuses narrowly on banking. | Wider industry analysis |
| Serban et al. (2022) | ESG Scores & Market Capitalization | Europe | Significant correlation between ESG scores and market capitalization, with industry-specific variations. | Multiple linear and quantile regression | Provides sector-specific insights; however, it doesn't address non-European contexts. | Expansion beyond Europe |
| Zumente & Lāce (2022) | ESG Impact on Financial Performance in CEE | Central and Eastern Europe | Challenges the positive correlation assumption between high ESG scores and financial performance. | Quartile analysis | Challenges prevailing assumptions but focuses on a specific region. | Broader geographic scope |
| De Lucia et al. (2020) | ESG & Financial Performance in Public Enterprises | Europe | Positive correlation between ESG practices and financial performance in public sectors. | Machine learning and logistic regression models | Advances understanding in public sector but lacks private sector comparison. | Include private sector analysis |
| Taliento et al. (2019) | ESG Disclosure & Economic Performance | Europe | ESG disclosure offers a competitive edge; relative ESG performance is significant. | PLS and SEM | Innovative approach but focuses on large firms only. | Small and medium enterprises |
| Buallay et al. (2021) | Sustainability Reporting & Bank Performance | Europe | Negative relationship between ESG scores and performance metrics, highlighting complex interplays. | Data analysis across multiple regions | Sheds light on the nuanced impacts of ESG but needs more contextual factors. | Consideration of more factors |
| Dragomir et al. (2022) | ESG & Financial Performance | Global | Environmental performance had a varied impact on | Data analysis from Refinitiv database | Crucial pandemic-era insights but focuses on banks only. | Diverse industries |

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| | during COVID-19 | | financial outcomes during the pandemic. | | | |
| Koundouri et al. (2022) | ESG Performance & Financial Health | Europe | Links ESG performance with financial health; the impact is sector specific. | ESG reporting frameworks analysis | Important insights into legal obligations impact but needs more sectors. | Broader sectoral analysis |

APPENDIX B: List of banks used in the assessment

ABN AMRO BANK N.V: ABN AMRO is a Dutch bank offering a range of products and services to retail, private, and corporate clients in the Netherlands and internationally.

AIB GROUP PLC: AIB Group is a banking and financial services company in Ireland. It operates predominantly in Ireland and the UK.

ALIOR BANK SA: Alior Bank is a universal bank based in Poland, offering a wide range of banking products and services to both individual and institutional clients.

ALPHA SERVICES AND HOLDINGS: Alpha Bank, a part of Alpha Services and Holdings, is one of the largest Greek banks.

BANCA MEDIOLANUM SPA: Banca Mediolanum is an Italian bank, insurance and asset management conglomerate.

BANCA MONTE DEI PASCHI SIENA: Founded in 1472, it is considered the world's oldest surviving bank. It is an Italian commercial and retail bank headquartered in Siena.

BANCA POPOLARE DI SONDRIO: An Italian cooperative bank based in Sondrio, Lombardy.

BANCO BILBAO VIZCAYA ARGENTARIA (BBVA): BBVA is a Spanish multinational financial services company. It is one of the largest financial institutions in the world.

BANCO BPM SPA: An Italian bank that started operations in 2017, a merger of Banco Popolare and Banca Popolare di Milano.

BANCO COMERCIAL PORTUGUES: Also known as Millennium bcp, it is the largest private bank in Portugal.

BANCO DE SABADELL SA: The fifth-largest Spanish banking group, includes several banking brands, insurance, asset management, and more.

BANK HANDLOWY W WARSZAWIE SA: Trading as Citi Handlowy, it is a part of the Citi Group, one of the largest financial conglomerates globally. It is a Polish bank with its headquarters in Warsaw.

BANK MILLENNIUM SA: A Polish nationwide universal bank, catering to individual and corporate customers, offering its services through branches, a network of ATMs and the Internet.

BANK OF GEORGIA GROUP PLC: One of the leading Georgian banks.

BANK OF IRELAND GROUP PLC: One of the traditional 'Big Four' Irish banks, which offers international services besides its core markets of Ireland and the UK.

BANKINTER SA: A Spanish bank and financial services company headquartered in Madrid.

BNP PARIBAS BANK POLSKA SA: The Polish division of French international banking group BNP Paribas.

BPER BANCA: An Italian banking group offering traditional banking services to individuals, corporate and public entities.

CAIXABANK SA: A Spanish financial services company, which includes banking and insurance services.

COMMERZBANK AG: A major German bank operating as a universal bank, headquartered in Frankfurt am Main.

DANSKE BANK A/S: Danske Bank is a Danish bank whose name also literally translates into "Danish Bank". It was founded on 5 October 1871.

DNB BANK ASA: DNB ASA is Norway's largest financial services group with total combined assets of more than NOK 1.9 trillion.

ERSTE GROUP BANK AG: An Austrian bank and one of the largest financial services providers in Central and Eastern Europe.

EUROBANK ERGASIAS SERVICES: Eurobank Ergasias is the third largest bank in Greece by total assets and total loans, with more than 860 branches globally.

ING BANK SLASKI SA: The Polish operation of the Dutch multinational banking and financial services corporation, ING Group.

ING GROEP NV: A Dutch multinational banking and financial services corporation headquartered in Amsterdam, operating in over 40 countries.

KBC GROUP NV: A Belgian universal multi-channel bank-insurer, focusing on private clients and small and medium-sized enterprises in Belgium, Ireland, Central Europe and Southeast Asia.

KOMERCNI BANKA AS: A major Czech bank and the parent company of KB Group, a member of the Société Générale international financial group.

LLOYDS BANKING GROUP PLC: A major British financial institution, offering a wide range of banking and financial services in the UK and overseas.

MBANK SA: mBank is a Polish direct bank, part of Commerzbank.

MEDIOBANCA SPA: An Italian investment bank and financial services company headquartered in Milan.

METRO BANK PLC: A retail bank operating in the United Kingdom, founded by Vernon Hill in 2010.

MONETA MONEY BANK AS: A leading Czech bank providing retail and SME banking services.

NATIONAL BANK OF GREECE: The oldest and one of the largest commercial Greek banks.

NORDEA BANK ABP: The largest financial group in Northern Europe, operating in 20 countries, headquartered in Helsinki.

OTP BANK PLC: OTP Bank Group is one of the largest independent financial service providers in Central and Eastern Europe.

PERMANENT TSB GROUP HOLDINGS: A provider of personal financial services in Ireland.

PIRAEUS FINANCIAL HOLDINGS SA: One of the largest banking groups in Greece, offering a full range of financial products and services to approximately 5.4 million customers.

PKO BANK POLSKI SA: The largest and oldest Polish bank, it has been listed on the Warsaw Stock Exchange since 2004.

RAIFFEISEN BANK INTERNATIONAL: An Austrian banking group, it operates a network in Central and Eastern European countries.

SANTANDER BANK POLSKA SA: A Polish bank, part of the Santander Group.

SKANDINAVISKA ENSKILDA BANAN: Often abbreviated as SEB, it is a Swedish financial group for corporate customers, institutions, and private individuals.

SPAREBANKEN VEST: A Norwegian savings bank, operating in Western Norway.

SVENSKA HANDELSBANKENA SHS: Known as Handelsbanken, it is a Swedish bank providing universal banking services including traditional corporate transactions, investment banking and trading.

SWEDBANK AB: A Nordic-Baltic banking group offering retail banking, asset management, financial, and other services.

SYDBANK A/S: One of Denmark's largest full-service banks headquartered in Aabenraa.

TURKIYE HALK BANKASI: Known as Halkbank, it is a state-owned bank in Turkey.

TURKIYE VAKIFLAR BANKASI TD: Known as VakıfBank, it is the fifth largest bank in Turkey in terms of assets.

UNICREDIT SPA: UniCredit is a large Italian global banking and financial services company that offers local expertise as well as international reach.

VIRGIN MONEY UK PLC: Part of Virgin Money Holdings, it is a bank in the United Kingdom that was established in 2018 following the merger of CYBG plc and Virgin Money plc.

YAPI VE KREDI BANKASI: Yapı ve Kredi Bankası or Yapı Kredi is one of the first nationwide commercial banks in Turkey and is the fourth largest publicly owned bank in Turkey.