

**UNIVERSITY OF MISKOLC
FACULTY OF ECONOMICS**



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

Theses of the PhD dissertation

Miskolc, 2025

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MANAGEMENT AND REGIONAL SCIENCES**

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1. Topicality of the Theme and Research Hypotheses

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 is emblematic of 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 noteworthy development in this context is the recalibration of credit rating methodologies by agencies to include ESG ratings in their calculations. 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 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, Fenchel 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.

Furthermore, at the heart of this study lies a central hypothesis: that higher ESG scores not only contribute to the global pursuit of sustainability but are also correlated with superior performances within 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.

2. Definition of the 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 A.

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).

Valeria et al. (2021) seeks 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, I used it in my thesis to seek its impact on banks ESG Score.

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 was 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, I have chosen to include the Non-Performing Loans to Total Loans (NPL/TL) ratio to validate the findings of Ersan et al. (2022). Their study concluded that while the NPL/TL ratio is a measure of loan quality and is expected to adversely affect bank value, the relationship was not statistically significant in most of their models.

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 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.

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

<u>Air Quality</u> Air Emissions Air Emissions Policies <u>Climate Exposure</u> Transition Risk <u>Ecological Impact</u> Ecosystem Protection Environmental Fines Environmental Incidents <u>Energy Management</u> Energy Consumption Renewable Energy Use <u>Environmental Supply Chain Management</u> Sustainable Sourcing	<u>GHG Emissions Management</u> GHG Emissions GHG Emissions Policies GHG Regulation GHG Target <u>Sustainable Product</u> Green Product <u>Waste Management</u> Hazardous Waste Generation Hazardous Waste Recycling Waste Generation Waste Recycling <u>Water Management</u> Wastewater Water Use Water Use Policies
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Figure 1. Pillars, Issues and Sub-Issues Bloomberg's Environmental Scores
Source: 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

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

Figure 2. Pillars, Issues and Sub-Issues Bloomberg's Social Scores
Source: 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

BOARD COMPOSITION			
Director Roles	Diversity	Independence	Refreshment
CEO Roles	Age Diversity	Board Leadership Independence	Board Refreshment
Chair Roles	Gender Diversity	Board Independence	Chair Refreshment
Board Roles			
EXECUTIVE COMPENSATION			
Incentive Structure	Pay Governance	Pay for Performance	
CEO Incentive Plan Design	Compensation Board Oversight	Fixed Pay Alignment	
Executive Incentive Plan Design	Gender Diversity	Variable Pay Performance	
Executive Pay Equity	Say on Pay		
Executive Pay Linkages	Pay Policies		
SHAREHOLDER RIGHTS			
Shareholder Policies	Director Voting		
Takeover Defense	Director Terms		
Voting Rights	Director Support		
Director Election Policies			

Figure 3. 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.

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 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 was used for the statistical analysis of this thesis, which is an open-source software. 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, in order to do a preliminary testing of it, and 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.

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 statistic is 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 the 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. Final Results

As outlined in the previous section, due to heteroskedasticity in the dataset, the Clustered Standard Errors method was implemented to the Random Effects model. Initially, the combined ESG scores were used as dependent variables, and the results are shown below:

Dependent Variable - ESG

Table 1. 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 (Environmental, Social, Governance) scores, as indicated by a p-value of 0.9248. This finding aligns with the conclusions of Ersan 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. By including the NPL/TL ratio in my research, I aimed to validate these findings, and my 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 (Environmental, Social, Governance) 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 my thesis, I used ROE 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. While Buallay's study showed mixed results, my 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 my 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 2. 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.

Author's comment: 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.

Author's comment: 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.

Author's comment: 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.

Author's comment: 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 for 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 does not significantly impact environmental scores (coefficient: 0.0017, p-value: 0.9248). Therefore, H0-2 is accepted, and both H2a and H2b are rejected. This result indicates that the proportion of non-performing loans, which is a critical measure of loan

quality, does not influence a bank's environmental performance. This aligns with previous studies that have found the relationship between loan quality and ESG performance to be statistically insignificant. The negligible impact suggests that while non-performing loans are crucial for understanding a bank's financial health, they do not directly affect the bank's efforts or success in achieving environmental goals. Other factors such as corporate policies, stakeholder engagement, and regulatory compliance may play more significant roles in shaping a bank's environmental performance.

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.

6. Conclusion

The incorporation of Environmental, Social, and Governance (ESG) criteria within the banking sector marks a significant evolution in assessing banks' creditworthiness and operational methods. This research sets out to explore the complex connections between ESG scores and both the financial and non-financial performance metrics of European banks. Using data from 51 European banks covering the years from 2017 to 2021, a detailed panel data regression model was employed to scrutinize these relationships. The results suggest that ESG integration has begun to impact banks' financial stability, governance structures, and overall sustainability. With further data and more extensive integration, clearer indications of these effects are likely to emerge.

ESG considerations have become central in banking, mirroring a global trend towards sustainable development. Credit rating agencies are updating their methodologies to include ESG ratings, emphasizing the link between financial soundness and adherence to ESG standards. This update marks a fundamental shift in how banks' creditworthiness is evaluated, with lower ESG scores potentially harming credit ratings. The composition of loan portfolios, especially loans to high-impact industries like oil and gas, significantly affects ESG ratings. This underscores the need for banks to balance financial goals with environmental responsibilities, particularly their "E Score" in ESG metrics. Corporate finance activities, such as raising capital through equity or debt, are also crucial for exploration. ESG ratings, especially their governance aspects, are closely tied to stakeholder satisfaction, underscoring the importance of proactive measures that align with environmental and social factors while maintaining strong governance.

The concept of ESG and sustainability in banking has historical roots. In sixteenth-century Italy, early banks acted as intermediaries between savers and those needing funds for essential regional businesses, guided by ethical standards from the Catholic Church, unlike usurious moneylenders. These early practices laid the groundwork for integrating ethical considerations into banking. In the mid-nineteenth century, the cooperative banking movement in Germany, driven by the industrial revolution, aimed to provide fair lending opportunities to low-income groups, avoiding usury. These cooperative banks' ethical principles and regional focus helped them weather financial crises, demonstrating the resilience of ESG-oriented business models.

In the 1960s, ethical banks began incorporating ESG indicators into their core models, influenced by social movements and environmental concerns highlighted by works like Rachel Carson's "Silent Spring." Networks like the Global Alliance for Banking on Values advocate using finance for societal and environmental benefits. Despite a smaller market share, ethical banks have shown growth and resilience, especially during financial downturns. ESG criteria in commercial lending have evolved from addressing environmental risks to encompassing social and governance factors, driven by regulations like the polluter pays principle. Consequently, ESG risk assessment tools have been developed to manage these risks.

Recent global agreements, such as the COP21 meeting in Paris in 2015, have recognized climate change as a significant financial risk and opportunity for banks. Climate finance, including green bonds, has become a major part of green finance, attracting investors looking to reduce climate-related financial risks. Banks now incorporate ESG criteria into credit assessments, linking ESG considerations directly to financial performance. Academic research supports the positive

correlation between ESG and financial performance, explained by theories like institutional theory, slack resources theory, and good management theory.

As mentioned before, this research aimed to analyze the relationships between ESG scores, non-financial performance ratios, and financial performance using a detailed panel data regression model, applied to a dataset which included ESG scores and key performance metrics from 51 European banks. Performance ratios like 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) were independent variables in the model. The hypothesis was that higher ESG scores correlate with better performance in the banking sector. Each variable's impact on ESG scores was explored, providing insights for banks' strategic decisions, policymakers' regulatory frameworks, and further academic research.

The findings reveal that ESG integration significantly influences financial and non-financial performance metrics in banking. Higher ESG scores are linked to better financial stability, improved governance, and greater operational efficiency. Specifically, the RWA.TA ratio had a negative impact on ESG scores, indicating that higher risk-weighted assets are associated with lower ESG performance. In contrast, the number of employees (NOEMP) showed a positive association with ESG scores, suggesting that larger workforces may better implement ESG initiatives.

The study also found that the NPL.TL ratio did not significantly impact ESG scores, highlighting the complex relationship between loan quality and ESG performance. Similarly, ROE exhibited a positive but statistically insignificant relationship with ESG scores, suggesting that financial performance alone does not guarantee better ESG practices. This emphasizes the need for banks to balance financial returns with sustainability and social responsibility.

The research methodology was robust, using a sophisticated panel data regression model to analyze the dataset. Financial metrics were chosen for their relevance to banking performance and risk management. Bloomberg ESG scores provided a credible measure of ESG performance. Diagnostic tests ensured the model's validity and reliability, and the Clustered Standard Errors method addressed heteroskedasticity and autocorrelation.

Despite the methodology's robustness, the research faced limitations due to data availability and the relatively recent emergence of ESG scores. The dataset spanned from 2017 to 2021, a period marked by evolving regulatory frameworks. Future studies could benefit from a longer timeframe to capture more mature ESG practices. Unexpected insights, such as the non-significant impact of the NPL.TL ratio, suggest complex relationships that future research should explore further.

Future research should also extend the analysis timeframe and investigate mediating factors, like regulatory compliance, stakeholder engagement, and technological innovations. Comparative studies across different regions could reveal how regional regulatory environments impact ESG integration.

This research highlights the crucial role of integrating ESG principles within the strategic frameworks of banks, emphasizing the need to establish explicit sustainability objectives and continuous performance assessments. It encourages banks to embed environmental risk evaluations

into their broader risk management strategies, thereby reducing financial vulnerabilities and bolstering stability. Moreover, the enhancement of governance practices is emphasized as essential.

The study provides new insights into the adoption of ESG criteria in the banking sector, offering valuable guidance for practitioners, policymakers, and scholars. It reveals that higher ESG scores are linked to improved financial stability, more effective risk management, and increased operational efficiency. By exploring the link between ESG scores and banking performance across Europe with a robust methodology and detailed dataset, it addresses a significant knowledge gap.

The findings confirm a positive relationship between ESG and financial performance, challenging preconceived notions about the economic impact of social initiatives. The study underscores the nuanced benefits of ESG integration in banking, particularly its contribution to financial stability and efficiency, and it advocates for a cooperative approach in achieving sustainable development goals.

7. Limitations and Future Research Directions

The present study offers significant insights into the interplay between Environmental, Social, and Governance (ESG) scores and various financial indicators within the European banking sector. However, it operates within certain confines and highlights avenues for future scholarly exploration.

Limitations

One primary limitation of this study is its reliance on data spanning from 2017 to 2021. This temporal frame, although rich for current analysis, captures the banking sector's ESG integration and financial performance at a particular juncture preceding the latest regulatory evolutions across Europe. The European regulatory landscape, particularly in terms of sustainability and ESG compliance, has been experiencing rapid and significant changes post-2021, with a marked push towards enforcing more robust sustainability criteria within the banking sector. These regulatory shifts aim to enhance transparency, accountability, and the integration of sustainability risks into banking operations, directly influencing banks' strategies and operational paradigms. Given these evolving regulatory dynamics, the findings of this study, while reflective of the period under review, must be interpreted as a snapshot of that specific timeframe. The results highlight the associations between ESG considerations and financial metrics during this period but may not fully encapsulate the ongoing and future impacts of the intensifying regulatory focus on sustainability within the banking sector.

Additionally, the fragmented nature of ESG scoring methodologies across Europe presents another limitation. The proliferation of ESG rating agencies, each employing distinct criteria and scoring systems, results in a lack of standardization and comparability across ESG scores. This heterogeneity poses a significant challenge for researchers, as the absence of universally accepted ESG standards means that studies on the impact of ESG practices on financial performance may yield disparate outcomes, contingent upon the specific ESG scores and financial data employed.

Future Research Directions

The burgeoning landscape of ESG integration within the European banking sector presents both opportunities and challenges for academic investigation. Future research could benefit from incorporating post-2021 data to offer a more current perspective on how accelerated regulatory changes are shaping ESG integration within the European banking landscape. This would address the limitations posed by the study's temporal frame and provide insights into the ongoing impacts of recent regulatory advancements on banks' ESG strategies, operational practices, and financial performance.

To address the methodological challenges associated with diverse ESG scoring systems, future research could explore how regulatory advancements influence banks' ESG strategies while acknowledging the variability introduced by different ESG scores. A longitudinal approach could be particularly beneficial, tracking the trajectory of banks' ESG integration and financial performance over an extended period, both before and after the regulatory shifts. This would offer insights into the temporal evolution of ESG practices within the banking sector and help understand

the long-term financial implications in the context of diverse and evolving ESG scoring methodologies.

Moreover, comparative research across different geographic regions could reveal how regional regulatory environments and cultural factors impact ESG integration and banking performance. Such studies would provide valuable insights into best practices and region-specific challenges. This evolving scenario, underscored by the methodological challenges associated with diverse ESG scoring systems, presents fertile ground for future research endeavors. Studies could focus on developing a more standardized and universally accepted ESG scoring framework to enhance comparability and reliability across research findings.

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PUBLICATIONS

Almeida de Figueiredo, S., 2024. Digital readiness and economic growth: Analyzing the impact of DESI scores on GDP in European countries. *Economy and Finance*, 11(3), pp.282-300. doi: 10.33908/EF.2024.3.3.

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APPENDIX A: 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 KREDİ 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.

List of Publications:

Figueiredo, S. A., 2024. Digital readiness and economic growth: Analyzing the impact of DESI scores on GDP in European countries. *Economy and Finance*, 11(3), pp.282-300. doi: 10.33908/EF.2024.3.3.

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