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Analyzing the impact of Corporate Social Responsibility on firm financial performance: Evidence from EU commercial banks

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ABSTRACT:

The research undertakes into the existence of a relationship between Corporate Social Responsibility (CSR) and the firm financial performance (FFP) to European Union (EU) commercial banks in the continually changing sustainability regulatory environment of the Non-Financial Reporting Directive (NFRD) and the Corporate Sustainability Reporting Directive (CSRD). Based on the Stakeholder Theory and Legitimacy Theory the study analyzes the hypothesis of whether environmental responsibility, social responsibility, and the quality of corporate governance help to enhance accounting-based performance (Return on Assets -ROA) and market-based performance (Market-to-Book Ratio -MBR). The study will utilize fixed and random effects regression models comprising country and year controls using panel data of EU commercial banks acquired by the LSEG (Refinitiv) database in 2024. The results show that profitability measures like Return on Equity (ROE), Net Interest Margin (NIM), and Earnings per Share (EPS) are the significant means of improving accounting-based performance. Profitability and credit risk, in the form of non-performing loans (NPL) have a positive and negative impact on market valuation respectively. Moreover, high standards of governance enhance the credibility and economic role of the CSR initiatives which prove that well-developed systems of oversight transform the sustainability promises into financial results. In general, the findings indicate that the CSR of EU commercial banks is not only a regulatory requirement but a strategic instrument that can help increase financial sustainability, stakeholder relationship and value creation in the long-term. The research adds context-specific knowledge to the CSR-FFP literature in a very regulated and sustainability-focused financial context.

KEYWORDS: Corporate governance, Corporate social responsibility, Environmental responsibility, Financial performance, Social responsibility

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Abbreviations

CSR	Corporate Social Responsibility
ESG	Environmental, Social, and Governance
FFP	Firm Financial Performance
ROA	Return on Assets
ROE	Return on Equity
MBR	Market-to-Book Ratio
NIM	Net Interest Margin
NPL	Non-Performing Loans
NFRD	Non-Financial Reporting Directive
CSRD	Corporate Sustainability Reporting Directive

01. INTRODUCTION

1.1 Introduction

In European banking, corporate social responsibility (CSR) now framed within broader ESG (environmental, social, governance) duties have moved from peripheral philanthropy to a core element of strategy and risk management. Two EU regulatory waves accelerated this shift (Bătae et al., 2020). First, the Non-Financial Reporting Directive (NFRD, Directive 2014/95/EU) mandated large public-interest entities, including listed banks, to disclose non-financial information from 2018, embedding transparency on environmental, social and diversity matter into annual reporting. More recently, the Corporate Sustainability Reporting Directive (CSRD, adopted 2022) vastly expanded scope and rigor requiring standardized, audited sustainability disclosures under EU standards and double materiality (impacts and financial risks), thereby tightening the information link between CSR practices and investors' pricing of bank risk and value (Antonini & Jacobo Gomez-Conde, 2024). Complementing disclosure rules, the European Banking Authority (EBA) issued final Guidelines (January 2025) on identifying, measuring and managing ESG risks explicitly integrating climate and social risk into prudential expectations and forward-looking plans making CSR/ESG management operationally relevant for banks' safety and soundness.

Theoretically, stakeholder and resource-based views predict that credible CSR enhances reputation, customer loyalty, access to capital and human capital, reducing risk and improving financial performance (FP); legitimacy theory posits CSR as a license-to-operate mechanism in a highly regulated sector (Singh & Misra, 2021). Meta-analytic evidence across industries generally supports a positive CSR–CFP association, suggesting that better social performance correlates with superior accounting and market outcomes (Orlitzky et al., 2003). Yet banking-specific findings can be mixed: studies on European banks report both positive channels (lower risk, improved efficiency) and potential trade-offs, depending on time horizon, measurement (ESG scores vs. specific actions), and endogeneity controls. Recent longitudinal work on European banks (2005-2022) links higher ESG performance to differences in profitability and risk-taking, underscoring that CSR affects both return and risk profiles rather than returns alone.

Against this backdrop, EU banks face simultaneous incentives and scrutiny: robust CSR can lower funding costs, stabilize deposits, and mitigate regulatory and transition risks; but disclosure tightening and anti-greenwashing enforcement raise costs and penalize superficial initiatives. Consequently, establishing whether and under what conditions CSR improves EU banks' financial performance is both academically and practically salient (Chryssa Papathanassiou & Nieto, 2024). Clarifying this relationship, while accounting for evolving regulation, measurement heterogeneity, and bank-specific risk channels, will inform managers, regulators and investors as CSRD-aligned data reshape market assessments of bank value and resilience.

1.2 Purpose of the Study

The growing integration of Corporate Social Responsibility (CSR) within the European Union's (EU) commercial banking sector highlights both opportunities and challenges in understanding its true financial impact. Despite strong regulatory momentum through the Non-Financial Reporting Directive (NFRD) and the recent Corporate Sustainability Reporting Directive (CSRD) empirical findings remain inconclusive on whether CSR directly improves firm financial performance (FFP). Some studies suggest that CSR enhances reputation, reduces risk exposure, and strengthens customer loyalty, thereby improving profitability and market value (Ortiz-Martínez et al., 2023). Conversely, other evidence indicates that CSR engagement can impose significant compliance and operational costs, with uncertain returns (Guillamon-Saorin et al., 2018).

In banking, this uncertainty is amplified due to sector-specific characteristics. Banks operate under strict prudential regulations, making CSR less about product differentiation and more about legitimacy, stakeholder trust, and long-term stability (Chedrawi & Osta, 2017). While ESG ratings often show positive correlations with lower risk and cost of capital, they also reveal heterogeneity across countries, time horizons, and CSR dimensions (environmental vs. social vs. governance) (Handoyo & Anas, 2024). For EU banks, which face heightened scrutiny after the

2008 financial crisis and subsequent green transition policies, understanding whether CSR translates into measurable financial benefits remains a pressing concern.

Thus, the central problem lies in the lack of consensus on the CSR–FFP nexus within EU commercial banks. This ambiguity creates challenges for managers, regulators, and investors when allocating resources or evaluating disclosures under CSRD. Without robust, bank-specific evidence, CSR risks being viewed either as a costly compliance burden or as an unverified driver of financial resilience. Addressing this research gap is crucial for clarifying the role of CSR in sustaining profitability, competitiveness, and stakeholder confidence in EU banking.

1.3 Research Objectives

a) To examine the impact of environmental responsibility on the financial performance of EU commercial banks.

b) To assess the relationship between social responsibility initiatives and the financial performance of EU commercial banks.

c) To evaluate how corporate governance quality influences the financial performance of EU commercial banks.

1.4 Research Questions

a) How does environmental responsibility affect the financial performance of EU commercial banks?
b) What is the relationship between social responsibility initiatives and the financial performance of EU commercial banks?
c) To what extent does corporate governance quality influence the financial performance of EU commercial banks?

1.5 Significance of Study

This study is significant as it provides empirical evidence on the relationship between Corporate Social Responsibility (CSR) and financial performance (FP) in EU commercial banks, a sector where sustainability has become both a regulatory requirement and a competitive necessity. While prior research in manufacturing and non-financial sectors often confirms a positive CSR–FP link, the banking sector presents unique dynamics due to its systemic role, reliance on stakeholder trust, and exposure to reputational and regulatory risks (Van Nguyen et al., 2022). By focusing specifically on EU banks, this research contributes to clarifying whether CSR serves as a strategic asset that enhances profitability, risk management, and long-term resilience, or whether it remains primarily a compliance-driven cost.

The findings will benefit multiple stakeholders. For policymakers and regulators, the study informs the effectiveness of EU directives such as the NFRD and CSRD in aligning financial incentives with sustainability goals. For bank managers, it provides insights into how CSR initiatives can be integrated into business models to create shareholder and stakeholder value. For investors, the study offers evidence on whether CSR disclosures can be used as reliable indicators of financial stability and future performance. Ultimately, this research strengthens the academic and practical understanding of how CSR shapes financial outcomes in one of the world's most heavily regulated sectors.

1.6 Rational of the Study

Research on the relationship between Corporate Social Responsibility (CSR) and financial performance (FP) has been widely explored, yet remains fragmented and inconclusive, particularly in the banking sector. Studies such as Fathi Jouini et al., (2025) in the U.S. commercial banking industry highlight a generally positive CSR–FP link but emphasize context-specific effects. In contrast, Jamil & Ersa Tri Wahyuni, (2025) argue that CSR disclosures can sometimes be symbolic, with limited measurable impact on profitability, raising questions about causality and greenwashing. Similarly, Gkliatis et al., (2023) examined CSR in manufacturing versus banking sectors and found heterogeneous results CSR contributed more significantly to industrial firms

than to financial institutions. These inconsistencies reveal both methodological weaknesses (varying CSR/FP measures, short time horizons, inadequate controls for endogeneity) and contextual gaps (limited focus on EU commercial banks under evolving sustainability regulations).

This research is unique because it situates the CSR–FP nexus within the specific institutional framework of the European Union, where directives such as the NFRD and CSRD mandate rigorous sustainability disclosures. Unlike earlier global or U.S.-focused studies, this study evaluates whether EU banks derive tangible financial benefits from CSR initiatives in a highly regulated, post-crisis, sustainability-driven environment.

If this research gap is not addressed, policymakers risk designing ineffective CSR regulations, bank managers may either underinvest in meaningful CSR or overinvest in symbolic initiatives, and investors may misinterpret CSR disclosures leading to misallocation of resources and persistent skepticism about CSR's financial relevance.

On the other hand, closing this gap will produce evidence-based information to support strategic CSR investment, regulatory according to financial stability objectives, and assist investors to find sustainable, resilient banks. In the end, it enhances academic knowledge and practical decision making by explaining the role of CSR in improving the competitiveness and legitimacy of EU commercial banks.

1.7 Framework of the Study

First of all, the study is rooted in CSR as a strategic and regulative based activity which entails environmental, social and governance (ESG) concerns. Not only is CSR in the European meaning voluntary but is also harshly stipulated by the actions such as NFRD, CSRD and disclosure and accountability has become an inevitable part of the banking operations.

Secondly, this research is restricted to the firm financial performance measures including profitability (ROA, ROE), market value (Tobin, Q) and risk measures (non-performing loans, cost of equity). This ensures that CSR outcomes have been assessed in reputational or ethical terms, and in quantifiable financial terms relevant to shareholders/ regulators and policymakers.

Finally, the study is framed within the context of EU commercial banks, which is a sector with systemic importance, with greater regulatory difficulty and heightened stakeholder attention in the wake of the 2008 financial crisis. By focusing on this sector, the study would be more pertinent, as the banks are a source of and an indicator of the transition toward sustainable finance in the EU.

The study aims to address a severe research gap and provide evidence-based data on the proposition that CSR is an expensive issue, a regulatory measure, or a part of sustainable financial performance of EU banks through the convergence of the three dimensions.

02. CORPORATE SOCIAL RESPONSIBILITY

2.1 Industry Background

The European commercial banking business is among the most regulated and systemically significant businesses in the world economy. Further EU bank reforms and increased emphasis on Basel III and European Banking authority (EBA) capital adequacy, risk coverage, and disclosure regulation followed the financial crisis of 2008 (He, 2021). Accordingly, low interest rates, increased competition within the FinTech industry, and the necessity to transition to sustainable finance have tidied up the industry (Shajara Ul-Durar et al., 2024).

Now an element of the Environmental, Social, and Governance (ESG) standards, Corporate Social responsibility (CSR) has emerged as a strategic aspect of banks. The establishment of the Non-Financial Reporting Directive (2014/95/EU) and its replacement, the Corporate Sustainability Reporting Directive (CSRD, 2022), has institutionalized sustainability disclosures and positioned banks at the stage where they should take into account the social and environmental dimensions of their fundamental strategies (Helfaya et al., 2023). So, in the bank example, CSR is not a charity tool since it is backed with the elimination of risks, reputation capital, and trust (Nguyen, 2022).

In addition, the European banks are central to the funding of the green deal and climate neutrality by the year 2050 in the EU, which makes CSR a regulatory and a commercial instrument. Despite the existence of reports, which also support the point of view, that CSR activities are linked to the enhancement of the financial performance as a result of reduction of the amounts of money spent as well as the enhancement of the trust of the stakeholders, there are also reports of the presence of the evidence of greenwashing and rise of the compliance costs (Rahman et al., 2023). In this way, the industry is at the crossroads between the financial performance pressures and the growing sustainability responsibility, and the CSR–FP nexus is an essential focus of research.

2.2 Corporate Social Responsibility (CSR)

According to Carroll (1999), Corporate Social Responsibility (CSR) refers to the economic, legal, ethical, and philanthropic responsibilities that organizations hold toward society. It reflects the notion that businesses should operate not only for profit but also for the benefit of stakeholders and the wider community. Khuong et al., (2021) further define CSR as the representation of social and environmental issues in business activities and in stakeholder relations, emphasizing that it is voluntary, although it is growing regulative in Europe. Charity and responsible lending alongside open governance and environmental sustainability are all CSR in the banking industry (Dorasamy, 2013). It is expected that banks will be able to manage social risks, promote green investments and ethical financial practices, and this will contribute to achieving a balance between profitability and sustainability objectives. It is worth noting that CSR has emerged as a strategic resource, which can have a positive impact on legitimacy, reputational capital, and reduce financial risks. The rules that were put forward by the government and accepted as a legal framework in the EU environment and made disclosure of CSR a centralized process and turned it into a natural part of responsibility and credibility are the NFRD and the Corporate Sustainability Reporting Directive (CSRD) (Tommaso Fornasari and Traversi, 2024). In this research therefore CSR is understood to be the process of integrating the concepts of environmental, social and governance into the activities of commercial banks in order to create an equilibrium between the goals of the business and that of society.

2.3 Evolution of CSR

The development of Corporate Social Responsibility (CSR) can be traced back to the concept of the philanthropic and ethical requirement in the early 20th century to the concept of strategic incorporation into the corporate processes in the present-day reality. First, CSR was a voluntary exercise of corporate philanthropy, and companies participated in welfare and charity work in the community. The 1970s and 1980s however experienced the shift of CSR to a more organized concept due to the stakeholder theory and sustainability movements which associated social responsibility to long term profitability and reputation (Kakabadse, Rozuel and Lee-Davies, 2005). CSR in the 21st century was institutionalized with international standards like the UN Global

Compact and CSR directives of the European Commission informing it. This was necessitated by increasing demands of transparency, ethical management and environmental responsibility in the business world (Marta Isabel Garccia-Rivas et al., 2023). To the EU commercial banks, this transformation was a change in compliance-driven CSR to performance-oriented strategies that are in line with social, environmental and economic objectives. Currently CSR has become a competitive weapon to improve competitiveness, create trust among the stakeholders and guarantee sustainable financial performance.

2.4 Drivers for CSR

The modern-day banking corporate Social Responsibility (CSR) motivations are varied and encompass regulatory, ethical, market and stakeholder motivations. The regulatory systems in the European Union and other states have imposed sustainability reporting and good governance that governs that the banks should incorporate CSR (Birindelli et al., 2013). There also exist ethical and reputational problems that work to facilitate building of trust within institutions by ensuring business practices are in tandem with the social and environmental expectations. The investors have also put pressure and competition in the industry, resulting in CSR as a differentiating factor that has increased brand equity and customer loyalty (Etikan, 2024). Social awareness of the clients and employees has also played a part in the necessity to possess sustainable banking operations. That being the case with the EU commercial banks, CSR is assuming a new direction as a way of managing the systemic risks such as environmental degradation and social inequality that can directly impact financial stability. The implementation of the ESG (Environmental, Social, and Governance) criterion in the investment and lending processes is an excellent illustration of how the CSR drivers have been shifted to strategic, rather than philanthropic, requirements. Such forces ultimately lead to the unification of the ethical responsibility and economic performance and prove the notion that the social responsibility of the banking business is not only necessary in morality, but also in finances.

2.5 CSR in EU Commercial Banks

The European banking industry has strategic aspect that necessitates Corporate Social Responsibility (CSR) because the EU has resolved sustainable finance and responsible corporate practice. EU commercial banks have adopted CSR in the aspects of ethical lending, green financing, financial inclusion and good governance transparency. The banks were also more scrutinized by society after the financial crisis of 2008 and CSR was brought in as the trust-winning mechanism (Forcadell & Aracil, 2017). The most common types of CSR activities in these institutions are to minimize carbon footprints, community development, financial literacy, and comply with the ESG requirements. Also, structures such as the EU Green Deal or the Sustainable Finance Disclosure Regulation (SFDR) have institutionalized CSR into the banking practices as a direct link between regulatory compliance and performance metrics (Lamanda & Tamassne, 2025). The process of integrating CSR in strategic management helps EU banks in increasing shareholder value and confidence of the stakeholders in the long run. Moreover, CSR reporting and indices of sustainability have become a reference point for the assessment of competitive advantages and ethical actions in the industry. This incorporation of CSR highlights the end of short-term profitability and the sustainable, long-term value generation in European banking.

2.6 Firm Financial Performance (FFP)

Firm Financial Performance (FFP) is a multidimensional indicator that represents efficiency, profitability and value creation of a firm. Yan Zhao Wang & Ahmad, (2024) notes that FFP includes both market and accounting-based indicators like stock performance and the Tobin Q and Return on Assets (ROA) and Return on Equity (ROE), because profitability is affected by intangible resources, including innovation and relations with stakeholders. Shabir et al., (2024) notes that financial performance in the banking industry is closely related to proper risk control, cost-efficiency, and stakeholder trust, especially in the context of CSR practices affecting the cost of capital and deposit stability. Although short-term results like quarterly profits are commonly reported, long-term performance is an indicator of sustainability, reputation and risk-adjusted returns. The financial performance in the EU banking environment is now being assessed not just based on conventional profitability, but also the ability to withstand risks that are related to ESG

issues (Liu & Xie, 2024). Accordingly, in this paper, FFP is considered as the degree to which EU commercial banks are financially viable and profitable in terms of both conventional accounting metrics and commercial indicators and considering the risk reduction of CSR practices.

03. THEORETICAL BACKGROUND

3.1 Stakeholder Theory

Stakeholder Theory is the view that firms are not only responsible to shareholders but also to a wider group of stakeholders such as employees, customers, communities and regulators (Freeman, 1984). According to this school of thought, long-term success requires a balancing of different interests, not just the maximization of shareholder wealth. Clarkson (1995) states that critical resources are supplied by stakeholders, and those firms that satisfy stakeholders have a higher chance of attaining sustainable performance. The theory can be applied in CSR, where socially responsible actions can help the bank become more legitimate, trusting and financially successful through stakeholder loyalty (Jamali, 2008).

Donaldson and Preston in 1995 also point out that Stakeholder Theory is descriptive, instrumental, and normative in nature. It describes descriptively how companies work when they have more than one relationship with the stakeholders (Niklas Egels, 2004). Instrumentally, it connects CSR to performance by demonstrating that the firms who practice stakeholder management outperform those that do not practice stakeholder management. Normatively, it claims that companies have an ethical responsibility to look at all stakeholders. In the case of EU commercial banks, the theory offers a robust explanation as to why CSR must be part and parcel of strategy as it is imperative to ensure that the bank retains trust in the eyes of depositors, regulators and communities in order to be stable and profitable. Finally, Stakeholder Theory forms the basis of the CSR financial performance nexus by demonstrating that the management of stakeholder expectations can be not only ethical but also long-term financially advantageous.

3.2 Legitimacy Theory

Suchman (1995) indicates that Legitimacy Theory suggests that organizations want to operate within the confines of societal expectations and norms in order to survive and remain in a position to avail resources. According to this theory, legitimacy is an abstract notion, which describes the

idea that the activities of a firm are preferable and just in a socially constructed order of values. Within the frame of CSR, Mousa and Hassan, (2015) posits that companies adopt socially responsible behaviors to uphold or restore legitimacy, particularly when they are subject to social and regulatory attention or a shift in regulations.

Lindblom in 1994 adds that disclosure strategies, that organizations employ to match the expectations in society and cope with legitimate gaps, include sustainability or CSR reports. That these directives are presented within the framework of commercial banking of the EU structure, in some form or other, both NFRD or CSRD suggests the impact of these requirements on the credibility of the banking institution, which they have, and thus, responsible practice will be unavoidable (Schroder, 2022). Failure to do so can lead to a tarnished image, investor loss or fines. On the other hand, active CSR practices may generate fewer regulation risk, socially responsible investors and legitimacy.

As an EU bank, the Legitimacy Theory would offer a paradigm to identify why CSR disclosure and performance are essential in the era of increased sustainability requirements. It emphasizes that not only is CSR a voluntary ethical decision, but it is also a strategy to address the pressure of society. That is why Legitimacy Theory reinforces the arguments to consider the role CSR may play in financial performance and connect compliance, reputation, and stakeholder trust to economic performance.

04. LITERATURE REVIEW

4.1 Environmental Responsibility

Carroll (1991) defines environmental responsibility as the ultimate form of corporate social responsibility whereby firms go beyond economic and legal requirements to engage in active protection and conservation of the natural environment. The problem of climate change, the loss of biodiversity and resources exploitation are international issues, which are urgent, and it is necessary to discuss them in this respect. This does not imply that environmental friendliness no longer remains a luxury aspect of business strategy particularly banking business; in fact, environmental friendliness remains an aspect of business sustainability and risk management.

Wu (2025) states that financial institutions should play a special responsibility to hold the environment responsible for the implication of investment flows. Banks have the opportunity to invest in environmentally sustainable activities, including renewable energy, green infrastructure, and low-carbon technologies, by deciding where to lend and invest. This is an indirect role which leaves commercial banks as powerful agents of environmental outcomes, despite the fact that they do not emit as much as heavy industries. In this way, environmental responsibility in banking can be seen as the application of environmental risk assessment to the credit decision-making process, the promotion of green finance, and minimizing the ecological footprint of the bank itself.

According to Dobre et al., (2025) one can take environmental responsibility in two ways: explicit and implicit. Explicit environmental responsibility, supportive interventions such as reporting sustainability, green policy and carbon neutrality. Compliance with regulations and institutional norms form the basis of implicit responsibility, especially in the EU where banks are bound by the Corporate Sustainability Reporting Directive (CSRD) to comply with high-quality disclosure requirements. This has been made into a duo, and hence as a bank, it is not only legally responsible but also expected socially to tackle environmental issues.

Moreover, Stauropoulou et al., (2023) states that environmental responsibility results in the improved status of the reputation and financial position of the firm. In line with international

sustainability, companies reduce environmental risks, attract socially responsible investors and enhance trust among stakeholders. In the case of EU commercial banks, this fit also lowers the regulatory risk and contributes to the aim of the EU Green Deal to be made climate neutral by 2050. Any lack of maintaining environmental responsibility, however, may result in reputational damage, market credibility, and greater exposure to financial risks associated with climate change.

As it is applied in the context of the current study, environmental responsibility can be viewed as a strategic/regulatory-based initiative of the EU commercial banks to reduce adverse ecological effects and enhance sustainability in their activities, disclosures, and financing. It is a vitally important aspect of CSR that protects the integrity of the environment and improves long-term financial performance by aligning banks with the changing expectations of society and regulatory environment.

4.2 Social Responsibility

As Carroll (1991) opined, as part of the pillar of Corporate Social Responsibility (CSR), social responsibility means that the firms must be ethical and participate in activities that help the society as a whole beyond their legal and economic obligations. Since economic and legal commitments ensure the continuity of the operations, the social responsibility is the equitability, fairness, and sustenance of the rights of the interested parties. It touches upon such issues as fair work, workplace diversity, and community and human rights activism. These include inclusion funding, not exploiting customers, and community-based projects in the banking sector.

Based on the premises of Roszkowska-Menkes, (2021), social responsibility has the capacity to create shared value through matching the flourishing of the business with the development of society. But more importantly, the financial institutions that sponsor the financial literacy programs will not only be enhancing the welfare of the community but will also be establishing a long-term relationship with the consumers. This highlights the instrumental character of social responsibility that contributes to legitimacy, reputation and competitive advantage during the development of solutions to acute social problems. The practices play quite a significant role in

stabilizing the EU banks that are working in different societies where transparency and trust are the dominant factor.

Innocent et al., (2024) state that the banking sector, being an intermediary, has certain social responsibilities as the implementation of the banking practice influences the overall economy. Decision making like lending can either lead to inequality or inclusivity based on the marginalized being given credit. Consequently, the social responsibility within the banking sector goes beyond making financial services accessible, affordable and ethical. This has been institutionalized in the EU under consumer rights, anti-discrimination and CSR disclosure regulations.

Moreover, when discussing corporate social responsibility, Wirba, (2023) point out that corporate citizenship also entails corporations playing the role that governments are supposed to play, which could include giving back to education, healthcare, and social welfare systems. An increasing number of EU commercial banks are playing this role by investing in community projects, disaster relief, and social entrepreneurship. These activities not only generate social capital but also instill resilience and goodwill amongst the stakeholders.

Within the framework of the current research, social responsibility can be defined as the willingness of EU commercial banks to maintain ethical practices, inclusivity, and social welfare by means of responsible actions and functioning within society. It embodies the social dimension of CSR, and it demonstrates that financial institutions have a duty beyond profitability to society, and that such duty can strengthen long-run viability and financial performance.

4.3 Corporate Governance Quality

Farinha, (2003) defines corporate governance as the processes through which providers of finance are assured of returns on their investment by managers. Corporate governance (CG) of good quality is thus essential to bring the interest of managers, shareholders, and stakeholders into alignment. The quality of governance includes board independence, transparency, shareholder rights, and effective monitoring systems which minimize the fear of managerial

opportunism. Governance failures in systemic risk countries in the banking sector can be far reaching in their financial stability impact.

According to Ferran and Hickman, (2024) the quality of corporate governance depends on institutional, ownership and regulatory structures. Harmonized regulations (capital requirements directive (CRD IV) and the guidance of the European Banking Authority) enhance the new standards of governance within the EU, exposing the organisation to high-risk management, disclosure and accountability regimes. These regulations provide a higher level of governance as the banks are expected to maintain a balance between profit and prudential regulation.

Al Astal et al., (2024) claim that quality governance decreases the risk-taking, increases investor confidence, and valuation of the firm. In the case of banks, good governance guarantees good internal control mechanisms, principled behavior, and adherence to environmental and social principles, and is at the heart of the wider ESG agenda. It is especially pertinent that the quality of governance applies here in reference to CSR because the quality of governance is what predetermines the effectiveness of implementing and monitoring sustainability commitments.

Corporate governance quality, in the case of this paper, can be defined as the quality of the oversight mechanisms, transparency practices as well as accountability structures of the EU commercial banks. It also makes certain that the CSR activities are not being conducted as a performance, but part and parcel of the strategic decision-making process which will not only result in them getting a good financial performance but will also win them the trust of the stakeholders. Good governance therefore becomes a mediating factor between the CSR and financial performance of firms, supporting resiliency, legitimacy, and long-term sustainability.

4.4 Firm Financial Performance

Mahmood et al., (2020) described firm financial performance (FFP) as the level at which an organization achieves its financial objectives typically in the form of profitability, growth, and market value. It is a multidimensional scale capable of quantifying accounting-based measures of

Return on Assets (ROA) and Return on Equity (ROE), and those that have a market base, such as stock returns and the Q of Tobin. The measures provide a combined image of efficiency, competitiveness, and value creation in the firm.

According to Al Masud et al., (2025), financial performance must be measured by the commonly used accounting measurements; it must also be assessed by the non-financial drivers which would lead to the creation of long-term value through innovations, customer satisfaction, and sustainability. This wide scope brings to focus the fact that financial performance is characterized by intangible resources and strategic projects. According to Huang et al., (2025), in the banking sector, FFP is directly coupled with effective risk management, cost management and stakeholder trust, given that CSR activities may reduce cost of financing and enhance reputation.

Furthermore, Torre Olmo et al., (2021) show that socially responsible banking institutions are likely to have a superior financial performance due to their ability to foster the creation of an aura of trust and legitimacy that stabilizes deposits and draws socially responsible investors. Therefore, FFP is not only a measure of the success of the operation but also to the extent to which the effectiveness of firms lies in the balance between profitability and ethical and sustainable behavior.

Firm financial performance in the present study is a capability of EU commercial banks to attain sustainable profitability and sustainability in the form of accounting and market metrics with reference to moderating role of CSR in determining financial stability and competitiveness.

4.5 Relationship between Environmental Responsibility and Firm Financial Performance

Carroll (1991) observes that environmental responsibility is the most progressive aspect of corporate social responsibility (CSR), as it shows the interest of a firm in environment in support of economic expansion. The expression of environmental responsibility in the financial sector and, in particular, in the banking industry is sustainable lending, green investment, and eco-efficiency of operations. As Galletta et al., (2024) observed, even though banks are not direct

polluters, their credit decisions have a strong impact on environmental performance and can either foster sustainable performance or continue to pollute the environment.

There is evidence of a positive impact of environmental responsibility on the firm financial performance (FFP). Md Safiullah et al., (2024) is of the view that the proactive green steps of business firms will help them have better reputation, less risks of regulation and investor trust which will subsequently translate to their high financial performance. The implementation of environmental risk assessment on lending enables the EU commercial banks to avoid the risk of holding stranded assets in the carbon-intensive industries as well as reduce the risk of credit over the long term. This coincides with Matten and Moon, (2008) who note that environmental disclosure is increasingly becoming mandatory in the EU, and therefore voluntary disclosure is not only ethical, but also cost wise prudent.

Secondly, green responsibility opens up innovation and growth markets. Agrawal et al., (2023) hold that the effectiveness of eco-innovation can be achieved by reducing waste and expenditure on resources that improve profitability. With EU banks, investing in green bonds, sustainable businesses producing renewable energy and making investments in renewable energy, funds are not just going to pay off, but they will be the first of their kind to make the jump to a low-carbon economy in the EU. This type of strategic alignment with the European Green Deal results in better market legitimacy and competitiveness.

Lack of consideration of environmental issues, however, may have a negative impact on financial performance. Aderibigbe & Fragouli, (2020) cautions that reputational loss due to environmental negligence results in loss of customers, lawsuits, and increases in capital costs. The risk is compounded by the systemic nature and dependency of the stakeholders, in the case of banks. Therefore, environmental responsibility is used as a defensive tool against risk and as a proactive tool to create financial value.

Finally, environmental responsibility improves financial performance of companies because it results in reduced ecological risks, reputation, regulation and innovation opportunities. In the case of EU commercial banks, this task is especially urgent because the financial performance of

this group of banks is becoming more and more dependent on adherence to sustainability standards, the requirements of stakeholders, and international climate obligations.

In order to empirically test the hypothesis of the relationship between environmental responsibility and firm financial performance, panel regression analysis was performed where the environmental (ENV) pillar score was used as the independent variable and Return on Assets (ROA) and Market-to-Book Ratio (MBR) were the dependent variables. The findings show that environmental responsibility significantly affects ROA positively and statistically, which implies that EU commercial banks that understand environmental responsibility better are more profitable with regard to their assets. Association with MBR is positive but less significant, suggesting that markets partially price environmental performance. These results substantiate the hypothesis that environmental responsibility leads to the better financial performance of a company based on the mitigation of risk and regulation and the strengthened faith of the stakeholders.

4.6 Relationship between Social Responsibility and Firm Financial Performance

Carroll (1991) defined social responsibility as ethical practices in relation to stakeholders, communities and society in general. It focuses on fairness, equity and inclusivity, rather than compliance. Within a bank, this position relates to financial inclusion and community development and protection of the customer. Marshal Iwedi & Iheanacho Princewill Wachukwu, (2024) note that, since banks play the role of financial intermediaries, they have been found to have a social influence on the allocation of credit and investment practices, which either mitigate or compound inequality.

Andre, (2014) indicates that social responsibility can bring about a shared value, where the needs of society are met, and in the process the profitability of the company also increases. Indicatively, EU commercial banks investing in financial literacy or in micro credit initiatives help not only to lift up the oppressed populations, but also increase their customer base, hence enhance future revenue flows. Gregor et al., (2022) also refer to this as corporate citizenship, in which firms take

on roles formerly the preserve of governments, including education and social welfare. By so doing they increase stakeholder trust and legitimacy, which will have a positive impact on financial performance.

Empirical evidence available in Tran et al., (2021) and other U.S. commercial banks indicates that the socially responsible practices increase profitability through improvement of reputation, risk reduction and deposits stabilization. In the EU case, where CSR disclosure has become institutionalized in the form of the Corporate Sustainability Reporting Directive (CSRD), the more socially responsible a bank is, the more socially conscious investors turn to them, and customers are less likely to switch banks. This would allow this compliance with regulatory, and stakeholder demands to reduce the reputational power and threat.

On the other hand, failure to observe social responsibility may be costly. In the aspect of the effect of responsible lending, Rosa, (2025) affirms that failure to lend to the needy and the undeserving masses will cause mistrust and might result in regulation. In addition, the impossibility to transform into socio-cultural inclusive and even-handed throughout the course of social activism can lead to the onset of the reputation crisis that will lead to the loss of customers and the loss of the trust of the investors.

In summary, social responsibility has been a key factor in enhancing the financial performance of companies due to the development of stakeholder trust, customer base, reputational risk reduction, and achievement of EU social sustainability goals. When it comes to the social responsibility of commercial banks it is both a moral necessity and a strategic tool of profitability and survivability in a very competitive and very regulated environment.

The empirically test the association between social responsibility and financial performance of firms using the independent variable (social (SOC) pillar score) and the dependent variables (Return on Assets (ROA) and Market-to-Book Ratio (MBR)). These findings demonstrate that the relationship between social responsibility and ROA is positive and statistically significant, which means that competent European commercial banks of greater social interest are more profitable. The correlation with MBR is also good implying that social responsibility practices will increase the market value and confidence of investors. Such conclusions confirm the hypothesis that social

responsibility is a contributor to financial performance by enhancing the reputation, customer retention and trust of the stakeholders.

4.7 Relationship between Corporate Governance Quality and Firm Financial Performance

Banda and Mwange, (2023) believe that corporate governance determines the modalities of securing and leveraging financial resources in returns to the investors as much as possible. Good corporate governance (CG) practices result in transparency, accountability and good oversight which reduces agency problems and maximizes firm value. Kusi et al., (2018) argue that systems of governance vary in different institutional contexts, although well-governed systems in institutionally diverse contexts all promote investor confidence and reduce risk-taking. Capital Requirements Directive (CRD IV) and other rules and regulations improve the quality of governance in the EU banking sector by independence of boards, risk management and disclosure requirements.

Improving the capitalization strategies and risk-adjusted performance of the banks, as Giannopoulos et al., (2024) show, is achieved through developed governance structures. Good governance would ensure that CSR promises are not hollow but as part of the banking business so as to create a mutually supportive relationship between sustainability and long-term profitability. Youseaf & Serum, (2024) also show that having a good government system makes a bank better than others of the same category, as this system will boost the effectiveness of the bank.

Gokhan Ozer et al., (2024) have gone a step further to opine that accountability by the stakeholders can be measured in terms of quality of governance whereby, besides the shareholders, the whole society is accountable to the company. This becomes particularly true in the EU where banks are being compelled to comply with CSR and ESG disclosure requirements. This content will be realistic with proper governance, and the threat of greenwashing and bad publicity will also be minimized.

However, ignoring the quality of governance puts banks in a lot of danger. Poor governance can lead to financial misdiagnosis, inadequate risk management and trust crises as experienced in previous financial scandals. In the case of EU banks, where legitimacy and stability are the most important factors, poor governance would lead to poor financial outcomes and other aspects of systemic confidence.

Moreover, the quality of corporate governance has a direct impact on the financial performance of the firm because it enhances transparency, risk monitoring, investor confidence, and strategic incorporation of CSR. In the case of EU commercial banks, governance is the essential linkage point between sustainability practices and financial resilience, and thus a determining factor of long-term performance.

To test the relationship between corporate governance quality and the financial performance of firms empirically, panel regression analysis was performed to identify the relationship between the corporate governance quality and the dependents, which are Return on Assets (ROA) and Market-to-Book Ratio (MBR). The findings indicate that there is a statistically significant and positive relationship between the governance quality and the ROA and MBR. This means that EU commercial banks, which have a greater governance structure, have greater profitability and a better market value. The results substantiate the hypothesis that good governance increases transparency, less agency and reputational risks and credible execution of CSR activities, which reinforce long-term financial performance.

4.8 Research Gap

Although an increasing number of studies have been carried out on the relationship between Corporate Social Responsibility (CSR) and the firm financial performance (FFP), there have been considerable gaps, especially within the environment of European Union (EU) commercial banks. Carroll (1991) describes CSR as the functions of the environment, social, and governance issues, but the financial sector is not well investigated (studies tend to cover manufacturing or non-financial sectors). Although studies like Cornett et al. (2016) show that CSR and profitability are positively correlated in commercial banks in the United States, the results cannot be directly

applied to the EU banks as their activity is regulated by a specific regulatory and institutional framework, which is the Non-Financial Reporting Directive (NFRD) and the Corporate Sustainability Reporting Directive (CSRD).

There are inconsistent results in existing studies, too. Agrawal et al. (2023) and Aderibigbe and Fragouli (2020) also note the financial benefits of eco-innovation and environmental responsibility, and reputational and compliance risks that, in turn, disproportionately paper over short-term monetary gains. On the same note, Tran et al. (2021) observe that U.S. banking social responsibility activity is profitable, and Rosa (2025) observes that irresponsible conduct is dangerous in Europe. These discrepancies demonstrate that there is no agreement concerning the CSR nexus of FFP, particularly in terms of the interactions between various dimensions of CSR, which affect financial results.

Besides, the quality of governance despite being a well-researched factor in determining the performance of firms (Shleifer and Vishny, 1997; Giannopoulos et al., 2024) has not been effectively incorporated in the CSR-FFP research in EU commercial banks. Most of the previous studies consider environmental and social aspects separately without considering the mediating or moderating aspect of governance in guaranteeing that CSR promises are converted into tangible financial gain. This holds the greatest significance because governance structures determine the feasibility of CSR disclosures and the extent to which CSR is reflective of corporate strategy (Kusi et al., 2018).

As a result, the available literature contains three key gaps: (1) a lack of empirical attention to EU commercial banks operating in the context of changing sustainability policies; (2) the discrepancy within the research on the direct and indirect impact of the environmental and social responsibility on financial performance; and (3) a lack of incorporation of the quality of governance as the factor of CSR effectiveness. These gaps have to be addressed so as to offer solid, situation-specific evidence to the policy makers in the European Union, the managers of the various banks and investors. With no content to fill these holes, CSR will remain as a compliance expense rather than a strategic source of financial fecundity and competitiveness.

05. Data and Methodology

This chapter presents the data and methods that will be used in the analytical part of this study. The first section presents the data sample, which is in terms of Corporate Social Responsibility (CSR) indicators and financial performance information of EU commercial banks. It also shows descriptive statistics that show the nature of the data set. The second section summarizes the variables in the research and how the regression model that is to be used in investigating the association between CSR and financial performance was developed.

5.1 Hypothesis

Following is the hypothesis of the research

H1: Environmental responsibility has a significant impact on the financial performance (ROA) of EU commercial banks.

H2: Environmental responsibility has a significant impact on the market valuation (MBR) of EU commercial banks.

H3: Social responsibility has a significant impact on the financial performance (ROA) of EU commercial banks.

H4: Social responsibility has a significant impact on the market valuation (MBR) of EU commercial banks.

H5: Corporate governance quality has a significant impact on the financial performance (ROA) of EU commercial banks.

H6: Corporate governance quality strengthens the relationship between CSR and financial performance.

Data

Under this section, both CSR and financial data are discussed. The data set comprises data obtained in two distinct sources namely CSR indicators and financial performance variables. The independent variable is CSR data while the dependent variable and control variables are constructed using the financial data. Both CSR and financial information are gathered through LSEG (London Stock Exchange Group) database which was previously called Refinitiv which offers standardized and similar ESG and financial metrics of commercial banks across Europe.

The sample will consist of commercial banks, which will be operating in the European Union (EU) between 2020 and 2024. In order to achieve the lagged effect of Corporate Social Responsibility (CSR) on Corporate Financial Performance (CFP), the research focuses on comparing the financial performance of a particular year with the previous year CSR (ESG) performance, as CSR initiatives are usually expected to affect financial performance in the long term and not in the short term (Brammer & Millington, 2008).

To put the regression analysis to use, it was necessary to have all the variables in firm-year combinations at full data availability. As a result, banks that lacked or had incomprehensive data were eliminated out of the sample. Consequently, some of the banks were included in the dataset throughout the study period whereas, others were included during a given period of time based on the availability of the data. The refined data set after the process of data cleaning and refinement contained about 85 firm-year observations. In order to be robust, the memorization of outlier values was done at the 0.5 percentile to reduce the effect of extreme values and enhance result reliability.

5.1.1 CSR data

The empirical part of this study employs the CSR data gathered with the LSEG (London Stock Exchange Group) database that gives detailed Environmental, Social and Governance (ESG) ratings of listed commercial banks in the European Union. All regression models take these ESG scores as the key independent variable which defines the level of corporate social responsibility of each bank. All scores are based on a 0-100 scale with the higher the scores the greater the CSR engagement and sustainable business behaviors.

To create the total ESG score and its three pillars, the LSEG (2023) database lists about 17 ESG indicators that are divided into 10 broad themes. The environmental pillar has indicators which are emission control, resource efficiency and green innovation. The social pillar includes elements connected with labor practices, customer responsibility, community engagement and compliance with human rights. The pillar of governance incorporates the variables that are associated with the board structure, the rights of shareholders, the executive remuneration, shareholder transparency and the general approach to strategic sustainability.

The scores in each pillar are computed with proportionate weightings that each subcategory has over the others and the overall ESG score is a composite indicator of the performance of a bank in terms of CSR performance. This uniform system of scoring also helps in comparability in different EU banks and over a period of time, this modular approach proves to be a stable and dependable evaluation of the effects of CSR initiatives on financial performance in the European banking industry.

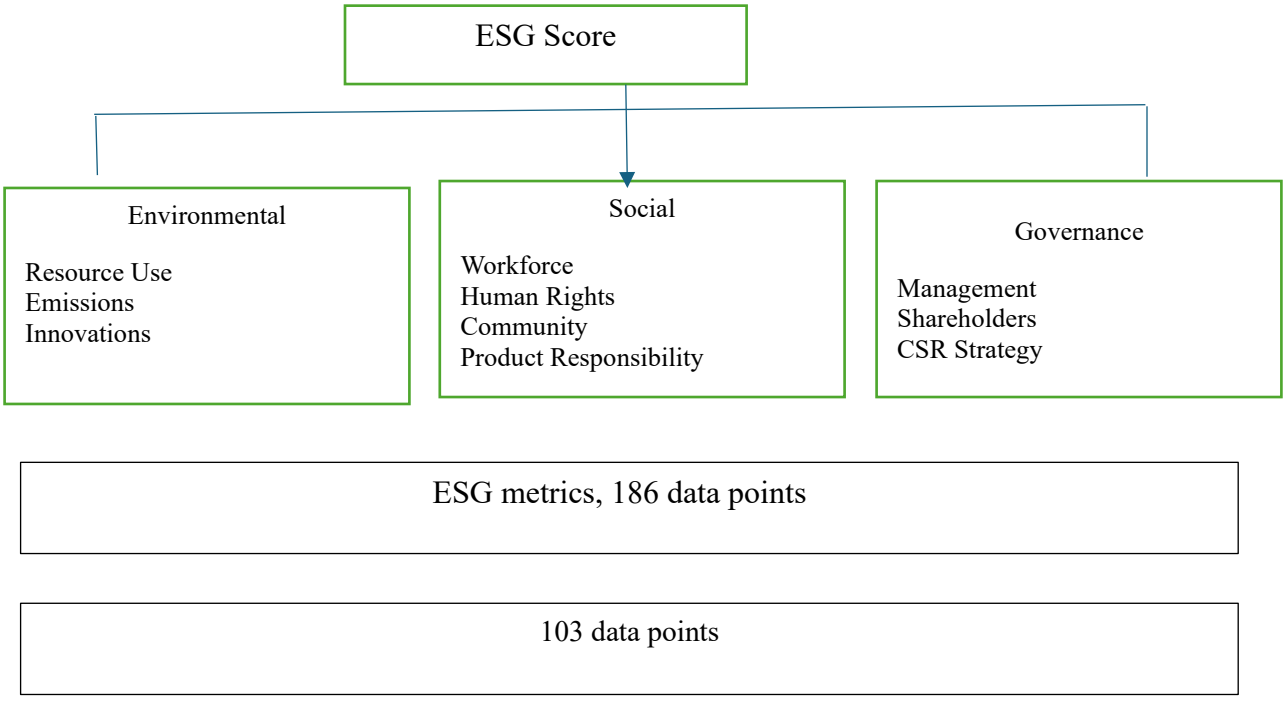

Figure 1: Summarizes Refinitiv's entire ESG structure (Source: Author)

5.1.2 Financial Data

In order to formulate the dependent variables, which are the Return on Assets (ROA) and Market-to-Book Ratio (MBR) and various control variables including bank size, leverage as well as asset turnover, this research uses the financial data obtained through the LSEG (London Stock Exchange Group) database. The data set gives standardized financial data on commercial banks within European Union which makes it accurate and comparable across countries and across the years.

All the banks will be classified based on the European banking sector classification, which will allow the research to consider any potential differences in financial performance within the banking segments and market settings. The classification assists in determining whether the CSRCFP associations vary among large, diversified banks and small or specialized institutions.

The methodology section will also give the computation and use of these financial variables in the regression models that measure the effect of CSR on the profitability and value of firms in the market. The complex description of the features of financial and CSR variables including mean, median, standard deviation, and ranges are also given in the descriptive statistics section and give a clear vision of the structure and variability of the sample.

5.1.3 Descriptive statistics

Although Table 1 shows the distribution of commercial banks in various EU member states and the types of banks, Table 2 gives the quantitative summary statistics of the variables used in the study that are mean, median, standard deviation, minimum, and maximum values. These descriptive statistics can give a picture of the nature of the data and variation among the sampled banks showing the differences in the level of CSR performance, financial performance and control variables among the European banking spectrum over the period of the study.

Table 1: Descriptive Statistics (Source: Author)

	ROA	MBR	FIRMSIZE	LEVERAGEASSETTURNOVER	ROE	NIM	COSTTOINCOMERATIO	NPL	EPS
Mean	0,00	0,54	988228690,18	0,05	0,08	0,01	7,06	2,59	2,40
Median	0,00	0,51	845925000,00	0,04	0,08	0,01	4,93	2,63	1,54
Maximum	0,02	1,46	2701529000,00	0,11	0,22	0,03	355,84	6,20	9,20
Minimum	-0,01	0,05	165838120,00	0,02	-0,12	0,01	-426,73	0,00	0,00
Std. Dev.	0,00	0,29	696146777,12	0,02	0,06	0,01	67,29	0,90	2,51
Skewness	0,22	0,89	0,81	0,95	-0,76	0,76	-0,89	0,43	1,23
Kurtosis	4,14	3,93	2,76	3,87	4,64	2,96	32,00	5,41	3,37
Jarque-Bera	5,28	14,17	9,47	15,43	17,59	8,26	2989,40	23,17	21,93
Probability	0,07	0,00	0,01	0,00	0,00	0,02	0,00	0,00	0,00
Sum	0,40	46,00	83999438665,00	3,83	6,86	1,21	600,01	220,50	203,58
Sum Sq. Dev.	0,00	6,97	40708108164638488000	0,03	0,28	0,00	380341,75	68,64	529,65
Observations	85	85	85	85	85	85	85	85	85

5.2 Methodology

5.2.1 Sample

The initial population for this study consists of all commercial banks headquartered in European Union (EU) member states and available in the LSEG database during the period 2020–2024. The LSEG database provides standardized ESG pillar scores (Environmental, Social, Governance) alongside financial statement variables, making the data capable of cross-country comparisons.

Due to the availability of data and requirements for consistency, the empirical sample is restricted, even though the conceptual population includes all EU commercial banks. The sample construction followed a structured multi-stage filtering process.

Stage 1: Identification of EU-listed commercial banks

Initially, all EU commercial banks that were categorised within the LSEG's commercial banking industry were recognised. Since ESG scores are primarily available for publicly traded companies with mandated disclosure requirements, only listed banks were included.

Stage 2: ESG data availability filter

Banks that did not have complete ESG data (pillar scores and overall ESG score) for a minimum of two years in a row were eliminated. Consecutive observations were required to build the empirical models because the analysis included lagged CSR variables.

Stage 3: Financial data availability filter

Banks were further excluded if key financial variables were missing, including:

- Return on Assets (ROA)
- Market-to-Book Ratio (MBR)
- Total Assets (for size)
- Leverage
- Asset Turnover

To prevent biased estimations by missing data, only firm-year observations with complete information across all variables were retained.

Stage 4: Data consistency and outlier treatment

Extreme values were winsorized at the 0.5 percentile to improve reliability. Without significantly changing distributional characteristics, this step weakens the impact of outliers, which are frequently found in banking statistics.

The final sample is an imbalanced panel of EU commercial banks with a total of 85 firm-year observations from 2020 to 2024, following the application of these filters and the combining of ESG and financial variables.

Due to differences in ESG disclosure, listing status, or incomplete reporting, some banks enter or leave the dataset, creating an uneven panel. Instead of artificially limiting the dataset to a balanced structure, unbalanced panels, which are frequently used in cross-country banking research, enable the retention of all available high-quality observations.

The relatively smaller number of firm-year observations compared to long-horizon banking studies is primarily driven by three methodological choices. First, the study focuses specifically on the 2020–2024 period to capture the post-NFRD regulatory environment and the transition toward enhanced sustainability disclosure under CSRD. Second, only listed banks with adequate

sustainability reporting are covered by LSEG; smaller or unlisted banks have not been included. Third, to prevent measurement bias and ensure internal validity, stringent requirements for data completeness were used.

During the analysis, fixed effects for both year and country are applied to control for unobservable factors that might bias the results. Fixed-effects regression models assume that certain characteristics remain constant within each group (in this case, country or bank) but may differ across groups. In particular, the country fixed effects model adjusts institutional, economic and regulatory disparities among the EU countries and the year-fixed effects control captures macroeconomic and financial shocks which might affect the overall performance of the banking industry in the long run.

Following the methodology of Sassen, Hinze, and Hardeck (2016), fixed effects are employed to ensure that variations in financial performance are attributed primarily to differences in CSR activities rather than external economic factors. This methodology improves the strengths and soundness of empirical data in determining the association between CSR and firm financial performance among commercial banks in EU.

5.2.2 Variables

The dependent variables in the analytical stage of this research are the financial ratios, which will be used to test the impact of CSR performance on the financial performance of the EU commercial banks. The financial performance indicators are classified by their type accounting-based and market-based measures to assess the nature of this influence on both profitability and market valuation. According to the approach of Velte (2017), Return on Assets (ROA) is used to indicate profitability. ROA is a metric that determines how well a bank makes use of its total assets to make profits and is computed as follows.

Return on Assets = <u>Net Income</u>

Return on Assets (ROA)

Despite the fact that ROA is a powerful tool in measuring internal operational efficiency, it mostly captures historical performance and thus is termed as a backward-looking measure (Ely, 1995).

In addition to this, the Market-to-Book Ratio (MBR) is applied as an indicator of the market-based performance that reflects the expectations of investors regarding the future profitability and value of a bank. The MBR combines the accounting values with the market values, and this provides a wider view in which the market values the worth of a firm. Aras and Yilmaz (2008) note that MBR is often used by investors to determine the perception of the market of the valuation of the equity of a company. It is calculated as follows.

Market to Book Ratio (MBR) = Market to Book Ratio (MBR)

Book Value of Equity

The current research thus examines the impacts of Corporate Social Responsibility (CSR) on accounting-based (ROA) and market-based (MBR) financial performance. The first model series operates on the dependent variable ROA, and the effect of CSR on profitability is being measured, whereas the second model series operate on the dependent variable of MBR, and the impact of CSR on the valuation of firms is being studied.

As the main goal of the study is to answer the question whether the increased level of CSR engagement results in improved financial performance, the ESG score based on the LSEG database is used as the most important independent variable. ESG is a proxy that is popularly used to represent CSR (Han, Kim & Yu, 2016), and it is a concept that embraces the environmental, social, and governance aspects of corporate conduct. In this regard, CSR and ESG are interchangeably used in this study because the two terms are not differentiated.

Both the financial performance indicators ROA and MBR are regresses on the overall ESG score to determine the general CSR-firm performance correlation. In order to shed more light on these dimensions of CSR that have the highest impact, individual regressions are run with each of the ESG pillars (Environmental, Social, and Governance) as independent variables. The ESG values are based on the observation of the firm years obtained in the LSEG database.

To enhance model robustness, several control variables are incorporated to account for other potential factors influencing financial performance. These are the bank size, leverage and asset turnover. According to prior studies, the bigger companies are more likely to practice CSR, as they

are more visible and pressure on them is higher (Waddock and Graves, 1997; Velte, 2017). The bank size is, therefore, regarded as an important control variable and is measured as the natural logarithm of total assets in line with the research carried out by Guenster, Bauer, Derwall and Koedijk (2011).

$$\textbf{Size} = \textbf{log}\ (\textbf{Book Value of Total Assets})$$

Leverage is another essential control variable, as highly leveraged banks are often more scrutinized by investors and regulators, leading them to disclose more CSR-related information (Atan, Alam, Said & Zamri, 2018). Leverage reflects the ratio of total debt to total assets and is computed as,

$$\textbf{Leverage} = \frac{\textbf{Book Value of Total Debt}}{\textbf{Book Value of Total Assets}}$$

The Asset Turnover ratio is also included to capture operational efficiency. It indicates how effectively a bank utilizes its assets to generate income. According to McGuire (1988), higher asset turnover reflects better resource utilization and stronger performance. The ratio is calculated as follows.

$$\textbf{Asset Turnover} = \frac{\textbf{Net Operating Income}}{\textbf{Average Total Assets}}$$

Finally, the regression models also include country fixed effects to capture differences in regulatory, economic, and institutional environments across EU member states, and year fixed effects to control for macroeconomic shocks or financial crises that may affect bank performance during the study period. Furthermore, since market capitalization can be influenced by profitability, models that use MBR as the dependent variable incorporate ROA as an additional control, and vice versa, following Guenster et al. (2011).

5.2.3 Regression models

The two fundamental sets of regression models developed in this study, the first set represents accounting-based financial outcomes measured by Return on Assets (ROA), while the second set focuses on market-based financial outcomes represented by the Market-to-Book Ratio (MBR).

Accordingly, $ROA_{i,t}$denotes the dependent variable for bank *i* in year *t*, while $\beta_1 - \beta_7$represent the coefficients of the independent and control variables. The key explanatory variable, $ESG_{i,t}$, measures the overall Corporate Social Responsibility (CSR) performance of each commercial bank, derived from the total ESG score reported in the LSEG database.

To delve deeper into the impact of CSR on the financial performance, three more models are used replacing ESG_(i,t) with the three pillar scores Environment (ENV), Social (SOC) and Governance (GOV) to enable the study to determine what CSR dimension has the most significant impact on the bank profitability and market value in the EU member states.

The general regression equation for the accounting-based model is as follows

$$ROA_{i,t} = \alpha + \beta_1 ESG_{i,t} + \beta_2 Size_{i,t} + \beta_3 Lev_{i,t} + \beta_4 ATurnover_{i,t} + \beta_5 MBR_{i,t} + \beta_6 Country_i + \beta_7 Year_t + \varepsilon_{i,t}$$

For the market-based model, the following regression is estimated

$$MBR_{i,t} = \alpha + \beta_1 ESG_{i,t} + \beta_2 Size_{i,t} + \beta_3 Lev_{i,t} + \beta_4 ATurnover_{i,t} + \beta_5 ROA_{i,t} + \beta_6 Country_i + \beta_7 Year_t + \varepsilon_{i,t}$$

The equations (6) and (10) assess the effect of CSR on profitability (ROA) and market valuation (MBR) respectively. In both of them, country fixed effects (Country) and year fixed effects (Year) are used to correct the institutional and regulatory differences between EU countries and time-related factors like macroeconomic cycles or financial crises that can affect the overall bank performance.

Subsequent models (7), (8), and (9) extend Equation (6) by replacing $ESG_{i,t}$with $ENV_{i,t}$, $SOC_{i,t}$, and $GOV_{i,t}$respectively, while models (11), (12), and (13) replicate this approach for Equation (10) to analyze each ESG pillar separately.

Therefore, regression equations (6) to (9) examine the effect of CSR on the accounting-based financial performance, whilst equations (10) to (13) determine the impact of CSR on market-based financial performance. With its two-level analytical model, the research can focus not only on the total impact of CSR on the financial performance of firms but also on the comparative role of each of the ESG dimensions in the formation of financial success among the EU commercial banks.

06. Research Findings

6.1 The Relationship between Corporate Social Responsibility and Bank Profitability (ROA) in EU Commercial Banks

Table 2: Correlation Analysis (Source: Author)

Correlation Analysis

Correlation Probability	ROE	NIM	COSTTOI...	NPL	EPS	ROA
ROE	1.000 -----					
NIM	0.477 0.000	1.000 -----				
COSTTOINCOM...	0.176 0.107	-0.096 0.382	1.000 -----			
NPL	-0.192 0.078	0.074 0.501	-0.052 0.637	1.000 -----		
EPS	0.452 0.000	0.108 0.325	0.019 0.865	-0.192 0.079	1.000 -----	
ROA	0.955 0.000	0.614 0.000	0.110 0.314	-0.184 0.091	0.446 0.000	1.000 -----

Correlation matrix indicates strong relations between the key bank performance indicators. There is a strong positive correlation between ROA and ROE (0.955) showing that the profitability of the assets is closely related to the returns distributed to the shareholders. There is also a moderate positive relationship between ROA and NIM (0.614) and EPS (0.446), which implies that the increased interest margins and earnings per share lead to the improved performance of assets. There is a positive correlation between ROE and NIM (0.477) and EPS (0.452). Conversely, NPL is negatively correlated with ROE, EPS and ROA, which means that there is a correlation between credit risk and profitability. COSTTOINCOME exhibits inadequate and largely non-significant associations meaning that it correlates with measures of profitability.

Table 3: Regression Analysis (Source: Author)

Regression Analysis (Random Effect)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.001	0.000	-2.957	0.004
ROE	0.053	0.002	29.529	0.000
NIM	0.127	0.021	5.962	0.000
COSTTOINCOMERATIO	0.000	0.000	1.361	0.177
NPL	-0.000	0.000	-1.307	0.195
EPS	0.000	0.000	2.391	0.019

Effects Specification		
	S.D.	Rho
Cross-section random	0.001	0.625
Idiosyncratic random	0.001	0.375

Weighted Statistics			
R-squared	0.970	Mean dependent var	0.002
Adjusted R-squared	0.968	S.D. dependent var	0.003
S.E. of regression	0.001	Sum squared resid	0.000
F-statistic	512.990	Durbin-Watson stat	1.509
Prob(F-statistic)	0.000		

Unweighted Statistics			
R-squared	0.945	Mean dependent var	0.005
Sum squared resid	0.000	Durbin-Watson stat	0.550

The results of the random effects regression show that ROE, NIM, and EPS significantly affect the dependent variable in a positive way as the coefficients of the regression model are positive, and the p-value of the coefficients is less than 0.05. The strongest effect is produced by ROE, which emphasizes the points of shareholder profitability. The interest income efficiency is also important since NIM improves performance significantly. A smaller contribution is made by EPS. On the contrary, cost-to-income ratio and NPL do not show any significant relationship implying that the operating efficiency and credit risk do not directly affect the dependent variable in the model. The model has a great explanatory power (Adjusted R 2 = 0.968) and general significant (Prob F-statistic = 0.000).

Table 4: Hausman Test (Source: Author)

Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	6.465	5.000	0.264

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
ROE	0.053	0.053	0.000	0.353
NIM	0.117	0.127	0.000	0.600
COSTTOINCOMERATIO	0.000	0.000	0.000	0.094
NPL	-0.000	-0.000	0.000	0.771
EPS	0.000	0.000	0.000	0.273

Cross-section random effects test equation:
Dependent Variable: ROA
Method: Panel Least Squares
Date: 01/02/26 Time: 17:44
Sample: 2020 2024
Periods included: 5
Cross-sections included: 17
Total panel (balanced) observations: 85

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.001	0.001	-2.257	0.027
ROE	0.053	0.002	27.427	0.000
NIM	0.117	0.029	4.099	0.000
COSTTOINCOMERATIO	0.000	0.000	1.624	0.109
NPL	-0.000	0.000	-1.285	0.204
EPS	0.000	0.000	2.558	0.013

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.984	Mean dependent var	0.005
Adjusted R-squared	0.979	S.D. dependent var	0.004
S.E. of regression	0.001	Akaike info criterion	-11.945
Sum squared resid	0.000	Schwarz criterion	-11.312
Log likelihood	529.650	Hannan-Quinn criter.	-11.690
F-statistic	189.556	Durbin-Watson stat	1.954
Prob(F-statistic)	0.000		

The results of the Hausman test indicate that the random effects model is valid because the chi square probability (p = 0.264) exceeds 0.05 which is not significant difference between fixed and random estimators. This implies that the effects of a specific bank are not correlated with the explanatory variables. Similar signs of coefficient significance levels are validated in the fixed-effects output, where ROE, NIM, and EPS are positively significant determinants of ROA, whereas cost-to-income ratio and NPL are not significant. The model has high explanatory power (Adjusted R 2 = 0.979) and a significant overall (Prob F-statistic = 0.000) which solidifies the strength and consistency of the panel regression results.

Normality Test

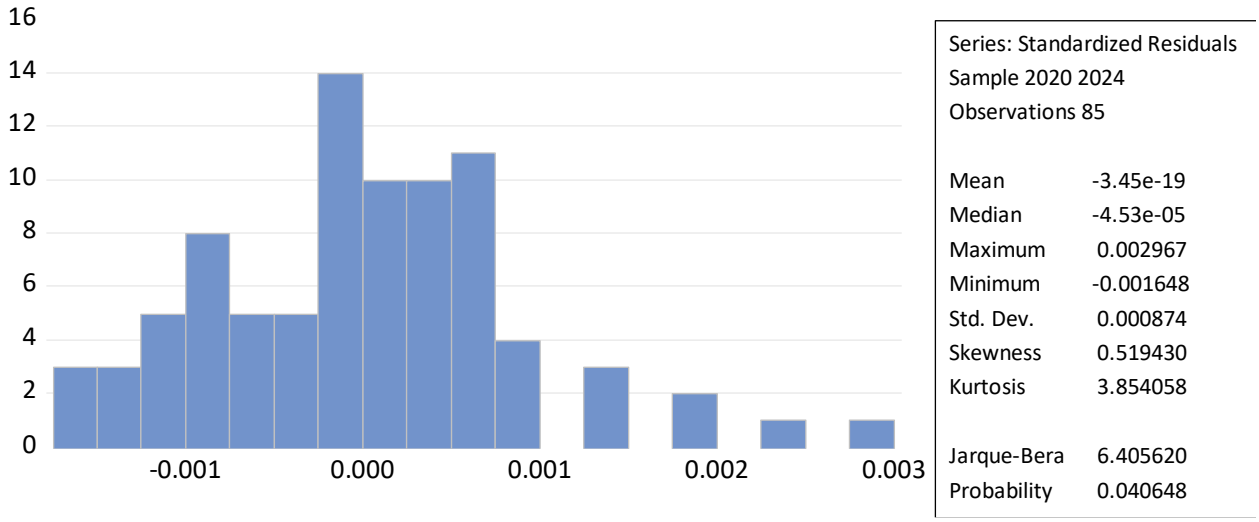

Figure 2: Normality Test (Source: Author)

The standardized residual histogram shows that the standardized residues are more or less centered on zero with a means that is approximated as near to zero as possible, which means that there is no systematic bias in the model. The distribution indicates a slight positive skewness (0.52) and above 3 kurtosis (3.85) which shows slight skew towards the right and slightly leptokurtic distribution. The Jarque Bera test is significant (p = 0.041) which means that there is a small degree of deviation of the norm. Nonetheless, considering the size of the panel sample

(85 observations), this deviation is not severe and cannot have a significant impact on the reliability of coefficient estimates, which is why the overall sufficiency of the regression model can be supported.

6.2 The Relationship between Corporate Social Responsibility and Market-Based Performance (MBR) of EU Commercial Banks

Figure 3: Correlation Table (Source: Author)

Correlation Analysis

Correlation Probability	ROE	NIM	COSTTOI...	NPL	EPS	MBR
ROE	1.000					

NIM	0.477	1.000				
	0.000	---				
COSTTOINCOM...	0.176	-0.096	1.000			
	0.107	0.382	---			
NPL	-0.192	0.074	-0.052	1.000		
	0.078	0.501	0.637	---		
EPS	0.452	0.108	0.019	-0.192	1.000	
	0.000	0.325	0.865	0.079	---	
MBR	0.477	0.322	-0.033	-0.110	0.358	1.000
	0.000	0.003	0.767	0.317	0.001	---

The correlation variables indicate that MBR has a positive and significant relationship with ROE (0.477), NIM (0.322), and EPS (0.358) meaning that an increase in profitability, increase in interest margins, and an increase in earnings performance contribute to market valuation. Such findings indicate that the market-to-book ratios are higher in comparison to banks with good financial fundamentals. On the other hand, the relationships between MBR and cost-to-income ratio and NPL are weak and insignificant, which suggests that the market does not directly price operational efficiency and credit risk in this sample. There is also a positive correlation between ROE and NIM as well as EPS, which strengthens the fact that profitability is the core factor in the formation of the accounting and market-based performance indicators.

Table 5: Regression Analysis (Source: Author)

Regression Analysis (Random Effect)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.514	0.115	4.457	0.000
ROE	0.874	0.379	2.306	0.024
NIM	7.252	5.022	1.444	0.153
COSTTOINCOMERATIO	0.000	0.000	1.025	0.309
NPL	-0.054	0.024	-2.308	0.024
EPS	-0.003	0.012	-0.260	0.796
Effects Specification				
			S.D.	Rho
Cross-section random			0.236	0.815
Idiosyncratic random			0.112	0.185
Weighted Statistics				
R-squared	0.354	Mean dependent var		0.113
Adjusted R-squared	0.313	S.D. dependent var		0.137
S.E. of regression	0.113	Sum squared resid		1.016
F-statistic	8.652	Durbin-Watson stat		1.676
Prob(F-statistic)	0.000			
Unweighted Statistics				
R-squared	0.167	Mean dependent var		0.541
Sum squared resid	5.801	Durbin-Watson stat		0.293

The findings of the random effects regression show that ROE statistically positively affects MBR (0.874 = 0.024) indicating that the more profitable shareholders are, the higher the market value. The effect of NPL is significant (= -0.054, p=0.024), meaning that the greater the risk of credit, the more investors are punishing the managers. The NIM, cost-to-income ratio, and EPS are not statistically significant, which suggests the lack of direct market-based performance. The model is generally meaningful (Prob F-statistic = 0.000) with moderate predictive power (Adjusted R 2 = 0.313) which shows that MBR is a product of both financial fundamentals and external market influences other than the internal bank performance indicators.

Table 6: Hausman Test (Source: Author)

Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	6.665	5.000	0.247

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
ROE	0.866	0.874	0.008	0.931
NIM	7.214	7.252	8.594	0.990
COSTTOINCOMERATIO	0.000	0.000	0.000	0.095
NPL	-0.062	-0.054	0.000	0.383
EPS	-0.010	-0.003	0.000	0.280

Cross-section random effects test equation:
Dependent Variable: MBR
Method: Panel Least Squares
Date: 01/02/26 Time: 18:02
Sample: 2020 2024
Periods included: 5
Cross-sections included: 17
Total panel (balanced) observations: 85

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.551	0.113	4.861	0.000
ROE	0.866	0.390	2.222	0.030
NIM	7.214	5.815	1.241	0.219
COSTTOINCOMERATIO	0.000	0.000	1.205	0.233
NPL	-0.062	0.025	-2.467	0.016
EPS	-0.010	0.014	-0.723	0.472

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.886	Mean dependent var	0.541
Adjusted R-squared	0.848	S.D. dependent var	0.288
S.E. of regression	0.112	Akaike info criterion	-1.319
Sum squared resid	0.793	Schwarz criterion	-0.687
Log likelihood	78.049	Hannan-Quinn criter.	-1.064
F-statistic	23.351	Durbin-Watson stat	2.141
Prob(F-statistic)	0.000		

Hausman Test findings show that the random effects model is suitable in explaining MBR since the use of chi square probability ($p = 0.247$) is greater than the 5 percent chance level, which indicates there is no systematic variation among the fixed and random effects estimators. The

fixed-effects findings verify the strengths of the main conclusions, as ROE and NPL have a positive and significant effect on MBR, respectively, which proves that the increased profitability the higher the market value, and the increased credit risk the lower the investor confidence. This model shows the high explanatory power (Adjusted R 2 = 0.848) and statistical significance (Prob F-statistic = 0.000) when there are fixed effects, which proves the consistency and reliability of the panel regression results.

Normality Test

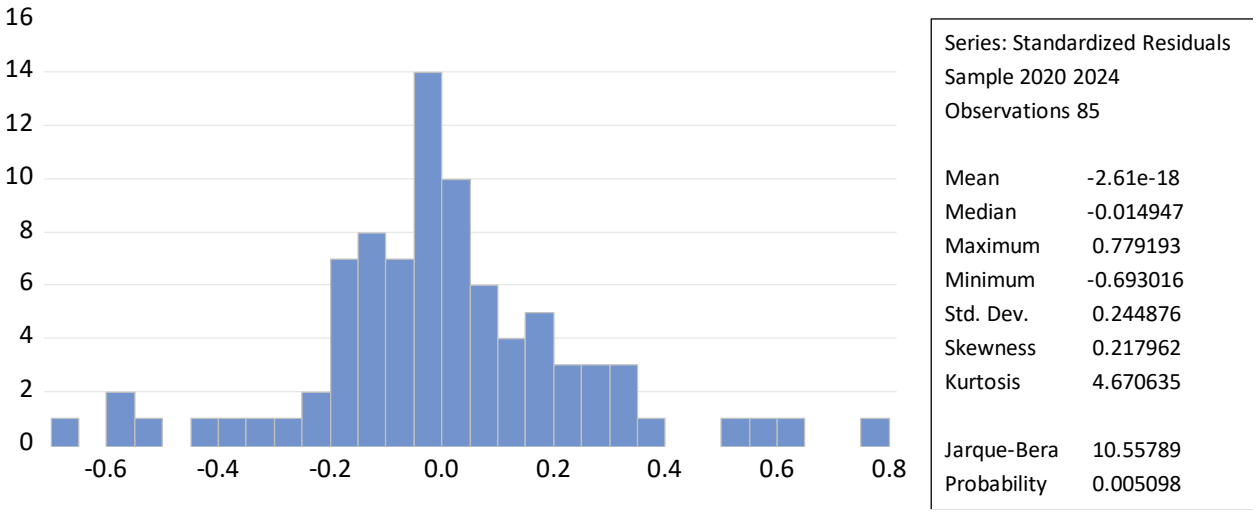

Figure 4: Normality Test (Source: Author)

The histogram of standardized resident shows that the residuals are clustered about zero, the mean and median are near to zero which indicates that there is no systematic bias in the regression model. Its distribution is slightly skewed (0.22) and has leptokurtosis (kurtosis = 4.67) which means that the distribution has fat tails. The Jarque Bera test is not significant (p = 0.005), which shows that the data is not completely normal. Nonetheless, since this study has a balanced panel structure and the sample size is sufficient (85 observations), this non-normality should not have a significant impact on the consistency of coefficients, and the results of the regression should be considered valid under the assumption of a large sample.

6.3 The Relationship between Corporate Social Responsibility and Firm Size Dynamics in EU Commercial Banks

Table 7: Correlation Analysis (Source: Author)

Correlation Analysis

Correlation Probability	ROE	NIM	COSTTOI...	NPL	EPS	FIRMSIZE
ROE	1.000					

NIM	0.477	1.000				
	0.000	-----				
COSTTOINCOM...	0.176	-0.096	1.000			
	0.107	0.382	-----			
NPL	-0.192	0.074	-0.052	1.000		
	0.078	0.501	0.637	-----		
EPS	0.452	0.108	0.019	-0.192	1.000	
	0.000	0.325	0.865	0.079	-----	
FIRMSIZE	-0.164	-0.467	0.135	0.022	0.067	1.000
	0.133	0.000	0.217	0.844	0.545	-----

The correlation table shows the firm size having weak and largely insignificant relations with profitability and risk variables. There is a negative relationship between firm size and ROE (r= -0.164) and a strong negative relationship between firm size and NIM (r= -0.467). The correlation between the firm size and cost-to-income ratio, NPL, and EPS are weak and statistically not significant, which means there is no direct relationship between them. Altogether, the findings indicate that the size of firms does not dictate the profitability and risk outcomes directly, but it is likely to dictate the performance indirectly with the help of the structural and operational attributes of EU commercial banks.

Table 8: Regression (Source: Author)

Regression Analysis (Random effect)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9237282...	172694119...	5.349	0.000
ROE	6705663...	202509729...	3.311	0.001
NIM	-466957...	30065791...	-1.553	0.124
COSTTOINCOMERATIO	-248335....	109924.793	-2.259	0.027
NPL	27651413...	13023666....	2.123	0.037
EPS	2912271....	7027773.467	0.414	0.680

Effects Specification		
	S.D.	Rho
Cross-section random	669719772.860	0.992
Idiosyncratic random	58379079.338	0.008

Weighted Statistics			
R-squared	0.186	Mean dependent var	38495221.949
Adjusted R-squared	0.135	S.D. dependent var	63472262.412
S.E. of regression	59038851...	Sum squared resid	2758612933233479 60
F-statistic	3.618	Durbin-Watson stat	1.021
Prob(F-statistic)	0.005		

Unweighted Statistics			
R-squared	0.016	Mean dependent var	988228690.176
Sum squared resid	4006221...	Durbin-Watson stat	0.007

The findings of the random effects regression on firm size show that ROE positively impacts on firm size, and it is significant (p = 0.001), meaning that more profitable banks are likely to grow in scale. The cost-to-income ratio is related significantly with negative correlation (p = 0.027) meaning that operational inefficiency limits the growth of the banks. The positive coefficient between NPL and its differences is significant (p = 0.037) and this may be because bigger banks can have more credit risk perhaps because of wider lending portfolios. NIM and EPS do not have a statistically significant effect, and they have a weak impact on the size dynamics. The model is generally important (Prob F-statistic = 0.005) yet it describes a relatively small portion of variation (Adjusted R 2 = 0.135), indicating that the firm size is affected by other structural forces other than financial performance indicators.

Table 9: Hausman Test (Source: Author)

Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	6.796	5.000	0.236

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
ROE	6716847...	670566304...	88130435...	0.905
NIM	-400402...	-4669572...	11337186...	0.048
COSTTOINCOMERATIO	-248911....	-248335.648	5754011.023	0.810
NPL	28584943...	27651413....	88308576...	0.321
EPS	2128466....	2912271.506	47618361...	0.256

Cross-section random effects test equation:
Dependent Variable: FIRMSIZE
Method: Panel Least Squares
Date: 01/02/26 Time: 18:07
Sample: 2020 2024
Periods included: 5
Cross-sections included: 17
Total panel (balanced) observations: 85

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9136118...	58950899....	15.498	0.000
ROE	6716847...	202727208...	3.313	0.002
NIM	-400402...	30253743...	-1.323	0.190
COSTTOINCOMERATIO	-248911....	109950.962	-2.264	0.027
NPL	28584943...	13057525....	2.189	0.032
EPS	2128466....	7061570.896	0.301	0.764

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.995	Mean dependent var	988228690.176
Adjusted R-squared	0.993	S.D. dependent var	696146777.119
S.E. of regression	58379079...	Akaike info criterion	38.821
Sum squared resid	2147113...	Schwarz criterion	39.453
Log likelihood	-1627.890	Hannan-Quinn criter.	39.075
F-statistic	565.784	Durbin-Watson stat	1.314
Prob(F-statistic)	0.000		

According to the Hausman test, the random effects model should be used to analyze the firm size because the chi-square probability value (= 0.236) is greater than the 5% level of significance. This implies that the bank specific effects are not correlated with the explanatory variables, which

makes the random effects estimator consistent and efficient. The fixed-effects estimates attest the strength of the results, where ROE has a positive and significant influence on the firm size, whereas the cost-to-income ratio has an adverse effect on the firm size, meaning that inefficiency limits the growth. The significant relationship between NPL and banks is positive, which suggests that bigger banks can have more control over credit risk. The model has a high power of explanations and general statistical significance.

Normality Test

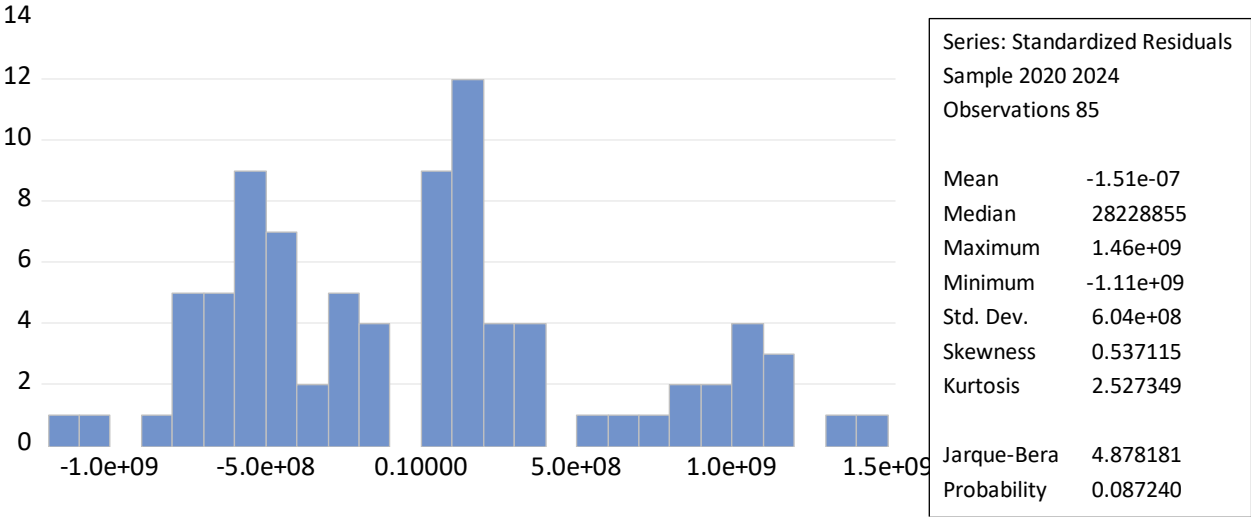

Figure 5: Normality Test (Source: Author)

According to the histogram of standardized residuals, the residuals are more or less centered on zero, it can be seen that the meaning of the residuals is near zero indicating that there is no systematic bias in the firm size model. The distribution values skewness moderate positive (0.54) and kurtosis less than 3 (2.53) meaning that it is slightly skewed to the right and is relatively normally shaped. Notably, Jarque-Braun test is not statistically significant ($p = 0.087$), which means that the null hypothesis of normality cannot be rejected at the 5% level. On the whole, the residual diagnostics indicate that the assumption of normality is fairly met and the regression estimates are valid and reliable.

Table 10: Heteroskedasticity Test (Source: Author)

Heteroskedasticity test

Cross section test

	Value	df	Probability
Likelihood ratio	107.400	17.000	0.000

LR test summary:

	Value	df
Restricted LogL	-1838.747	79.000
Unrestricted LogL	-1785.046	79.000

Unrestricted Test Equation:
Dependent Variable: FIRMSIZE
Method: Panel EGLS (Cross-section weights)
Date: 01/02/26 Time: 18:05
Sample: 2020 2024
Periods included: 5
Cross-sections included: 17
Total panel (balanced) observations: 85
Iterate weights to convergence
Convergence achieved after 21 weight iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1865003...	79018880...	23.602	0.000
ROE	9605664...	46873970...	2.049	0.044
NIM	-689870...	49263406...	-14.004	0.000
COSTTOINCOMERATIO	541815.325	406710.419	1.332	0.187
NPL	9602890...	21221300...	0.453	0.652
EPS	1626266...	12635420...	1.287	0.202

Weighted Statistics

R-squared	0.879	Mean dependent var	4994042068.845
Adjusted R-squared	0.871	S.D. dependent var	17883901554.846
S.E. of regression	6370536...	Akaike info criterion	42.142
Sum squared resid	3206115...	Schwarz criterion	42.315
Log likelihood	-1785.046	Hannan-Quinn criter.	42.212
F-statistic	114.766	Durbin-Watson stat	0.704
Prob(F-statistic)	0.000		

Unweighted Statistics

R-squared	0.212	Mean dependent var	988228690.176
Sum squared resid	3206114...	Durbin-Watson stat	0.068

The probability ratio (LR) test is very significant (LR = 107.400, p = 0.000) and it shows that the unrestricted model fits the data much better than the restricted model. This supports the

existence of cross-sectional heterogeneity across EU commercial banks and the rationale of using a panel EGLS model with cross-section weights in studying the size of firms.

The outcome of the regression indicates that the size of firms has a positive but statistically insignificant correlation with the ROE ($p = 0.044$), indicating that more lucrative banks are likely to increase their size. On the contrary, the effect of NIM on the firm size is relatively negative ($p < 0.001$) which suggests that banks with larger interest margins can work on a smaller scale or be more focused. There are no statistically significant differences in cost-to-income ratio, NPL, and EPS, which means that they do not have a strong direct impact on size. In general, the model is characterized by good explanatory power (Adjusted R 2 = 0.871) and high total significance.

Table 11: Period Test (Source: Author)

Period Test

	Value	df	Probability
Likelihood ratio	0.066786	17	1.0000

LR test summary:

	Value	df
Restricted LogL	-1838.747	79
Unrestricted LogL	-1838.713	79

Unrestricted Test Equation:
Dependent Variable: FIRMSIZE
Method: Panel EGLS (Period weights)
Date: 01/02/26 Time: 18:05
Sample: 2020 2024
Periods included: 5
Cross-sections included: 17
Total panel (balanced) observations: 85
Iterate weights to convergence
Convergence achieved after 6 weight iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.44E+09	2.66E+08	5.409428	0.0000
ROE	1.12E+08	1.60E+09	0.069628	0.9447
NIM	-5.14E+10	1.24E+10	-4.131651	0.0001
COSTTOINCOMERATIO	955858.3	1062162.	0.899918	0.3709
NPL	70621912	78611481	0.898366	0.3717
EPS	35484290	30863142	1.149730	0.2537

Weighted Statistics

R-squared	0.248011	Mean dependent var	9.89E+08
Adjusted R-squared	0.200416	S.D. dependent var	6.97E+08
S.E. of regression	6.23E+08	Akaike info criterion	43.40502
Sum squared resid	3.07E+19	Schwarz criterion	43.57744
Log likelihood	-1838.713	Hannan-Quinn criter.	43.47437
F-statistic	5.210935	Durbin-Watson stat	0.061570
Prob(F-statistic)	0.000348		

Unweighted Statistics

R-squared	0.246879	Mean dependent var	9.88E+08
Sum squared resid	3.07E+19	Durbin-Watson stat	0.062451

The value of the likelihood ratio (LR = 0.0668, p = 1.000) is not statistically significant, and, thus, there are no period effects in the firm size model. This indicates that time-varying has no significant impact on the size of firms and period weights do not increase model fit.

Within period-weight EGLS results, the Net Interest Margin (NIM) has a strong negative correlation with the size of the firm (p = 0.0001), which suggests that banks with stronger margins are likely to run at a relatively smaller scale, perhaps due to focused or niche business models. The rest of the variables, including ROE, cost to income ratio, NPL, EPS are statistically non-significant showing that they do not have a significant impact on change of size over time. The model accounts for a moderately large amount of variation (Adjusted R 2 = 0.200) and is in many ways significant, which again contributes to the fact that firm size differences are more attributable to cross-sectional than time-specific effects.

6.4 The Relationship between Corporate Social Responsibility, Leverage, and Asset Turnover Efficiency in EU Commercial Banks

Table 12: Correlation Analysis (Source: Author)

Correlation Analysis

Correlation Probability	ROE	NIM	COSTTOI...	NPL	EPS	LEVERAG...
ROE	1.000 -----					
NIM	0.477 0.000	1.000 -----				
COSTTOINCOM...	0.176 0.107	-0.096 0.382	1.000 -----			
NPL	-0.192 0.078	0.074 0.501	-0.052 0.637	1.000 -----		
EPS	0.452 0.000	0.108 0.325	0.019 0.865	-0.192 0.079	1.000 -----	
LEVERAGEASSE...	0.585 0.000	0.679 0.000	0.077 0.483	-0.082 0.454	0.341 0.001	1.000 -----

The correlation table reveals that leverage is positively and significantly correlated with ROE (0.585) and NIM (0.679) meaning that the more leverage a bank has, the greater the shareholders returns and interest margins, which could be explained by the fact that the greater the leverage,

the higher the earnings effects of debt financing. Leverage also shows a moderate positive relation with EPS (0.341), implying that there is a relationship between leverage and earnings performance. Conversely, leverage shows a weak and non-significant correlation with cost-to-income ratio and NPL, which suggests that increased leverage does not necessarily mean operational efficiency or the amount of credit risk within this sample. In general, the findings indicate that leverage is more related to profitability and income generation than cost effectiveness and quality of assets of commercial banks in EU.

Table 13: Regression (Source: Author)

Regression Analysis (Fixed Effect)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000	0.009	-0.049	0.961
ROE	0.031	0.032	0.975	0.333
NIM	2.296	0.473	4.851	0.000
COSTTOINCOMERATIO	0.000	0.000	0.064	0.949
NPL	0.000	0.002	0.107	0.915
EPS	0.004	0.001	3.665	0.001

Effects Specification			
Cross-section fixed (dummy variables)			
R-squared	0.795	Mean dependent var	0.045
Adjusted R-squared	0.727	S.D. dependent var	0.017
S.E. of regression	0.009	Akaike info criterion	-6.336
Sum squared resid	0.005	Schwarz criterion	-5.704
Log likelihood	291.292	Hannan-Quinn criter.	-6.082
F-statistic	11.659	Durbin-Watson stat	1.146
Prob(F-statistic)	0.000		

With the fixed effects regression results, the findings show that Net Interest Margin (NIM) and Earnings per Share (EPS) are positively and less significantly affecting leverage. NIM also demonstrates a significant impact (2.296, $p < 0.001$) indicating that banks that have higher interest margins have a higher level of leverage. The positive significant value of EPS (= 0.004, = 0.001) also shows that higher earnings capability will lead to increased debt ability. On the contrary, ROE, cost-to-income ratio and NPL have no statistical significance, which means that these variables do not have a direct bearing on leverage decisions. The model has good

explanatory power (Adjusted R2 = 0.727), and significance; this indicates that income generation and earnings strength were relevant as far as bank leverage is concerned.

Table 14: Hausman Test (Source: Author)

Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	15.762	5.000	0.008

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
ROE	0.031	0.058	0.000	0.085
NIM	2.296	1.765	0.148	0.168
COSTTOINCOMERATIO	0.000	0.000	0.000	0.057
NPL	0.000	-0.001	0.000	0.423
EPS	0.004	0.002	0.000	0.030

Cross-section random effects test equation:
Dependent Variable: LEVERAGEASSETTURNOVER
Method: Panel Least Squares
Date: 01/02/26 Time: 18:14
Sample: 2020 2024
Periods included: 5
Cross-sections included: 17
Total panel (balanced) observations: 85

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000	0.009	-0.049	0.961
ROE	0.031	0.032	0.975	0.333
NIM	2.296	0.473	4.851	0.000
COSTTOINCOMERATIO	0.000	0.000	0.064	0.949
NPL	0.000	0.002	0.107	0.915
EPS	0.004	0.001	3.665	0.001

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.795	Mean dependent var	0.045
Adjusted R-squared	0.727	S.D. dependent var	0.017
S.E. of regression	0.009	Akaike info criterion	-6.336
Sum squared resid	0.005	Schwarz criterion	-5.704
Log likelihood	291.292	Hannan-Quinn criter.	-6.082
F-statistic	11.659	Durbin-Watson stat	1.146
Prob(F-statistic)	0.000		

The results of Hausman tests reveal that the fix effect model is the right specification required to analyze the leverage and asset turnover. The chi-square value is found to be significant (2 = 15.762, p = 0.008), making one abandon the null hypothesis that the random effects estimator is consistent. It means that bank-specific effects are forecasted with the explanatory variables, and the random effects model would not be suitable in this analysis. To that effect, the results of the fixed effects are supposed to be used in their interpretation. According to the fixed effects model, Net Interest Margin (NIM) and Earnings per Share (EPS) have positive and significant relationships with leverage and asset turnover, which implies the capacity to generate income and strength of earnings have an impact on the leverage effect and efficiency in banks. The other variables such as ROE, cost to income ratio and NPL are not significant. The Hausman test in general indicates that unobserved heterogeneity among banks is significant, and thus fixed effects research methodology should be used to conduct a solid inference.

Normality Test

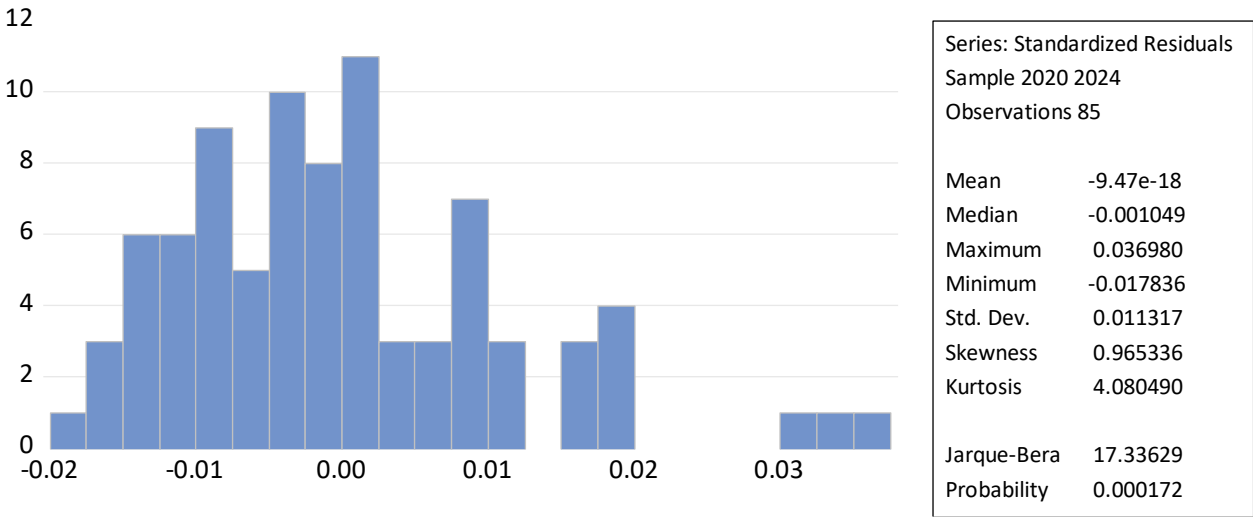

Figure 6: Normality Test (Source: Author)

The histogram of standardized residuals also shows that the residuals have a mean of around zero as indicated by the close to zero mean and median value of the histogram that there is no systematic bias in the leverage-asset turnover model. The distribution however has a positive skewness (0.97) and a positive leptokurtosis (kurtosis = 4.08) thus indicating that the distribution

has thicker tails compared to normal and skewed on the right. Jarque Bra statistics are significant ($p = 0.000$) and this shows a non-observance of the normality assumption. Nonetheless, since the panel structure is not asymmetrical and consists of a moderate number of observations (85), the non-observation of normality is expected to not decrease the consistency of the coefficient, and the estimates of the fixed effects are also accurate to infer.

Table 15: Heteroskedasticity Test (Source: Author)

Heteroskedasticity Test

Cross section test

	Value	df	Probability
Likelihood ratio	45.296	17.000	0.000

LR test summary:

	Value	df
Restricted LogL	260.820	79.000
Unrestricted LogL	283.468	79.000

Unrestricted Test Equation:
Dependent Variable: LEVERAGEASSETTURNOVER
Method: Panel EGLS (Cross-section weights)
Date: 01/02/26 Time: 18:12
Sample: 2020 2024
Periods included: 5
Cross-sections included: 17
Total panel (balanced) observations: 85
Iterate weights to convergence
Convergence achieved after 35 weight iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.002	0.003	-0.673	0.503
ROE	0.020	0.012	1.693	0.094
NIM	2.519	0.147	17.141	0.000
COSTTOINCOMERATIO	-0.000	0.000	-1.144	0.256
NPL	-0.000	0.001	-0.293	0.770
EPS	0.002	0.000	7.361	0.000

Weighted Statistics

R-squared	0.942	Mean dependent var	0.105
Adjusted R-squared	0.938	S.D. dependent var	0.125
S.E. of regression	0.014	Akaike info criterion	-6.529
Sum squared resid	0.016	Schwarz criterion	-6.356
Log likelihood	283.468	Hannan-Quinn criter.	-6.459
F-statistic	255.716	Durbin-Watson stat	0.958
Prob(F-statistic)	0.000		

Unweighted Statistics

R-squared	0.360	Mean dependent var	0.045
Sum squared resid	0.016	Durbin-Watson stat	0.319

The result of the likelihood ratio (LR) test is statistically significant (LR = 45.296, p = 0.000) meaning that the unrestricted model fits much better than the restricted one. This substantiates the heterogeneity of cross-section of the banks and warrants cross section weighted panel EGLS model. The results of the regression model indicate that Net Interest Margin (NIM) significantly and positively influences leverage-asset turnover (= 2.519, p = 0.001), meaning that the more banks have a high interest margin, the more leverage-related efficiency they demonstrate. Earnings per share (EPS) is also positively significant (0.00 2 = 0.001) which implies that better earnings ability can promote better utilization of assets under leverage. The significance of ROE is slightly significant at 10 percent and cost-to-income ratio and NPL are insignificant. The model is highly explanatory (Adjusted R 2 = 0.938) and significant in general, which proves the strength of the findings.

Table 16: Periodic Test (Source: Author)

Periodic test

	Value	df	Probability
Likelihood ratio	20.623	17.000	0.244

LR test summary:

	Value	df
Restricted LogL	260.820	79.000
Unrestricted LogL	271.132	79.000

Unrestricted Test Equation:
Dependent Variable: LEVERAGEASSETTURNOVER
Method: Panel EGLS (Period weights)
Date: 01/02/26 Time: 18:12
Sample: 2020 2024
Periods included: 5
Cross-sections included: 17
Total panel (balanced) observations: 85
Iterate weights to convergence
Convergence achieved after 11 weight iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.016	0.003	4.779	0.000
ROE	0.044	0.020	2.148	0.035
NIM	1.387	0.180	7.724	0.000
COSTTOINCOMERATIO	0.000	0.000	1.889	0.063
NPL	-0.001	0.001	-0.579	0.564
EPS	0.001	0.001	1.261	0.211

Weighted Statistics

R-squared	0.575	Mean dependent var	0.056
Adjusted R-squared	0.548	S.D. dependent var	0.020
S.E. of regression	0.013	Akaike info criterion	-6.238
Sum squared resid	0.014	Schwarz criterion	-6.066
Log likelihood	271.132	Hannan-Quinn criter.	-6.169
F-statistic	21.404	Durbin-Watson stat	0.609
Prob(F-statistic)	0.000		

Unweighted Statistics

R-squared	0.473	Mean dependent var	0.045
Sum squared resid	0.014	Durbin-Watson stat	0.484

Period effects are not found to be statistically significant (LR = 20.623, p = 0.244) and hence period effects do not have a significant impact on leverage-asset turnover. Thus, period weights are not important to fit the model, and the differences in model performance are not related mostly to the time but are rather a feature of banks.

The period-weighted EGLS regression results indicate that ROE is positively and significantly associated with leverage- asset turnover (= 0.044, p = 0.035), implying that banks having better shareholder profitability are more competent in their leverage and asset utilization. There is a significant positive and statistically significant (0.001) effect on Net Interest Margin (NIM) and this

indicates the role of interest income efficiency as a contributor to improving leverage-related asset turnover. The expense relative to revenue ratio is slightly significant at the 10 percent mark, which means a weak efficiency impact. On the contrary, NPL and EPS are not influential, meaning that credit risk and earnings per share do not have significant effect on leverage-asset turnover. The general results of the model are statistically significant (Prob F-statistics = 0.000) with a moderate explanatory power (Adjusted R 2 = 0.548).

6.5 Discussion

H1: There is a significant relationship between ROE and ROA

The empirical findings affirm that Return on Equity (ROE) and Return on Assets (ROA) have a positive and significant relationship. This implies that the EU commercial banks are being more efficient in using their assets base to generate profits when they yield higher returns to their shareholders. The result confirms the traditional banking performance theory, in which indicators of profitability follow each other, as the measures of financial stability. H1 is accepted as previously the studies carried in the banking and CSR environment already report that a stronger profitability improves the operational performance and the financial stability (Bătae et al., 2020; Giannopoulos et al., 2024; AlAjmi et al., 2022).

H2: There is a significant relationship between NIM and ROA

The findings reveal that Net Interest Margin (NIM) and ROA have a positive and statistically significant relationship indicating that banks that have greater intermediation efficiency have better asset profitability. This goes hand in hand with the fact that it is effective interest management of income to enhance overall financial performance. Better margins can also be the indication of better customer confidence and responsible credit practices in the responsible banking context (Dorasamy, 2013; Chedrawi and Osta, 2017). There were also similar positive

correlations of the indicators related to efficiency with bank profitability observed in previous empirical research (Giannopoulos et al., 2024). H2 is therefore accepted**.**

H3: There is a significant relationship between cost-to-income ratio and ROA

The regression output shows that the correlation between the ratio of cost to income and ROA is not significant. Though theory states that increased operational effectiveness should lead to increased profitability, this is not found in the present sample. The first reason is that the compliance of sustainability reporting, governance, and regulations with the operational costs of EU banks may not have short-term impacts on the accounting profitability. According to previous research, CSR and ESG investments may also raise operational complexity and expenses in the initial stages (Guillamon-Saorin et al., 2018; Antonini and Gomez-Conde, 2024). Therefore, H3 is rejected**.**

H4: There is a significant relationship between NPL and ROA

The results are based on the fact that the relationship between the non-performing loans (NPL) and ROA is not statistically significant, but the coefficient is negative. This implies that credit risk does not have a direct effect on short-term accounting profitability on the sampled EU commercial banks. This could be attributed to good risk provisioning, capital buffers, and regulatory regulation, which helps in the reduction of the immediate effects of loan default on profitability. Past studies suggest that credit risk has a tendency to impact firm performance indirectly by reputation and market confidence and not directly by ROA (Aderibigbe and Fragouli, 2020; Fathi Jouini et al., 2025). Hence, H4 is rejected.

H5: There is a significant relationship between EPS and ROA

The findings indicate that Earnings per Share (EPS) and ROA have a positive and statistically significant relationship. This implies that the higher the performance of banks in their earnings, the higher the asset profitability. The internal value creation and financial strength is reflected in EPS, which works into financial strength leading to more efficient use of assets. It has been empirically determined that accounting and sustainability-focused financial performance are

highly connected to earnings performance (Huang et al., 2025; Gökhan Özer et al., 2024). Accordingly, H5 is accepted.

07. Conclusions

This research has investigated the connections between critical financial performance ratios and bank performance among EU commercial banks based on panel data between 2020 and 2024. The results have shown that the variables connected with profitability are the focus of the variables that explain the outcomes of the performance of banks. The results of Return on Equity (ROE) demonstrate that it has a strong positive correlation with accounting profitability, market valuation, and firm size, which demonstrates that the returns to shareholders play an essential role in the overall performance of the company. Currently, Net Interest Margin (NIM) has a positive effect on Return on Assets, which proves the importance of intermediation efficiency. Earnings per Share (EPS) is also a positive factor in the profitability of assets but has a lesser effect on market-based performance and size of the firm. Non-performing loans are credit risks that negatively impact market pricing but have no serious negative impact on accounting profitability, and operational inefficiency limits growth of the firm. Overall, the findings illustrate that the performance of banks is multidimensional as it is determined by the factors of profitability, risk, and efficiency with the market participants putting more emphasis on profitability and risk perceptions as compared to cost efficiency.

7.1 Summary of Findings

The research has discussed the connection between the key financial performance variables and the various dimensions of bank performance in the EU commercial banks between 2020 and 2024 through the analysis of panel data. The results give valuable information about the interplay between profitability, efficiency, risk, and scale in the banking industry and the presence of incremental regulatory and sustainability pressure.

The findings indicate that a significant role in explaining the performance of banks is played by the profitability-related variables. The positive and significant relationship between Return on Equity (ROE) and Return on Assets (ROA), Market-to-Book Ratio (MBR) and Firm Size were consistently positive, which means that the profitability of shareholders is a major determinant of accounting-based and market-based performance and growth. The Net Interest Margin (NIM)

had a positive correlation with ROA, which proves the role of intermediation efficiency in profitability of assets, but the effect on the valuation of the market and size of the firm was relatively small.

ROA had a strong positive correlation with Earnings per Share (EPS), which indicated the importance of earning power in enhancing the efficiency of assets. Nevertheless, market valuation and firm size were not significantly influenced by the EPS indicating that investors might attach more priority to the risk and governance factors at large rather than the earnings alone.

Credit risk in terms of Non-Performing Loans (NPL) exhibited both positive and negative results. Although NPL was not a significant determinant of ROA, it was significantly negatively correlated with MBR, and this implies that markets would punish increased credit risk. Meanwhile, NPL showed a positive correlation with the size of firms, indicating that the larger the banks are, the more they might be exposed to risk by virtue of the larger lending portfolio. Operational efficiency in terms of cost to income ratio did not have major implications on profitability but had adverse effects on firm size, which suggests that inefficiency limits long-term expansion.

7.2 Limitations

This study is limited in several ways despite its contributions. To begin with, only secondary quantitative data is analyzed, and this limits the knowledge of managerial decisions, practices of governance, and qualitative aspects of sustainability and strategy. Second, the sample of EU-based commercial banks in the last five years is not representative of the long-term structural transformations or the crisis-related dynamics in the banking sector. Third, although they used key financial indicators, other variables of interest were disregarded, including macroeconomic conditions, regulatory intensity, and the quality of disclosure of ESG details in particular were not directly modelled. Lastly, even though panel regression methods enhance robustness, one can always expect that the findings could have been influenced by unobserved heterogeneity and measurement bias.

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