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Does sustainable lending influence bank profitability:

Evidence from European financial institutions

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ABSTRACT:

The purpose of this study is to investigate whether sustainable lending influences bank profitability. Sustainable loans are green financial instruments that banks offer to companies and individuals for their green initiatives with usually a lower interest rate. The distribution of this lending type has only started to increase in the recent years which in its part explains the lack of research on the subject within the EU. To the increase of the sustainable lending may also have contributed recent changes in legislation and sustainable targets set by the EU where the banks chosen for the study locate. Initiatives such as the EU taxonomy, net zero goal and European green deal are such examples. The study approaches the subject with three research questions that examine whether sustainable lending influences bank profitability and if an increasing time or amount of distributed sustainable lending affects bank performance. The study uses panel data method which observes sustainable lending towards the performance measure ROA as indicating bank performance. The research doesn't find statistically significant indications for sustainable lending affecting bank performance. A positive correlation to bank performance is observed when sustainable lending has been distributed for an increasing amount and when the time-period for the distribution has been shorter. Many aspects influence bank performance and the result can imply that sustainable lending may have a positive impact towards performance when distributed for a longer time and in a cautious manner. The study observes the trend for green financing and green initiatives to be increasing. This seems to occur along with the increasing demand for sustainability and a changing legislation around sustainable finance reporting. These factors contribute to a more sustainable future and offer more research material for the next studies to come. It is a positive direction from an environmental perspective, and it also includes a potential link to performance if the "need for green" is aligned with the sustainable strategies of the financial institutions.

KEYWORDS: sustainable finance, green finance, sustainable lending, green lending, commercial bank, bank profitability

VAASAN YLIOPISTO**Laskentatoimen ja rahoituksen yksikkö**

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TIIVISTELMÄ:

Tämän tutkimuksen tarkoituksena on selvittää, vaikuttaako vihreä luotonanto pankkien kannattavuuteen. Vihreät lainat ovat kestäväen kehityksen rahoitusinstrumentteja, joita pankit tarjoavat yrityksille ja yksityishenkilöille ympäristöystävällisiin kohteisiin, yleensä alhaisemmalla korolla. Tämä lainatyyppi on alkanut yleistyä vasta viime vuosina, mikä osaltaan selittää aihetta koskevan tutkimuksen puutteen EU:n alueella. Vihreän luotonannon lisääntymiseen on voinut vaikuttaa myös viimeaikainen lainsäädännön kehitys ja EU:n asettamat kestävät tavoitteet. Nämä tavoitteet vaikuttavat tutkimukseen valittuihin pankkeihin, sillä ne sijaitsevat EU:n lainsäädäntöalueen sisällä. Lainsäädännön sekä aloitteiden esimerkkejä ovat esimerkiksi EU taxonomia, nettonollatavoite ja Euroopan green deal - ohjelma. Tämä tutkimus lähestyy aihetta kolmella tutkimuskysymyksellä. Niiden avulla pyritään selvittämään, vaikuttaako vihreä luotonanto, pidempi vihreä luotonantoaika tai vihreän luotonannon määrä pankkien kannattavuuteen. Tutkimuksessa käytetään paneelianaalyyysiä, joka havainnoi vihreää luotonantoa ROA kannattavuusmittariin, joka tutkimuksessa havainnollistaa pankin kannattavuutta. Tuloksissa ei havaittu tilastollisesti merkittäviä viitteitä vihreän luotonannon vaikutuksesta pankkien kannattavuuteen. Positiivinen korrelaatio pankkien kannattavuuteen havaittiin, kun vihreää luotonantoa oli lainattu pidemmällä aikavälillä ja maltillisemmalla rahoitetulla määrällä. Monet seikat vaikuttavat pankkien kannattavuuteen ja tutkimuksen tulos voi viitata siihen, että vihreällä luotonannolla voi olla myönteinen vaikutus kannattavuuteen mikäli lainoja lainataan pitkäaikaisesti maltillisella määrällä. Tutkimuksessa havaitaan, että vihreä rahoitus ja vihreät aloitteet ovat lisääntymässä. Tämä näyttää tapahtuvan samanaikaisesti kestäväen kehityksen liittyvän kysynnän lisääntyessä ja kestäväen rahoituksen raportointia koskevan lainsäädännön muuttuessa. Nämä tekijät edistävät kestävämpää tulevaisuutta ja tarjoavat lisää tutkimusaineistoa tuleviin tutkimuksiin. Se on myönteinen suunta ympäristön näkökulmasta ja sisältää myös mahdollisen yhteyden kannattavuuteen mikäli kasvavaan vihreän kysyntään voidaan vastata yhdistämällä kysyntä pankkien omaan kestäväen strategiaan.

AVAINSANAT: kestävä rahoitus, vihreä rahoitus, vihreä luotonanto, vihreät lainat, liikepankki, pankkien tuottavuus

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Abbreviations

CIR	Cost to income ratio
CSRD	Corporate Sustainability Reporting Directive
EBA	European Banking Authority
ECB	European Central Bank
EEA	European Economic Area
ESRS	European Sustainability Reporting Standards
ESRB	European Systemic Risk Board
EU	European Union
LEV	Leverage
LIQ	Liquidity
NPL	Non-performing loans
ROA	Return on Assets
ROE	Return on Equity
UN	United Nations

1 Introduction

Rising environmental issues have been identified as one of the biggest challenges of our time. The changing climate is a shared concern and cross-national measures and agreements have been made to affect change to the situation for the better. Companies such as nations have been subject to participate to the endeavors for hindering climate change and many report the measures taken towards sustainable development.

Banks and other financial institutions play an important role in sustainable development as their direct and indirect activities impact the environment. The responsibility for battling climate change that these kind of financial institutions have has two sides. As one consequence of climate change are financial problems caused to customers whose issues are then reflected on financial institutions. This implies that bank performance is connected to the financial health of their customers. For battling climate change banks can offer products and services that contribute to sustainable development (Stanghellini et al. 2008). The beforementioned also refers to that climate change isn't only a threat for the environment but also to the economy. Initially the initiatives for the battling climate change have come from the policymakers, central banks and other supervisors. Now both the public and the private sector are finding ways of taking action against the undesired development of the climate. Many banks such as commercial banks have started to include additional green financial products as their financial instruments offered to customers that support sustainable development (Park and Kim 2020). Commercial banks often act as the primary financier for green projects and green investments for corporate and private customers. Sustainable and green loans as a form of financing that specifically have an environmental objective have started to generalize beside the more common green instruments, green bonds. Sustainable and green loans are similar to green bonds in their green objective and that they should solely be used for green projects. These types of loans are offered to individual corporate and private customers. This enables funding for green projects that have smaller financing needs than what a green bond debt issuing would be used at (The World Bank, 2021).

1.1 Purpose of the study

The purpose of this study is to provide research-based information to the area of sustainable and green lending. The financial instrument in question, sustainable or green loan is chosen specifically since it is directed to private and corporate customers and differs from other lending instruments by its objective, size and the receiver of the loan. This study will from now on coherently refer to sustainable and green lending with the term sustainable lending. This is because in practice the term doesn't yet seem to have established as much that this study could alone concentrate to only one type of lending. This decision is later argued more thoroughly in this study. The aim in this study is to examine whether a positive correlation between sustainable lending and bank profitability exists amongst European financial institutions in different EU countries. Since much previous research hasn't been conducted within this area with this focus, this study will try to fill this research gap by providing information gathered from those financial institutions that operate and locate in this area. The focus is on big banking organizations within the EU in different countries that offer sustainable lending or that would be expected to offer sustainable lending based on the size of the organization. This study will later also argue why especially the size of the organization seems to suggest a potential existence of sustainable lending in a specific financial institution.

This study examines whether a positive correlation between sustainable lending and bank profitability exists and whether the amount or time of the lending offered has an effect in it. In Europe it is geographically visible that many financial institutions that hold the most assets compared to other financial institutions in the area have focused on certain central areas. It is though not self-evident whether the size of the financial institution contributes to the potentially existing correlation between bank profitability and sustainable lending. This is one aspect that this study will also observe.

For reaching this goal this study has formed the following three hypotheses that will be viewed in the light of the analysis of the research results:

H0: Sustainable lending has no positive correlation to bank profitability

This null hypothesis states that no correlation exists between the financial institutions chosen for this study and measured bank profitability. The hypothesis assumes that no statistical significance exists amongst the observations gathered. The three next hypotheses assume the opposite and account also for other potentially influential factors.

1: Sustainable lending is correlated to positive bank profitability

2: An increased number of years that sustainable lending has been distributed is positively correlated with bank profitability

3: An increasing amount of sustainable lending distributed is positively correlated with bank profitability

These research hypotheses have been created based on the suggestions of previous research and literature that would indicate that such correlation could exist. Research conducted in the EU area with a data sample of financial institutions such as in this study has yet not been previously conducted. The data is gathered for a time period of 5 years between 2018 and 2022. This five year time frame was chosen because most of the financial institutions included in this study didn't report or offer sustainable and green lending before this time period. Observations from this five year period include 337 from 69 different organizations. The year 2023 is at this point excluded from the study since the reporting concerning sustainability measures differs amongst organizations and not all organizations had reported 2023 figures at the time that this study was conducted. This was visible especially in organizations located in France, Greece, Ireland and Italy. More detailed sustainability measures are sometimes reported only in ESG reports. The date for publishing ESG reports seem to vary amongst different organizations.

1.2 Structure of the thesis

The structure of this thesis is divided into a theoretical part and an empirical part. The background prior to literature aims in introducing the policies and initiatives that

sustainable finance is linked to. Then the study continues into defining and introducing the financial lending instruments, the loan type in question and the type of institutions that offer them as tools to reach the goals of the set initiatives for sustainability. The literature then can offer insight to the current state of research related to the subject and provide the tools for researching the hypothesis. The theoretical framework provides the ratio that is used for measuring profitability within the institutions examined. Examining whether a positive correlation exists between bank profitability and the specific type of loans will be located in the empirical part of this study. The results and conclusions are presented in the final part of the thesis along with suggestions for future research.

2 Background

The background for the study will introduce the policies and strategies that relate to the green financial instruments and the underlying framework. The changing legislation related to ESG and sustainability reporting along with general demand are contributing factors for the increase of sustainable products.

2.1 Global strategies that guide financial operators

Global operators such as the UN and the EU has set strategies for guiding the transition towards a more sustainable economy. The UN has set a global strategy called sustainable development goals launched in 2015 which are directed to governments. The governments have the responsibility to reach these goals. There are 17 goals which alongside sustainability aim in peace and prosperity in the world. The goals give direction to a global future development. The strategy is called the 2030 agenda for sustainable development. For reaching its goals, this strategy includes directions for creating policies related to regulation and a taxonomy that addresses environmental and social challenges (Schoenmaker & Schramade, 2019, p.11-12). The UN has a global influence since 193 out of 197 countries recognized by the UN are members (WorldAtlas, 2024). The UN and the EU cooperate to reach the UN determined goals where the EU works continuously to advance these goals with different measures taken (European Commission, 2024b).

2.1.1 European Green Deal

The European Green Deal is a group of policy initiatives launched by the European Commission in 2019. The Green Deal has been created as a strategy to reach the UN set 2050 goal. The 2050 strategy is aiming for guiding the EU to a green transition and to a climate neutral continent by 2050. In 2030 the greenhouse gas emissions are targeted to have been decreased by 55%. A climate neutral economy in 2050 aims in not creating net emissions of greenhouse gases. This goal is also known as the net-zero goal. The climate neutral economy also strives in detaching resource usage from economic growth. These

goals are sought to be met while simultaneously building and maintaining a modern, resource efficient and competitive economy. The set of initiatives include climate, environment, energy, transport, industry, agriculture, and sustainable finance. The Green Deal also operates as an initiative to sustainably recover from the COVID 19 pandemic. It has received one third of a 1.8 trillion investment from the NextGenerationEU Recovery Plan and a part from EU's seven-year budget (European Commission (2024c)).

2.1.2 EU taxonomy for sustainable finance

The EU has created a sustainable finance framework that aims in increasing transparency in the market. Within that framework is the EU taxonomy, launched in 2020 that classifies or gives the criteria for such activities that can be considered environmentally sustainable or that align with the agreed climate goals. The goals of the EU are formatted into the 2050 plan which extends the objectives to concern all countries within the EU. The taxonomy itself includes six environmental objectives along with the criteria for sustainability. The objectives include mitigating climate change and adapting to it, using marine resources sustainably, green transition, preventing further pollution and protecting the biodiversity of the planet (Doyle, 2021). For achieving the set objectives regarding increased transparency in the sustainable finance sector the EU identified a need for a precise classification for environmentally sustainable activities. This classification system would make it easier for companies, investors and individuals to have a shared understanding of what is considered as sustainable activities. Financial and non-financial organizations need to report their activities that align with the taxonomy. Sustainability reporting increases comparability amongst institutions and increases transparency. The taxonomy also has a security aspect to it. Greenwashing, which is later defined and addressed in this study, is a problem that has occurred with the increase of needed and demanded sustainable activities amongst companies and organizations. Shared common definitions will identify the actual sustainable activities for operators (European Commission, 2023).

The green asset ratio (GAR) quantifies EU taxonomy aligned assets as a percentage in relation to total covered assets. The GAR ratio is designed to increase transparency on sustainable measures taken by a financial institution as financial undertakings. Its aim is to make sure that financial institutions within the EU align with the set environmental goals. The GAR hasn't been chosen as the best indicator for bank sustainability or an indicator for measuring the progress of the green transition regardless of its aim. This is because not all banks report GAR and the metric itself can't take into account all activities that can be considered sustainable. A financial institution can support environmentally unfriendly customers to reduce their negative impact to the environment but this activity might not necessarily be reflected in the GAR caused by the unsustainable profile of the customer. This would be an example of a sustainable activity that isn't measured in overall sustainability and reported. There are also a lot of customer companies receiving loans from banks, which are not required to report their operations under similar legislation as companies that need to comply with EU regulation are. The abovementioned issues create information asymmetries around the GAR ratio. They however don't reduce the fact that the ratio may be helpful for investors and other parties to be more informed about the financial institution's operations and increased transparency (EBF, 2024).

2.1.3 Corporate sustainability reporting

Corporate sustainability reporting has been required from the beginning of the year 2024. The European Commission has made a new corporate sustainability directive (CSRD) that compels large companies and listed SMEs that locate in the EU to disclose information about their social and environmental impact. The directive itself has been effective from the year 2023. The aim of the directive is to increase transparency of sustainability towards investors, different organizations, consumers and stakeholders. The CSRD is linked to the European sustainability reporting standards (ESRS) and it expands the information that has previously been obligated to report. The ESRS are the standards and requirements that guide the sustainability reporting. They are created by the

European financial reporting advisory group (EFRAG) and align with international sustainability standards (European Commission, 2024).

2.1.3.1 Mitigation of environmental risk in financial institutions

Climate change and the consequences of it represent an environmental risk to the whole economy. When it comes to the responsibility of environmental protection related to business it is more common to link it to companies whose actions directly affect the environment. It is important to view banks and other financial institutions as intermediaries that finance businesses that either are environmentally friendly or not. For this reason, environmental issues concern financial institutions greatly since their effect to the businesses that operate in the market is significant. With offering finance for sustainable and green activities the financial institutions can steer the overall development into a more sustainable direction. Even if the financial institutions aren't directly affecting the climate with the nature of their operations it is important for them to consider sustainability and the environment with risk mitigation. The risks that emerge in connection with financing polluting businesses or in general environmentally unfriendly businesses are concrete for the financial institutions. The risks reflected on banks can be for example related to credit, legal, reputation, market, interest rate, liquidity, operational and strategic. It is not self-evident how these risks are to be identified, measured, monitored or controlled within financial institutions. If the risks would be presented as to their likelihood and impact then credit, legal and reputational risks would emphasize. Credit risk for a bank in a sustainability related lending activity can be a result of a situation where the customer of a bank has been affected by costs related to environmental issues. This can lead to bankruptcy in the worst-case scenario and the loan will be defaulted. Banks can encounter credit risk also in a situation of property impairment caused by environmental issues. In the environmental point of view, legal risk arises when compliance in relation to legal environmental obligations is neglected. Legal risk may also be connected to credit risk by banks being legally obligated to pay for environmental problems caused by a contaminated property the bank acted as a lender to. Reputational damages are as severe as the beforementioned risks. They may occur even if the bank isn't legally

obligated to cover for specific environmental damages but if the bank is associated with a project that is environmentally damaging. Reputational risks may have huge implications on the banks business because information travels fast in the modern society. Environmental issues don't only carry risk but also opportunity. When risk mitigation and recognition is in place it is possible for the financial institutions to try to seize the opportunities that the more sustainable business projects hold in society striving for a greener future (Carse, 2000).

2.1.3.2 Greenwashing

The issue of green washing is a relevant subject to mention when dealing with environmental topics in relation to company environmental reporting. Greenwashing as a term refers to misleading information directed to the public about climate and environmental actions taken by a company or other organization. In a greenwashing case, the company doesn't actually do as much for the environment as they claim to do. This reflects negatively to the environment since as many actions for tackling climate change hasn't been initiated as is led to believe. Common example of greenwashing is when a company claims to work towards decreasing polluting emissions but lack a concrete plan to reach this goal. The EU taxonomy with a specified classification system for sustainable activities and increased transparency through ESG reporting are concrete actions against greenwashing (United Nations, 2024).

2.1.3.3 Legitimacy theory

The policies and laws set by global policymakers and officials are not the only drivers for company social and environmental disclosures in corporate communication. Legitimacy theory discusses the voluntary social and environmental disclosing of companies. These environmental disclosures are typically expressed through annual and sustainability reports composed by companies. The legitimacy theory is formed through a number of studies dating back to 1992. According to the theory, there are many factors that influence company disclosures. One factor is environmental laws assigned by policymakers.

Stakeholders to the companies also have increasing expectations towards companies to take part in environmental activities and report them. It is not sufficient anymore that the companies only reports to take part in these activities. It is also expected that these activities have a positive and meaningful impact to the environment that could be measured. The aim in disclosing environmental actions are to justify and legitimize the operations carried out by the company within the society. It also has an affect on company's image that can be appealing to the general public when addressing environmental issues or vice versa. A negative public image may restrict a company's access to resources crucial to the operations and is linked to one of the risks identified in connection to environment in the banking business. A good image can be utilized as a competitive advantage and limit company environmental liabilities (Mousa & Hassan, 2015). The legitimacy theory explains why many companies have disclosed reports and communicated their sustainable activities from a time when such disclosures weren't enforced by policies and regulations.

2.2 Sustainable finance

This study is concentrated on topics such as sustainable finance, green finance, sustainable lending and green lending. These types of lending instruments are related to sustainable and green finance which this background section will introduce. The reason why this research uses the term sustainable lending as an umbrella term when referring to the above-mentioned sustainable lending types is because the individual terms don't seem to have been established yet amongst the European financial institutions. The empirical research into the types of sustainable lending instruments that European financial institutions offer showed that these terms are very broadly used to refer to similar types of lending even though the terms have their own definitions. In the future when similar research is being conducted it is highly likely that the terms have become more established. This allows the study to focus on a specific lending type that is more precise and defined than this study at this point can with this exact set of observations. It is also possible that the EU taxonomy has an impact in the term establishment since it includes

clear definitions of the types of instruments that qualify to the reporting of environmental activities.

Sustainable finance is a broad term that refers to processes where ESG criteria is taken into consideration when making investing decisions in the financial sector. The aim is to direct capital to such projects that are long term investments favorable to the environment (The European Commission, 2024b). ESG is connected to the concept of sustainable development that aims in securing enough resources for future generations without burdening the planets capacity to supply these resources. ESG stands for three aspects that are environmental, social and governance. For example the environmental aspect is aiming for preventing climate change and further pollution of the environment. It can also aim in preserving biodiversity and enhance circular economy. Social and governance aspect account for issues related to social matters and business related issues. (The European Commission, 2024a). The reason why sustainable development and ESG concerns finance is diverse. The main function of the financial system is to allocate funding to productive usage. This gives the financial institutions a significant role in directing finance to companies and projects that support sustainable development. Funding allocated to ESG aligning initiatives advance the transition to a more low-carbon and circular economy. Investors also have a role in guiding the direction for the demand. A demand for more sustainable targets to invest in have increased with the awareness of the climate related matters. When it comes to long term investors aligning with ESG, they can demand companies to include and grow the proportion of sustainable business in their operations based on risk mitigation. The objective for sustainable finance has developed from the initial pursuit for short term profit into a long-term value creation which is a good basis for positive long-term environmental effects (Schoenmaker & Schramade, 2019, p.3-4).

Sustainable finance is the framework for policy goals included in the European Green Deal and the EU taxonomy. The EU has many sustainability linked global commitments that sustainable finance as the framework is contributing to. The EU channels private investment into the transition along with public investment. In short, the EU is striving

to build a financial system that supports sustainability and sustainable growth (European Commission, 2023).

2.2.1 Green finance

The function for green finance is to increase and direct financial flows from public and private sources to targets that contribute to sustainable development. Green financing has many channels through which it can be promoted. One of them is policy and regulatory framework changes that would be directed to achieve similar goals as the UN set sustainable development goals are. Also an overall increase in green financing from different sectors to clean and green technologies are approaches that aim towards sustainability. A division of the UN has been working towards uniting financial systems by countries, financial regulators and the finance sector. An increased unity between these parties contribute to the 2030 and 2050 goals. The main contributions by green finance to these goals currently is the support towards the public sector, promotion of public-private partnerships on financing mechanisms or instruments and support community enterprises that utilize micro-credit (UN environment programme, 2024).

2.2.2 Transition finance

Transition finance is such finance that has been raised or harnessed to the use of companies for their net-zero transition. A transition takes resources both time and money consuming for reaching goals set by global operators such as the UN. Besides the common goal of the net-zero transition, it is up to the nation or the organization to determine how the transition will be carried out. The aspects that affect the net-zero transition vary greatly amongst those that have or will adopt the transition in their operations. As a result of the need for transition, “transition investments” have gained attention from public authorities, industry associations, investors and from the civil society. In general, transition finance is defined as an intention to decarbonize entities or economic activities that are negatively affecting the environment. These entities and economic activities are however important for future development but currently aren't that

environmentally friendly. This is where transition finance supports the transition of an essential entity or economic activity to meet the demands for a sustainable future (OECDiLibrary, 2024).

2.2.2.1 Sustainable loans

Sustainable lending can be defined as a decision done by financial institutions to lend to corporate or private borrowers who consider environmental and societal impact in their operations. The overall focus of financial institutions towards the risks related to the environment and social risks has led to sustainable lending. The awareness that lead to sustainable lending through considering sustainable issues is increasing in the banking industry. The banks hold a key role in financing customers that have an interest toward sustainable issues. The banks evaluate their customers operations to find out whether they fulfill the set sustainability criteria. Avoidance of financing unsustainable customers is a risk related issue. The customers are assessed besides their financial strength but also in their commitment for sustainability throughout the loan period. This creates a requirement for the loan receivers to be able to report how the sustainable loan has been used for the project it was received for. It also creates a demand for being able to measure the sustainable impact of the project (Calderon, 2022).

2.2.2.2 Green loans

Green loans are financial loan instruments that finance or re-finance green projects. The aim of the green loan market as a whole is to support those projects that further sustainable development. Green projects should give such environmental benefits that they can be defined and in some cases even quantified as environmentally sustainable. The party that provides the green loan has definitions to what they consider to be projects categorized as “green” (Asia Pacific Market Association et al. 2023). Banks and other financial institutions are the providers of green loans to companies and other parties that direct the funds for example to green innovations. Green loans are generally promoted by having lower interest rates. Lower interest in the loan is an attractive aspect for a

company or individual that is planning on launching a sustainability linked project or other operation within the business such as a green purchase with long term benefit for the environment (Li et al. 2018). The green loan principles are as the name suggests principles that characterize green loans. The characteristics established for green loans are use of proceeds, process for project evaluation and selection, management of proceeds and reporting. The use of proceeds stands for utilizing the loan to a green and sustainable project. In the loan documents it should be clearly stated to what the loan is being used for. The environmental benefits should be measurable and able to be reported. In the case of refinancing a project it should be stated which part of the project is already financed and which part is being re-financed. The green project's main goal is to address an environmental concern such as climate change, the decrease of natural resources, loss of biodiversity and so on. It is acknowledged that the definitions of green initiatives or green projects vary in different areas and sectors and that an all-encompassing definition for a green project can't be determined. The process for project evaluation and selection refers to the loan borrowers' task to disclose to the lender their sustainable objectives. It also includes defining the fitness of the project for the loan and the eligibility criteria. Also, if possible, the briefing includes acknowledgement of potential existing environmental risk. This information is encouraged to be disclosed in the company sustainable reporting. The principle of management of proceeds of a green loan aims in maintaining transparency and the promotion of the integrity of a product. This is achieved by either crediting the loan to a dedicated account or tracking the loan in some other appropriate way. By establishing internal governance for tracking the allocation of the funds for the green projects is a mechanism that contributes to transparency and integrity.

The last principle of green loans includes the reporting of the green loans and projects. The reporting is done on an annual basis and a thorough reporting includes a brief description of the green project reported. The expected impact of the project estimated contributes to the transparency aspect (Asia Pacific Market Association et al. 2023).

Green loans are also distributed through syndicated green loans. Syndication refers to a group of lenders providing the loan. The group can consist of institutions and investors and the syndicated loan value is much higher when compared to a single loan offered by a single financial institution to a loan receiver. In loan syndication the risk is diversified which aligns with the increased loan amount and the related risk being tolerable for the lenders (Liu, 2023). This study doesn't take into account syndicated green lending since the focus of this study is individual financial institutions instead of groups and their sustainable lending offerings which potentially correlates with profitability.

2.3 Sustainable lending on bank profitability

2.3.1 Bank profitability

Bank performance is a combination of internal and external factors. The banking performance is an outcome of main activities which the business of the banks consists of. These activities are collecting funds as savings from the public and channeling funds to the public as credit or in other forms. In short banking performance reflects the efficiency of bank operating and achieving its financial goals that are measured with different KPIs. The internal factors that affect the activities carried out by a bank are such that the banks have an influence into. The internal factors are influenced by the banks management, and internal governance. The external factors are such that the bank has no control over. These are higher in risk and occur in the macroeconomic sector as inflation, interest rate or GDP growth for example (Indriastuti & Muharam, 2020). The European Central Bank has determined different determinants that affect bank performance. These are the banks earnings or profitability, competitive strategy chosen by the bank, efficiency of the bank, diversification and adequate management. The competitive strategy is referring to the methods that the bank uses to differentiate from its competitors or for finding a competitive advantage in comparison to them. Efficiency is explained as the variation between a set of prices and quantities of inputs and outputs that align with the chosen strategy and has an effect on profitability. In this connection the ECB emphasizes the increased efficiency of larger banks such as commercial banks in comparison to smaller

local savings banks for example. Diversification is brought up as sources that the institutions have for income that contributes to profitability. Last an appropriate management of bank capital has an effect on bank performance by affecting future availability on funding for lending decisions. Capitalization is found to have an impact in profitability and it also affects banks credit rating. Credit rating has a significant influence on the cost of funding for banks. All these factors are related to the internal factors that the banks can affect (European Central Bank, 2005). The macroeconomic factors or the external factors impact the bank profitability through effects of net income and the ability of borrowers to pay back. Repayment issues affect the credit risk of banks and are presented also as defaulted loans on annual basis. Negative effects on bank profitability caused by external factors may result in banks reducing lending and in a bigger perspective lead to a large scale financial instability (von Peter, 2009).

The most essential aspect in measuring bank performance is to measure the ability of a bank to create profit or profits from multiple conducted activities (European Central Bank, 2005).

3 Literature review

This literature review will present the previous research conducted that is related to the subject of sustainable lending and bank performance. It also includes the theories and methodologies that were used in previous research to study the subject that could be utilized for the needs of this study.

3.1 Current state of research

When it comes to green financing instruments, green bonds were first issued in 2007 and have since represented a green investment in Europe and around the world (European Parliament, 2022). Several studies that focus on green bonds are available and the subject has been studied from many angles. Green lending however as a green financial instrument has been studied mostly in Asia in relation to regulative sustainability enforcing policies and their effects on financial institutions. A study that would investigate sustainable lending and its effect on bank profitability in European banks that are either commercial banks or offer commercial banking services hasn't yet been made with this exact focus. This would be the research gap that this study is primarily aiming to fill. A study has been conducted that focused on syndicated green lending affecting bank performance and risk. This study included 217 institutions providing syndicated green lending during the years 2010-2020. The majority of the banks chosen to the study were located in Asia (81%) and others around the world. The findings for the study were that a higher concentration of green lending of a financial institution has a connection to lower profitability. The study also concluded that green lending accompanies a moderate default risk and a lower credit risk. In the case of more collateralization and a longer duration for green lending the performance measure ROA was increased. The study used a panel data method with bank related variables such as green lending propensity, size, efficiency, liquidity, performance, default risk, nonperforming loan ratio and credit provisioning. The study results indicate that the relationship between green lending and bank performance isn't unambiguous (Del Gaudio et al. 2022). This study contributed to

the current one by implying that banking performance could potentially be linked to sustainable lending if the time period for the lending was longer.

A second study with the focus of the impact of green lending on bank performance in relation to small and medium size company financing was conducted including the time frame of 2011 to 2021. The study examined this bank performance in the BRIC countries which includes Brazil, Russia, India and China. The method used was panel data method that included 115 banks in the year 2011 and 137 in the year 2021. This means that the study had an unbalanced panel and the entities in the study were observed a different number of times. The results of the study were that a positive relationship between green small and medium enterprise lending and net interest margin exist (Mirza et al. 2023).

Green lending has mostly been studied in relation to sustainable policies and potential credit risk caused by the policy's aim of increasing green lending. The launch of China's green Credit Policy in 2007 did interest a lot of researchers to find out how the launch of a new greener policy would reflect on bank credit risk. The initiative behind Green Credit Policy was to instruct banks to favor sustainable businesses when issuing credit instead of businesses that weren't sustainable. China has been a forerunner in distributing green finance and the government set policies have been contributors for the advancement (Zhou et al. 2022).

The green credit policy launch has been in the background in the studies conducted about Chinese banks and credit risk in relation to green lending. One of such studies also focused in investigating how the regulations affected bank solvency of individual financial institutions and the resilience of the financial system. The financial crisis during 2007-2008 is also considered in many of the studies by reflecting the distrust of the public towards the financial sector. The sample in the study consisted of 41 Chinese banks and the time period for the observed green lending was during 2007-2018. The study found that the proportion of green lending offered by a bank depends highly on the size

and structure of state ownership. The study did consider all the different banking systems in China. These include the central bank, supervisory authority, commercial banks and policy banks. The conclusion was that the policy reduced credit risk for such institutions that were majorly state owned. This implied of an existing information and expertise asymmetry that was preventing city and regional banks from accessing these resources to evaluate credit risk of green lending more properly (Zhou et al. 2022). This study was very beneficial for the current one. The future research propositions included an identified research gap that was the implementation of green lending and its effect on bank performance across regions. This current study agreed on the existing research gap and focused especially on sustainable lending and bank performance in an area where such research hadn't been conducted.

Another study on a similar subject focused on the stock price crash risk where the underlying phenomena is a green credit reform in China (Chen et al. 2023). Studies related to green lending haven't only been focused on Asia. The relationship of green lending to credit risk in banks has also been studied regionally in the United Arab Emirates (Al-Qudah et al. 2023).

A study has also been conducted to examine if European bank's efforts to build a reputation for CSR benefits performance. The study concludes that CSR focused banks had experienced an improvement in their economic performance compared to their peers that didn't concentrate in sustainable CSR strategies (Forcadell & Aracil, 2017). Another study related to green lending was conducted to find out what kind of an impact a green credit policy set by Chinese officials had on 62 commercial banks during the time period of 2013 to the year 2020. The green credit policy means a policy that encourages banking institutions to create green credit and to include more environmental and social risk management to their operations. The study concluded that policies for green credit do benefit commercial banks' profits and thus performance (Gao & Guo, 2022).

3.2 Sustainable lending and bank performance

3.3 Hypotheses development

The previous studies did indicate that there would exist a research gap which would investigate sustainable lending and bank performance. As most of the previous research was concentrated in Asia it was suitable to find an area where much previous research hadn't been conducted. This was a starting point for the current research.

The area of the European Union was chosen since empirical research showed that mostly big sized organizations are as diversified in relation to their services that they would include and report sustainable finance. A brief research in the Nordic area implied that the sample of sustainable lending wouldn't be sufficient for the needs of the current research.

All the banks in the sample consist of well-resourced financial institutions that locate in the EU. All the bank types in the sample are commercial, or they offer commercial banking services which strives them for making profit for their shareholders. This is an important aspect in the study since it investigates bank profitability. The previous research can be interpreted to have implied that a correlation between sustainable lending and bank performance could exist but the nature of this correlation varies depending on the variables considered in the study. Three hypotheses were formed based on the previous research. The first hypotheses investigates whether a positive correlation exists between sustainable lending and bank performance. The second hypotheses investigates if an increasing time period of sustainable lending distribution correlates with performance and the last analyzes if an increased amount of sustainable lending distributed correlates with performance.

4 Theoretical framework

This theoretical framework introduces the key performance measure and other measures that can have an affect to bank performance. The dependent variable is ROA, the independent variables SLTL and SLTA. The measures for the control variable are also defined in this chapter. ROA as a performance measure was introduced in previous research conducted of sustainable lending in the study conducted by Del Gaudio et al. (2022). The control variables were chosen based on the studies conducted by Del Gaudio et al. (2022) and Zhou et al. (2022).

4.1 Performance ratios

4.2 ROA, return on assets

The focus of this study is on finding out if sustainable lending affects bank profitability. As a performance ratio, this study chose the return on assets (ROA). The ratio shows the connection between organizations net income and its total assets. The ratio is expressed as a percentage. The ratio presents an organizations efficiency in utilizing its total assets into generating profit (Petersen & Schoeman, 2008). The formula for return on assets is following:

$$ROA = \frac{Net\ income}{Total\ Assets}$$

4.3 ROE, return on equity

Return on equity can be defined as after-tax net income which is divided with average shareholder equity. The ratio is expressed as a percentage. The ratio is a metric for the evaluation of investment returns. When this ratio is compared amongst peers in the industry it is possible to evaluate the competitive advantage that might exist. It also

possibly indicates how the management of the company is investing its equity to accomplish company growth (Petersen & Schoeman, 2008).

$$ROE = \frac{\textit{Net income}}{\textit{Shareholders' Equity}}$$

4.4 Sustainable loan ratios

The banks chosen for this study vary a lot by their characteristics. The banks differ in size, the amount of sustainable lending offered and other financial ratios calculated based on annual financial information. For making the sustainable lending data more comparable amongst the banks in this study, two ratios were formatted. The study of Zhou et al. (2022) introduced a green loan variable type which was now utilized in this current study. The first ratio includes the bank specific annual sustainable lending amount in terms of the overall offered lending (SLTL). This way the observed sustainable lending is demonstrated as a proportion in the context of the overall lending.

$$\textit{Sustainable Loan} = \frac{\textit{Sustainable loan}}{\textit{Total loan}}$$

The other ratio presenting the amount of sustainable lending annually within a specific financial institution is divided with its overall assets (SLTA). This ratio also puts the sustainable lending within proportion of a specific financial institution and makes the value more comparable with other financial institutions the study considers.

$$\textit{Sustainable Loan} = \frac{\textit{Sustainable loan}}{\textit{Total assets}}$$

4.5 Control variable, leverage

The bank leverage ratio used in the study of Zhou et al. (2022) assess the extent that a bank funds its assets with equity compared to its debt. This metric indicates financial stability and risk. In general, a higher ratio implies a lower financial risk since the bank isn't relying strongly on debt, which would be riskier. A higher ratio suggests that the bank is less reliant on debt, which generally implies lower financial risk (Chen, 2022). The leverage ratio was retrieved from Orbis database to this study. The formula used is the following:

$$\textit{Leverage} = \frac{\textit{Total equity}}{\textit{Total liabilities}}$$

5 Data and research methodology

This chapter will introduce the data used in this study and the methodology that the data was analyzed with. This chapter also includes the expected results along with the conducted correlation analyses.

5.1 Data sources and description of data

For this study a data pool of 69 financial institutions located in 15 European countries was chosen. The data consists of 337 annual observations. The data aligns with the chosen institutions to the stress test conducted by the European Banking Authority in 2023 (EBA, 2023). The EBA conducted the bank stress test in cooperation with the European Systemic Risk Board (ESRB), European Central Bank (ECB) and the European Commission. The reason why an identical financial institution set was chosen for this study is because the EBA surveys banks whose assets represent 75% of EU banks' total assets. For this study it was crucial to find institutions that have a big impact on the economy and that would have enough resources to also include sustainable lending products amongst their other services. Investigating smaller financial institutions in the EU area indicated that it isn't common for very small financial institutions to offer sustainable lending. Most of the banks chosen for this study are commercial banks or offer commercial banking services. The ECB stated in their financial stability review that the euro area includes a wide range of financial institutions that differ by size and ownership structure. The big variation amongst the banks is an aspect that potentially complicates an analysis measuring profitability in the European banking sector when such explanatory factors such as size and ownership is used for measurement (ECB, 2005). Prior research conducted that relates to sustainable lending lacks further research in the EU area. When searching for sustainable loan data from different financial institutions around Europe it came apparent that sustainable lending information can be difficult to find. As stated previously in this study, loans that qualify as sustainable lending according to a general definition isn't a financial instrument that all banking institutions include in their loan portfolios. It is partly a matter of to what kind of financial institutions banks want to profile themselves

as when serving their customers. Choosing the EBAs set of financial institutions raised the probability of finding reported sustainable lending information in their financial and sustainable reports. A summarization report of sustainable lending data from European institutions wasn't available when this study was conducted. This led to a data search by examining publicly published annual and sustainability reports for each institution separately covering the whole five year time period. The data used was end year data. The method for the study was a panel data analysis. Since the data gathering method is by nature time consuming, a pool of 70 institutions was chosen to provide an overview to the subject. From the initial data pool the country Norway was excluded since Norway isn't part of the EU, though it is of EEA, so the same legislation doesn't similarly apply to the country as it does to all EU countries. The time period for the data gathered was between 2018-2022. The year 2023 was excluded since during the time of conducting this study, not all the banks had published their annual statements or ESG reports. ESG reports might be published late after the reporting period, some in the end of the new reporting period and it varies greatly amongst financial institutions. The nature of the panel data set was unbalanced that was caused by many reasons. The unbalanced data set here refers to missing values from the data set as a whole. Reasons for missing values were for example that the financial institution didn't report sustainable lending during one observation year. There were also cases where some financial institutions didn't include sustainable lending at all in their annual reports and financial statements. In the different regression analyses the missing value observations were left out of the analysis, which led to less observations accounted for. Because the regulation regarding the reporting on sustainable activities is now mandatory to large companies within the EU, it is likely that the institutions with missing information will start reporting such data in the near future. In some cases the data referring to sustainable lending was too inconsistent or difficult to determine for the study and was therefore excluded. In these situations, the data referring to sustainable lending could include another kind of financial data which causes discrepancies amongst the whole data set if included. All values are in Euros since most annual reports that this study utilized are reported in Euros.

The specific time period was chosen since the number of banks reporting sustainable lending is more common during the time period than before the year 2018 which the gathered data also indicates.

Table 1. Bank distribution regionally in the study

Region in Europe	Country	Number of banks	Bank type
Central and Eastern	Austria	2	commercial, investment
Western	Belgium	2	commercial, insurance
Western	Germany	14	commercial, cooperative, investment, savings
Western	Denmark	4	commercial
Southern	Spain	8	commercial
Northern	Finland	2	commercial, retail
Western	France	7	commercial, mutual, retail, postal
Southern	Greece	4	commercial, retail
Central and Eastern	Hungary	1	commercial
Western	Ireland	4	commercial, investment
Southern	Italy	8	commercial, retail
Western	Netherlands	4	commercial, cooperative
Central and Eastern	Poland	2	commercial
Southern	Portugal	2	commercial
Northern	Sweden	5	commercial, retail

The sustainable lending data is analyzed in relation to banking profitability. The performance ratio chosen for the study is return on assets (ROA) which represents the dependent variable. The ratios concerning the financial institutions in the study were provided by the Bureau van Dijks Orbis database. A universal global format was used when

accessing the data. In this way any reporting differences were avoided. Access to this database was granted by the University of Vaasa.

Figure 1. The average sustainable lending distribution, in thousands €

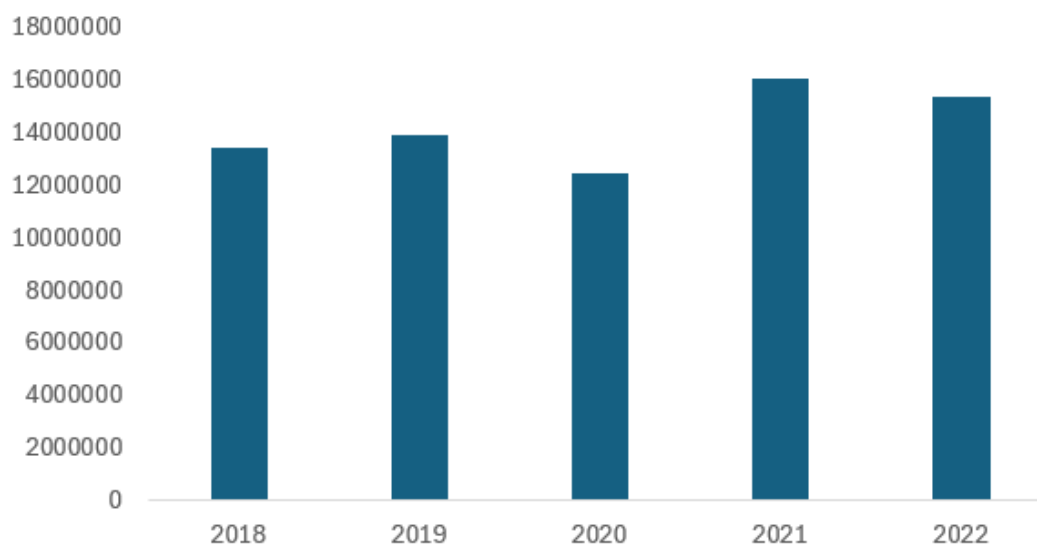


Figure 1 demonstrates the yearly sustainable lending distribution. It indicates that on average the lending has grown during the study period. A decline can be observed during 2020 assumingly as a consequence of the COVID19 pandemic. The last two years of the study represent values very close to one another. The recent changes in legislation might contribute in the future to the trend of increasing sustainable lending.

Sustainable lending data represents independent variables in this study. The sustainable lending data was formed as two different ratios the first being sustainable loans to total loans (SLTL) and the second sustainable loans to total assets (SLTA). This enabled to look into the proportion of sustainable lending from two different points of view. As the control variables this study used total assets (TA), cost to income ratio (CIR), liquid assets on deposits and short term funding (LIQ), non-performing loans on gross loans (NPL%) and leverage (LEV). The control variables are used for controlling for factors that could impact the outcome of the study.

The annual observations concerning all banks don't align. This means that not all variables presenting SLTL or SLTA are available resulting to fewer observations in some analyses.

5.2 Methodologies

This study uses panel data analysis for studying the research questions. The Breusch-Pagan-Godfrey test was conducted to all regression analyses to reveal if heteroscedasticity was present. The p-values indicated a value above the 0.05 significance level and heteroscedasticity wasn't detected. This resulted in continuing with OLS regression analysis with all regression analyses.

The empirical part of this study begins with a summary statistics of all data gathered and also including all main regions in Europe. This approach was chosen for two reasons. Displaying summary statistics from all 15 countries separate wasn't from a data analysis point of view reasonable since some countries only included one or two banks which was insufficient for statistical analysis of the observations. Second, uniting observations regionally combines information that possibly simplifies the analysis of the results when including for major descriptive statistics regionally instead of displaying all countries separately.

Table 2. Variable listing and definitions

Variable	Definition
ROA	Return on assets
SL/TL	Sustainable loans / Total loans
SL/TA	Sustainable loans / Total assets
TA	Total assets
LEV	Leverage (Total equity / Total liabilities)
LIQ	Liquid assets on deposits and short-term funding
CIR	Cost to income ratio

NPL%

Non-performing loans on gross loans (Impaired loans /
Gross customer loans & advances)

5.3 Panel data method

This study uses a panel data model as a method for analyzing time series data. The traditional panel data method is chosen because this study's interest is in observing the effects of a certain time period which doesn't take into account dynamic effects of time lags. The panel data model connects both a cross-section element and a time element to the estimation since there are several bank observations from a five-year time period. In this study the cross-section data consists of bank specific factors. Since the data includes different banks in different regions the variation between the banks can be visible. The time element includes those occurrences in the macroeconomic environment that might be reflected on bank profitability.

OLS regressions are run for estimating the first hypotheses which analyses whether sustainable lending is correlated to bank profitability. The regression equation for assessing the first hypothesis is of the following form:

$$Profit_{t+1} = \beta_0 + \beta_1 SLTL_ALL_t + \beta_2 SIZE_t + \beta_3 LEV_t + \beta_4 LIQ_t + \beta_5 CIR_t + \beta_6 NPL_t + e_{t+1}$$

Profit it represents the dependent variable ROA in period t +1. β_0 represents the null hypotheses. The independent variable SLTL represents a ratio formed by sustainable lending in relation to total loans or gross loans. Size, leverage, liquidity, cost to income ratio and non-performing loans ratio are all control variables for controlling other factors. The first regression model also includes another regression equation of the following form:

$$Profit_{t+1} = \beta_0 + \beta_1 SLTA_ALL_t + \beta_2 SIZE_t + \beta_3 LEV_t + \beta_4 LIQ_t + \beta_5 CIR_t + \beta_6 NPL_t + e_{t+1}$$

This regression equation also includes the second dependent variable that is also a ratio for sustainable lending in relation to total assets. Including both ratios in the study was done for receiving more information about sustainable lending.

The second regression equation was formed to analyze if an increasing number of years that sustainable lending was distributed has an effect on bank profitability. The regression equation for assessing the second hypothesis is of the following forms:

$$Profit_{t+1} = \beta_0 + \beta_1 SLTL_LONG_t + \beta_2 SIZE_t + \beta_3 LEV_t + \beta_4 LIQ_t + \beta_5 CIR_t + \beta_6 NPL_t + e_{t+1}$$

and

$$Profit_{t+1} = \beta_0 + \beta_1 SLTA_LONG_t + \beta_2 SIZE_t + \beta_3 LEV_t + \beta_4 LIQ_t + \beta_5 CIR_t + \beta_6 NPL_t + e_{t+1}$$

The regression equation includes a new variable controlling for the time that sustainable lending has been distributed. For the variable being able to present this information as different time periods that the data sample includes, the data was divided into three different categories representing the time of SL distribution. Caused by the small amount of SL observations in this study, it wasn't possible to include all five years as separate analyses. Because of this reason, years one or two, three or four and five years of SL distribution was divided as three different categories. The variable representing five years is SLLONG that the first regression equation for H2 includes. Again the regression equation was run for both sustainable lending variables SLTL and SLTA separately. The second regression including the variable for three or four years SL distribution is of the following forms:

$$Profit_{t+1} = \beta_0 + \beta_1 SLTL_MID_t + \beta_2 SIZE_t + \beta_3 LEV_t + \beta_4 LIQ_t + \beta_5 CIR_t + \beta_6 NPL_t + e_{t+1}$$

and

$$Profit_{t+1} = \beta_0 + \beta_1 SLTA_MID_t + \beta_2 SIZE_t + \beta_3 LEV_t + \beta_4 LIQ_t + \beta_5 CIR_t + \beta_6 NPL_t + e_{t+1}$$

Here the variable SLMID represents bank observations that are placed in the middle of distribution year categories which accounts for three or four years. The regression equation was run for both profit variables and both SL variables. The regression equation that studies the observations with the shortest SL distribution is of the following forms:

$$Profit_{t+1} = \beta_0 + \beta_1 SLTL_SHORT_t + \beta_2 SIZE_t + \beta_3 LEV_t + \beta_4 LIQ_t + \beta_5 CIR_t + \beta_6 NPL_t + e_{t+1}$$

and

$$Profit_{t+1} = \beta_0 + \beta_1 SLTA_SHORT_t + \beta_2 SIZE_t + \beta_3 LEV_t + \beta_4 LIQ_t + \beta_5 CIR_t + \beta_6 NPL_t + e_{t+1}$$

Here the variable SLSHORT represents bank observations for the shortest SL year distribution category of one or two years. The regression equation was run for both SL variables.

For the last hypothesis to analyze if an increasing amount of sustainable lending distributed is correlated with bank profitability the following equations were formed:

$$Profit_{t+1} = \beta_0 + \beta_1 SLTL_HIGH_t + \beta_2 SIZE_t + \beta_3 LEV_t + \beta_4 LIQ_t + \beta_5 CIR_t + \beta_6 NPL_t + e_{t+1}$$

and

$$Profit_{t+1} = \beta_0 + \beta_1 SLTA_HIGH_t + \beta_2 SIZE_t + \beta_3 LEV_t + \beta_4 LIQ_t + \beta_5 CIR_t + \beta_6 NPL_t + e_{t+1}$$

,

$$Profit_{t+1} = \beta_0 + \beta_1 SLTL_MED_t + \beta_2 SIZE_t + \beta_3 LEV_t + \beta_4 LIQ_t + \beta_5 CIR_t + \beta_6 NPL_t + e_{t+1}$$

and

$$Profit_{t+1} = \beta_0 + \beta_1 SLTA_MED_t + \beta_2 SIZE_t + \beta_3 LEV_t + \beta_4 LIQ_t + \beta_5 CIR_t + \beta_6 NPL_t + e_{t+1}$$

,

$$Profit_{t+1} = \beta_0 + \beta_1 SLTL_MOD_t + \beta_2 SIZE_t + \beta_3 LEV_t + \beta_4 LIQ_t + \beta_5 CIR_t + \beta_6 NPL_t + e_{t+1}$$

and

$$Profit_{t+1} = \beta_0 + \beta_1 SLTA_MOD_t + \beta_2 SIZE_t + \beta_3 LEV_t + \beta_4 LIQ_t + \beta_5 CIR_t + \beta_6 NPL_t + e_{t+1}$$

Here a new variable was created for representing the amount of sustainable lending. For being able to represent the data, the bank observations were divided into three categories that divided the SL lending in HIGH, MEDIUM and MODERATE amounts. The equations were run for the profit ratio ROA and for three different categories for SL distribution by value from highest to lowest amount. All different categories include almost the same amount of observations and the amount division in € for high distribution was 223000000 - 936893, for medium distributed sustainable lending 6563685 – 506800 and for moderate 2281000-500.

The panel data for the study was unbalanced since not all commercial banks have reported sustainable lending data in their reports. In the different hypotheses scenarios the missing value observations were left out from the analysis. Voluntary reporting has contributed a lot to this study since sustainable lending data has been made available even if it hasn't been obligatory to disclose in the earliest years of the study observations.

5.4 Descriptive statistics

Descriptive statistics including all data from all bank observations summarizes the entire time period observed in this study. The correlation coefficient does describe the strength and direction of two variables relationship. The range for the represented relationship is from -1 to +1. A positive correlation is indicated by +1 relationship where both variables increase in relation to each other. In a vice versa situation a negative relationship is

indicated by a -1 correlation. If no correlation exist between the variables, the correlation in 0 (LaMorte, 2021).

Table 3. Descriptive statistics of all banks

Variable	Mean	Median	Max	Min	St.D
SLTL	0.093	0.016	2.891	0.000	0.430
SLTA	0.022	0.010	0.112	0.000	0.029
TA	375730754	164921164	2398446400	4207208	492398039
ROA	0.4006	0.4054	1.7672	-1.3924	0.5089
LEV	7.75	6.87	19.82	3.26	3.22
LIQ	46.94	37.37	232.23	10.18	37.80
CIR	64.02	63.89	107.54	-40.33	22.16
NPL	4.80	3.06	34.76	0.07	6.66

In table 3 where all bank data is summarized, an overall conclusion can be drawn of the amount that the sustainable lending in relation to total loans (SLTL) and to total assets (SLTA) as a mean represents. Sustainable lending is only a part of a financial institutions lending products or instruments provided for customers of the overall lending portfolio. It doesn't represent the overall sustainable activities carried out in the organization since banks offer other kinds of different sustainable products such as a green bond for example. The mean for sustainable lending in relation to all loans is 9.3%. The median of 0.016 indicates that a notable portion of the banks in the study have relatively low ratios of sustainable lending. The maximum value which is 2.891 indicates that some banks in the study, that could also be called as outliers have a significant proportion of loans that can be categorized as sustainable. Including banks with very high proportions of SL in the study can significantly influence the mean value of SL. It is though important for the sake of the overall distribution of the data to also include those financial institutions with a large proportion of SL. The minimum value of 0.000 means that the observations also include banks that offer no sustainable loans at all. The value for standard deviation is

0.430. The value indicates that there is some spread in the SL lending data but it is not excessively wide. According to the above mentioned values for SLTL the SL in contrast to all lending isn't a significant proportion. When gathering the SL data it became apparent that it was unreasonable to include SL data previous the year 2018 because the lending type at that point was very scarce.

Sustainable lending in relation to total assets (SLTA) indicates notable differences amongst descriptive statistics. The mean of 0.022 is lower than in SLTL which indicates that the proportion of sustainable lending is much larger in comparison to the loan portfolio than to the total assets of the bank. The median value of 0.010 indicates a similar observation. The max and min value of SLTA indicates a similar observation to what was observed with SLTL. As the standard deviation was a smaller value on SLTA it can be interpreted that possibly a greater variability exists amongst incorporating sustainable lending in loan portfolios than in total assets. The summary indicates overall that there's a great variability on the amount of sustainable lending offered amongst the banks and that the sustainable lending stands out more notably when compared to overall loan portfolio than it is in comparison to total assets.

The descriptive statistics concerning the performance measure ROA implies that the banks in the study are profitable and even the least profitable banks are making profit. Since all the banks chosen for the study are observed by the EBA due to their size it isn't surprising that these institutions that mostly offer commercial banking services are profitable. Standard deviation concerning both ratios suggest variability that could be a result of differences amongst the banks operations and strategies for example that generate the profit observed here. The control variables descriptive statistics suggest that many of the banks in the study have quite high levels of debt financing in relation to their equity. The banks seem to have a high level of liquidity but also high level of operating expenses in relation to their income. The last ratio, non-performing loans (NPL) indicate that in general there are many banks that have quite a low level of non-performing loans when compared to total loans. The maximum value does though suggest that amongst some banks the NPL ratio is much higher than in the overall observations.

Table 4. Descriptive statistics of northern region, Finland and Sweden

Variable	Mean	Median	Max	Min	St.D
SLTL	0.032	0.024	0.064	0.008	0.023
SLTA	0.024	0.015	0.052	0.005	0.025
TA	210260863	200175471	564699600	20666856	186766766
ROA	0.5277	0.4992	0.838	0.3336	0.1753
LEV	6.15	6.11	9.18	4.33	1.55
LIQ	37.27	37.99	49.06	8.96	8.96
CIR	49.43	47.90	66.97	33.72	11.10
NPL	0.73	0.51	2.12	0.07	0.73

The study now briefly observes the differences between different regions where the banks are located. The banks were divided into four main regions in Europe that are eastern Europe, southern Europe, western Europe and northern Europe. This division was done for being able to observe differences amongst the countries. Since the study included initially 70 banks, the observation amount doesn't allow each country specific interpretation. Combining observations in regional areas does allow summarization of results in a more brief manner. The descriptive statistics for the northern region concerning sustainable lending implies that even if the region includes the least countries within a region the mean of SLTL isn't the smallest in the sample. This is also true with the mean of SLTA. In the Nordic region sustainable lending is offered quite moderately in comparison to the all observation mean. The banks in the Nordic region are not amongst the biggest by asset size within the study observation.

Table 5. Descriptive statistics of central and eastern region, Poland, Hungary and Austria

Variable	Mean	Median	Max	Min	St.D
SLTL	0.024	0.024	0.024	0.024	#NA
SLTA	0.013	0.013	0.013	0.013	#NA
TA	130447372	87330903	278234316	52158316	95003882
ROA	0.9830	0.877	1.7672	0.4814	0.5044
LEV	10.90	11.55	12.89	8.72	1.86
LIQ	29.992332	27.8639247	41.2447548	22.2661324	7.53067716
CIR	59.07	57.57	68.81	50.85	7.31
NPL	4.43	4.20	6.68	2.60	1.71

The central and eastern region holds the least banks and observations for SLTL and SLTA. This resulted in the inability of counting standard deviation amongst the variables in the region. This region includes generally the smallest banks within the study in terms of total assets.

Table 6. Descriptive statistics of western region, France, Germany, Denmark, Netherlands, Belgium, Ireland

Variable	Mean	Median	Max	Min	St.D
SLTL	0.068	0.024	0.330	0.000	0.103
SLTA	0.029	0.010	0.112	0.000	0.037
TA	533518570	291330695	2398446400	15089723	604861943
ROA	0.3319	0.3223	1.1622	-0.2326	0.3017
LEV	6.89	5.91	18.86	3.36	3.31
LIQ	63.92	50.40	232.23	17.35	49.21
CIR	69.71	68.05	102.76	37.34	13.58
NPL	2.48	2.28	6.20	0.49	1.34

The western European region is the area where most of the banks in the study locate. It is also the area with the largest concentration of total assets with the strongest individual banks liquidity vice. The region holds a large number of banks that don't offer sustainable lending at all which the min value for SLTL and SLTA indicate. In contrast the region holds banks that include the largest portion of SL in the whole study when assessed towards all loans and total assets.

Table 7. Descriptive statistics of southern region: Italy, Spain, Portugal and Greece

Variable	Mean	Median	Max	Min	St.D
SLTL	0.023	0.010	0.076	0.002	0.026
SLTA	0.013	0.006	0.042	0.001	0.015
TA	283305632	93118070	1564142000	14269979	395306354
ROA	0.3153	0.4173	1.182	-1.3924	0.6261
LEV	8.55	7.63	16.84	4.73	3.00
LIQ	32.80	27.60	75.49	10.65	16.90
CIR	61.65	64.24	102.80	-33.02	28.39
NPL	8.74	5.24	34.76	1.81	9.43

The last region includes second most banks the study observed with individual banks that hold large amount of total assets. With regarding this the mean for SLTL and SLTA is very moderate within the organizations.

Table 8. Correlation of variables

	ROA	SLTL	SLTA	TA	LEV	LIQ	CIR	NPL
ROA								
SLTL	-0.028115							
SLTA	0.013782	0.399***						
TA	0.022961	0.009624	0.390***					
LEV	0.055136	-0.053974	-0.202*	-0.342***				
LIQ	-0.046291	0.205*	0.131429	0.269***	-0.343***			
CIR	0.362***	-0.024398	-0.031915	0.148*	-0.113173	0.093352		
NPL	-0.263***	-0.022781	-0.081671	-0.185*	0.578***	-0.188*	-0.091890	

The study used a dependent variable ROA. A correlation matrix was created by including the dependent variable, independent variables and the control variables.

The correlation matrix suggest that a very weak negative correlation exists between SLTL and ROA. This means that in the case that SLTL is increased slightly then ROA is decreased slightly. However, in the vase of SLTA and ROA the correlation is positive while also being very weak.

The descriptive statistics were added for providing an overview to the banks that this study focuses on and to the trend of sustainable lending regionally. This insight provides a starting point for the main study that investigates whether sustainable lending has an effect on bank performance.

6 Empirical results

6.1 Regression analysis

For determining whether the fixed effects model or the random effects model would be more efficient for this analysis the Hausman test was conducted for both dependent variables. The Hausman test indicated that the random effects model would be more efficient and appropriate for this study. The dependent variable ROA was tested with the Hausman test where the p-value was above the commonly used significance level of 0.05. This led to failing to reject the null hypothesis and using the random effects model in the study for the dependent variable.

The results for regression 1 indicate that there is a negative relationship between the sustainable lending variable SLTL and ROA variable and that the value is not statistically significant. The second variable for sustainable lending SLTA in relation to ROA suggests there would be a positive relationship between the variables. However, the value isn't statistically significant either. Amongst the control variables leverage and cost to income ratio, the correlation is positive and statistically significant. Total assets and non-performing loans are negatively correlated to ROA with statistical significance.

In terms of H1 the first regression analysis don't support the hypothesis. The hypothesis is rejected caused by the lack of positive correlation.

Table 9. The result of regression 1

Variable	ROA	ROA
SLTL	-0.006169	
t-stat	-0.118	
SLTA		1.45695
t-stat		1.016
TA	-3.12E-11	-6.34E-11
t-stat	-0.399	-0.760
LEV	0.072251***	0.074703***
t-stat	3.531	3.666
LIQ	-0.00053	-0.00058
t-stat	-0.463	-0.527
CIR	0.006224***	0.006399***
t-stat	5.352	5.812
NPL	-0.025108***	-0.025711***
t-stat	-4.863	-5.038
Obs.	186	186

The second regression analysis was conducted for analyzing the effect of time during which the sustainable lending has been distributed. The three categories for sustainable lending time period were five years, three or four years and two or one year. For the maximum time period of sustainable lending distribution the results indicate a positive correlation towards ROA with both SL variables. The values lack statistical significance. Only cost to income ratio is positively correlated to ROA with statistical significance. In the case of a middle time period distribution of four to three years both SL variables are positively correlated with performance but without statistical significance. Cost to income ratio is negatively correlated with statistical significance. The shortest time period indicates a negative correlation with both SL variables. Cost to income variable is only marginally significant with a negative correlation towards ROA.

Table 10. The results of regression 2

Variable	LONG ROA	LONG ROA	MID ROA	MID ROA	SHORT ROA	SHORT ROA
SLTL	0.82457		1.38327		-0.08274	
t-stat	0.694		0.688		-2.058	
SLTA		3.43675		2.84008		-1.49006
t-stat		1.233		0.718		-0.658
TA	-1.42E-08	-1.42E-08	7.56E-09	7.65E-09	3.75E-09	-1.25E-08
t-stat	-0.736	-0.738	0.869	0.877	0.065	-0.182
LEV	1.42E-08	1.42E-08	-7.75E-09	-7.84E-09	-6.21E-09	1.13E-08
t-stat	0.734	0.736	-0.892	-0.901	-0.107	0.165
LIQ	-0.00163	-0.00192	0.00122	0.0013	0.00659	0.00261
t-stat	-0.404	-0.476	0.756	0.788	-0.425	0.651
CIR	0.009159***	0.009215***	-2.06E-02**	-0.020517**	-0.020509*	-0.024528*
t-stat	6.389	6.436	-3.458	-3.517	-2.270	-2.728
NPL	-7.45E-09	-7.57E-09	2.02E-10	6.62E-11	6.13E-08	4.05E-08
t-stat	-0.726	-0.738	0.016	0.005	0.835	0.493
Obs.	115	115	46	46	21	21

The last regression analysis was conducted for analyzing the effect of increasing sustainable lending amount distributed. The three categories for sustainable lending was high amount, medium amount and moderate amount. Each SL distribution was divided bank wise so that each bank total SL distribution could be compared with the other bank observations. The results for the highest distribution amount indicates a negative correlation with SLTL towards ROA. The value doesn't have statistical significance. SLTA is positively correlated but lacks statistical significance. Cost to income ratio is negatively correlated with high statistical significance. With the MED scenario both SL variables are negatively correlated with ROA including no statistical significance. No variables in the scenario include statistical significance. In the case of moderate SL lending both SL variables are positively correlated but without statistical significance. Only the cost to income variable is positively correlated with statistical significance. In terms of H2 in the second regression analysis is rejected caused by the lack of statistical significance despite the existence of positive correlation in different scenarios.

Table 11. The results of regression 3

Variable	HIGH ROA	HIGH ROA	MED ROA	MED ROA	MOD ROA	MOD ROA
SLTL	-1.02E-02		-3.155		5.45E+00	
t-stat	-0.307		-0.474		0.592	
SLTA		0.621		-2.606		6.288
t-stat		0.577		-0.308		0.466
TA	3.03E-08	3.74E-08	6.50E-09	5.99E-09	1.45E-08	1.98E-08
t-stat	0.557	0.686	0.417	0.386	0.188	0.260
LEV	-3.04E-08	-3.75E-08	-5.39E-09	-4.78E-09	-1.44E-08	-1.97E-08
t-stat	-0.557	-0.687	-0.357	-0.319	-0.187	-0.259
LIQ	-0.003206373	-0.003656*	-0.0029717	-0.003477784	-0.002617	-0.002459768
t-stat	-1.739	-2.233	-0.616	-0.753	-1.627	-1.537
CIR	-0.013084***	-0.012597***	-0.011035	-0.010565	0.010605***	0.010602***
t-stat	-4.898	-4.565	-1.665	-1.567	10.766	10.740
NPL	4.221E-09	5.07E-09	-3.11E-08	-3.10E-08	-2.69E-08*	-2.72E-08*
t-stat	0.762	0.368	-1.854	-1.833	-2.637	-2.654
Obs.	70	70	59	59	53	53

6.2 Discussion

The results for the different regression analyses in general don't support the assumption for sustainable lending being correlated with positive bank performance. The first regression analysis analyzed whether a positive correlation would exist between sustainable lending and performance. The results for the analysis didn't support this assumption since statistically significant positive correlation didn't appear. This led to rejecting the first hypotheses. The second regression analysis analyzed whether an increased time period that the lending had been offered would have an effect on bank performance. The findings indicate positive correlation when the time period is longer for SL distribution. The results lack statistical significance which resulted in rejecting also the second hypothesis. The last regression analysis analyzed whether an increased amount of SL offered during the study period affects bank performance. With the two SL variables the results differed. With SLTL the correlation was negative in the HIGH scenario. With the SLTA variable in the HIGH scenario the correlation was positive though without statistical significance. With the most moderate sustainable lending amount the SL variables are both positively correlated with ROA. The values don't include statistical significance. All in all also the third hypothesis is rejected since the results don't include statistical

significance. When interpreting the results different aspects need to be accounted for. Sustainable lending at the time of conducting the research in general doesn't reflect the majority of assets or loans within each bank. Sustainable lending has increased from the volumes of the initial study year 2018 and by the looks of the reported sustainable lending thus far representing 2024 the trend seems to continue. Changing legislation and an increasing interest from the general public towards sustainability is influencing the banks offered services in the area that this study was focused in. Most of the banks chosen for the study are commercial banks or offer commercial banking services which includes an assumption for a business that is aiming for revenue. These banks also hold the most assets in the area that leads to the assumption of resources far greater than a local savings bank. The existence of resources was crucial for finding a study observation pool of banks than would highly likely offer sustainable lending. Since the findings of this study don't support the assumption of sustainable lending affecting positively towards bank performance its reasons should be considered. The data for the study indicated that the amount of offered sustainable lending varies greatly amongst the banks in the study. This is natural since also the bank sizes vary amongst the banks. A general observation concerning sustainable lending based on the data is that sustainable lending is at this point quite a small proportion when compared to the banks overall assets or lending. If this proportion were to grow strongly in the future a study such as the one conducted now could indicate different results and the impact towards performance could be more significant.

6.3 Limitations

This study has limitations that are relevant to mention. Sustainable lending data has not been easily available and reported in a predetermined way as financials in financial statements that follow accounting and reporting standards. This has resulted in this study in having sustainable lending information that can include different lending instruments varied by the company focus. Some companies haven't disclosed financial sustainable lending information at all. Instead they've disclosed information on what the company considers as risks and opportunities related to social and environmental issues.

The sustainability disclosures that many of the commercial banks in this research report vary by the focus of the organization and differ also in availability. In the future this is expected to change resulted by the ESRS which has been in force from the beginning of 2024. Another limitation is also unestablished terms for different types of sustainable lending offered. The ESRS and the EU taxonomy can potentially contribute to a more precise usage of the terms in future reporting. At the time of the study the sustainable lending amounts don't account a large quantity of total assets of the banks or gross loans. The trend until this point seems to point for a growing proportion of sustainable lending amongst banks. When sustainable lending only accounts for a smaller part of the total assets or all loans within the financial institution its effect on the bank can be expected to be marginal. The last limitation observed that has a significance for the study is the short time period that sustainable lending data was able to be gathered from. Financial statements and ESG reports published before the year 2018 didn't in many cases include sustainable lending information. A larger time period for the study with more observations could've affected the results of the study.

7 Conclusions

The study concludes that sustainable lending doesn't affect bank profitability with statistical significance. This led to rejecting the first hypothesis. This hypothesis was tested with ROA performance measure and by dividing the two SL ratios to their own analyses. SLTA showed positive correlation towards ROA but lacking statistical significance. The sample size and the available time period for observing sustainable lending very likely affects the research result. A positive correlation might imply that sustainable lending can have potential benefits for the financial institutions. It is likely that with the data available at the time the research was conducted the potential benefits can't be sufficiently captured in the analysis which would be indicated by statistical significance. The second regression analysis also had the result of rejecting the hypothesis. The second regression analysis tested both performance measures and divided both SL ratios to their own analyses. The results indicated that a positive correlation exists mostly when sustainable lending is distributed for a longer time period. The results weren't statistically significant. The second regression analysis can be concluded with similar arguments that applied to the first analysis. Since the value isn't statistically significant it can only be assumed that sustainable lending contributes positively to a bank's performance over a longer time period. The performance might also be a result of other factors that the sustainable lending with itself might accompany. For example, a reputational benefit, long term lending increasing loyalty amongst loan receivers and lower default rates could be these positive contributors. With the last regression analysis the results in general indicated a positive correlation in scenarios where sustainable lending had been offered a smaller amount. The values weren't statistically significant which led to rejecting also the final hypothesis. A positive correlation towards a shorter time period of distributed sustainable lending could indicate that a more cautious starting point could correlate positively with performance. Altering the size and time frame of the observed sustainable lending could also have a significant impact on the results.

After rejecting all hypothesis the study concludes that during the time of the study in the EU area there isn't significant evidence for sustainable lending to affect bank performance. This study offers instead implications that in the future if the sustainable lending

continues with an increasing trend in the financial institutions loan offering it might have a more significant effect to the financial institutions. In general the growing demand and lending sustainable loans is a positive aspect for the environment. With the changing regulation aligning closer with environmental initiatives and goals it is expected that the trend indeed is heading for increased demand for sustainable loans and green financial instruments in general. This offers many avenues for future research within the subject. In future research it is possible to include larger datasets that take into account bigger time periods than this study was able to. Also controlling for other factors that this study didn't take into account could offer more information and a better understanding of the relationship of sustainable lending towards bank performance. Since this study seems to be one of the few ones that investigate the EU area it could be beneficial to continue the research to fill this research gap. Sustainable and green lending has for the most part been studied from the risk perspective in which the changing legislation has made their mark on, especially in Asia. The year 2024 is the first one in the EU that requires large companies to report their sustainable activities more thoroughly annually. In the future it might be informative to analyze how the changing legislation in sustainability reporting has affected the financial institutions in different regions within the EU.

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Appendices

Appendix 1. Sustainable lending data (added upon recommendation)