

THE RELATIONSHIP BETWEEN SUSTAINABILITY, CREDIT RISK AND  
PROFITABILITY IN FINANCIAL INSTITUTIONS – EVIDENCE FROM DEVELOPING  
COUNTRIES

A Thesis

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Ina Gjika

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## ABSTRACT

In the context of climate change, risks such as climate risk, or reputational and regulatory risks have become more material for businesses, and ultimately for financial institutions, as they reconsider their lending practices strategy. In this paper, I analyze how applying the ESG criteria in lending practices correlates with the credit risk metrics of their loan portfolio and how ultimately it translates into profitability metrics for financial institutions of 75 developing countries in six different regions. I find evidence of a positive relationship, between ESG performance and credit risk profile for financial institutions in the third ESG quartile<sup>1</sup>, and a positive relationship between ESG performance and profitability. Higher country sustainability is also positively associated with stronger credit risk and profitability.

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<sup>1</sup> Third ESG Quartile is defined as having an ESG score between 20 and 24, on a scale of 0-44 according to the ESG Index of financial institutions in the sample analyzed in this paper.

## BIOGRAPHICAL SKETCH

Ina Gjika is a committed professional in the fields of renewable energy, development economics, banking and sustainable finance. She is a graduate student at MS. Applied Economics and Management program at The Charles H. Dyson School at Cornell University, as a Master & Internship Program (MIP) fellowship recipient.

Ina is also working as a Project Finance and Development fellow for Distributed Sun, a clean energy company, where she also conducted her internship during Summer 2021. At Cornell, Ina is part of the Energy Club at Johnson Business School and also works at Cornell Center for Sustainable Global Enterprise. During Spring 2021, Ina was a graduate consultant as part of the Sustainable Global Enterprise Immersion program at Cornell Johnson School of Business - for a project on business development in the renewable energy and sustainable non-energy practices space.

Prior to her graduate studies at Cornell, Ina worked for five years at ProCredit bank, part of the German development-oriented financial group. She held several positions such as: Client Advisor for private clients, Client Relationship Manager for medium and large businesses and Credit Risk Specialist for medium and large exposures. Ms. Gjika is also a CITF candidate (Certification for the International Trade Finance), as an EBRD scholarship recipient. She has successfully graduated from the three-year Management Programme in Furth, Germany, an executive track within the ProCredit banking group, designed to be attended by a strictly selected number of employees with managerial potential. She holds a double BA degree in Business Administration and Political Science and International Relations and a Minor in Economics, from the American University in Bulgaria, where she graduated with the highest distinctions. Ina also worked as a Teaching Assistant for the Corporate

Finance and Business Ethics courses, as well as a Writing Tutor. She has been an active member and organizer of the Model UN simulations, and an Organizational Committee President at the Outgoing Exchange Functional Area, in the international student-run organization, AIESEC.

Ina is a scholarship recipient at the Youth Exchange and Study (YES) program— a program sponsored by the US Department of State. As part of the program, she spent a high school year in the USA, living with an American host family and engaging in local community service. After returning to Albania, she served as a YES Alumni Coordinator for the Albanian YES Alumni and has been actively volunteering in organizing different youth - targeting projects. Her extra-curricular interests include blog writing, reading non-fiction books of politics and philosophy, as well as traveling and experiencing new cultures.

I dedicate this master thesis to my supporting family.

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## LIST OF ABBREVIATIONS

CFI	Corporate Financial Institute
COP26	Conference of Parties 26
CSR	Corporate and Social Responsibility
ECB	European Central Bank
ESG	Environmental, Social and Governance
EU	European Union
FE	Fixed Effects
FI	Financial Institutions
GDP	Gross Domestic Product
GLP	Gross Loan Portfolio
GRI	Global Reporting Initiative
GSCI	Global Sustainable Competitiveness Index
HR	Human Resources
IMF	International Monetary Fund
LMI	Low-Middle Income
MDG	Millennium Development Goals
NBFI	Non-banks Financial Institutions
NGO	Non-Governmental Organizations
NPL	Non-Performing Loan
OLS	Ordinary-Least-Squares
PAR	Portfolio at Risk
PM	Profit Margin
RE	Random Effects
ROA	Return on Assets
ROE	Return on Equity
SASB	Sustainability Accounting Standards Board
SDG	Sustainable Development Goals
SME	Small and Medium Enterprise
TCFD	Task Force on Climate-Related Financial Disclosures
UK	United Kingdom
UN	United Nations
US	United States
VIF	Variance Inflation Factors

## **I. Introduction**

Integrating sustainability into business decision-making has increasingly become part of board meeting and investor conversations. In his letter to CEOs in 2021, Larry Fink, the founder, Chairman and CEO of Blackrock – the world’s largest asset manager, stated that Blackrock would be asking companies to disclose how they will incorporate environmental, social and governance (ESG) practices into their business model, paying attention especially to a Net Zero economy (Fink, 2021). One of the explanations driving the ESG theme forward is the growing consensus on climate change largely caused by human activities, as largely shown at COP26 held in Glasgow, UK in 2021, where more than 200 parties gathered to discuss adaptation and mitigation measures to cope with climate change (UN, UN Climate Change Conference 26, 2021). Due to their geographic location and low investment in resilience capabilities, developing countries are the most vulnerable and affected by climate change. From 2008 to 2018, “disasters cost the agricultural sectors of developing-country economies over US\$108 billion in damaged or lost crop and livestock production” (Food and Agriculture Organization, 2021). Moreover, due to natural disasters, 89.93 million people have lost or had livelihoods affected in the period 2018 – 2020, even without accounting for the COVID-19 impact. The environmental and social consequences of natural disasters have deeply impacted the developing world. In 2019, the least developed countries recorded 21% of global reported mortality and 5% of economic losses, which is quite significant considering their total population and GDP. The largest natural disaster in 2021 was the earthquake in Haiti, which caused over 2500 deaths (World Meteorological Organization, 2021).

Larry Fink’s statement and the data on climate change impacts on developing countries, which were mentioned above, indicate that businesses are key to reaching the sustainable development

goals (SDGs) related to climate change and social impacts, as defined by the UN (UN, SDGs, 2015). Bank loans are the most important source of finance for businesses in developing countries. Providing access to finance to SMEs, can create more jobs and develop the economy (World Bank, 2020). Therefore, financial institutions can play a role in financing in sustainable projects such as clean energy and other social initiatives. Moreover, financial institutions can further incentivize good corporate governance through conducting due diligence on businesses they finance by applying the ESG criteria. In this paper, sustainable businesses are defined as businesses which consider ESG factors in their business decisions, focusing on the long-term impact while also maintaining short-term revenues (Benker, 2021).

In the context of climate change, risks such as climate risk, or reputational and regulatory risks have become more material for businesses, and ultimately for financial institutions, as they reconsider their lending practices. However, in order for banks to further lend to sustainable businesses and their projects, it is important to understand how applying the ESG criteria in lending practices correlates with the credit risk metrics of their loan portfolio. Considering that developing countries can be more exposed to climate physical risk – risks arising from climate change impact and hazards (Reisinger, Howden, & Vera, 2020), then understanding this relationship becomes even more material. Failure to better assess climate risk impacting the banks' portfolio, conducting proper due diligence on environmental and social components of the businesses they lend to, as well as failing to capture the low-risk benefits from green loans such as investments in renewable energy projects, can either negatively impact the risk profile of the financial institution, or have the banks miss out on good business opportunities.

Previous research, as will be discussed in Section II of this paper, has looked into specific environmental, social or governance criteria in developed and some bigger developing countries

such as China or India. However, not all three ESG components have been examined for smaller developing countries. While the positive relationship between ESG-related finance decision-making and ESG-related financial products performance is becoming clearer in developed countries, such as the US, which also have developed capital markets, this relationship is not as clear for developing countries, which are still lagging in making sustainability-focused policies a priority. Moreover, previous research has mostly examined businesses of different industries such as manufacturing, instead of solely financial institutions.

This paper, therefore, contributes to the existing literature in several ways. Firstly, it examines the relationships between: 1) ESG and credit risk performance, and 2) ESG performance and profitability, for 616 financial institutions in 75 developing countries in six regions. The regions included in the sample analyzed are: Africa; East Asia and the Pacific; Eastern Europe and Central Asia; Latin America and the Caribbean; the Middle East and North Africa; and South Asia. I use the Mix Market datasets from the World Bank and analyze this relationship for each financial institution, also controlling for financial metrics such as size, liquidity, efficiency and solvency. Secondly, heterogeneous effects of this relationship are also examined at the country level, by using the Global Sustainable Competitiveness Index 2021 (Solability, 2021), which scores the countries on sustainable competitiveness, natural capital, resource intensity, social capital, intellectual capital and governance.

Understanding these dynamics and relationships can have important implications in financing green projects in developing countries. Banks can better assess risk and indirectly improve ESG practices of businesses in the private sector, giving firms access to lower cost financing. Moreover, understanding this relationship at the loan portfolio level can open further doors for banks to

develop other financial products such as green or sustainability-linked bonds in those countries where such green finance products are missing.

## **II. Background and Literature Review**

### **2.1. The Evolution of the Sustainable Business Concept**

In 1970, Milton Friedman of the Chicago school of economic thought, stated in a New York Times article that the sole responsibility of businesses lies in profit maximization (Friedman, 1970). Sustainability or corporate social responsibility (CSR) as referred to until the last decade, was seen as a side activity, which businesses could voluntarily choose to pursue, under the perception that it would only bring about costs and no benefits for the actual business performance. CSR was even viewed as an oxymoron (Lydenberg, 2005). The Porter Hypothesis in 1991 (Porter, 1991) had a different perspective, especially in the environmental sphere stating that strict environmental laws will lead to innovative practices that can improve business competitiveness and lead to a better financial performance due to cost savings.

In 2000, Elaine Sternberg would reflect on the Friedman doctrine and make her own version, by saying that the purpose of businesses is to “create long-term owner value, through the sale of goods and services” (Sternberg, 2000). The long-term focus gets this definition close to the realm of sustainability, which in 1987 was defined by the UN as “meeting the needs of the present without compromising the ability of future generations to meet their own needs” (UN, United Nations, 1987). 2011 is the year with the most publications on CSR and this was also the year when Porter and Kramer spoke about the notion of shared value in society as the purpose of corporations (Agudelo, et al., 2019).

Another milestone year is 2015, where there were developments in the academic and international political and private arena which refer to sustainability. Carroll (2015) stated that the concepts of business ethics, corporate citizenship, corporate sustainability and stakeholder engagement are interrelated and should be incorporated in businesses. This was also the year when the United Nations transformed the Millennium Development Goals (MDGs) into the 17 Sustainable Development Goals (SDGs) (UN, SDGs, 2015) and when the Paris Agreement, a legally binding treaty on climate change where countries pledge carbon neutrality was signed (United Nations Climate Change, 2015). Since 2015, different reporting guidelines such as Sustainability Accounting Standards Board (SASB), Task Force on Climate-Related Financial Disclosures (TCFD) or the Global Reporting Initiative (GRI) were developed to provide companies with a framework of incorporating and measuring sustainability (Pickens, 2020). Moreover, research regarding the implications of incorporating ESG criteria into decision-making in terms of risk and returns has intensified as there are more academic papers published on this matter (Agudelo, et al., 2019). Overall, while at first CSR was seen as an add-on or expense and highly debatable, today sustainable businesses are not seen as oxymorons in academic literature, but as a work in progress to be integrated in businesses, financial institutions and regulators.

## **2.2. Literature Review**

The role of financial institutions in society also can be important to incentivize green investments. Academic literature looks into the relationship between separate components of sustainability such as environmental, social and governance with aspects such as financial and credit risk performance of firms and banks. Corporate Financial Institute (CFI) defines financial performance as the complete evaluation of the firms' generation and utilization of assets to pay off liabilities, generate

revenue and ultimately profitability and return on equity (Corporate Financial Institute, n.d.). Whereas credit risk is defined as “ the risk of loss that may occur from the failure of any party to abide by the terms and conditions of any financial contract” (Corporate Finance Institute, n.d.). Also, a few papers look into all three components of sustainability while examining this relationship for different firm sectors, including the financial sector.

After reinforcing the green credit regulation in China<sup>2</sup>, firms that comply with environmental due diligence can have easier and cheaper access to funds, as opposed to noncompliant firms. This leads firms of different sizes to find ways to improve their environmental performance, such as by reducing their total emissions. One study finds that large firms invested in more energy efficient technology to control their emissions, whereas smaller firms lowered their environmental footprint by lowering their production (Fan, Peng, Qang and Xu, 2021). From the banks’ financing perspective, Dhruba P. from the Asian Development Bank (2018) finds that there have been several barriers to financing green projects as opposed to non-green projects, such as insufficient carbon pricing and incentives, the presence of fossil fuel subsidies, unpredictable and changing policy incentives, off-taker risk, technology risk. These barriers are related to higher costs of project finance analysis and due diligence or lack of stable green-incentivizing regulations. The same report further finds that there is a problem of scale of such projects and high offtake credit risk, especially as long-term investor commitment does not match short-term regulations (Dhruba, 2018). Cui et al. (2018) uses a two-stage least square regression (2SLS) and random-effect panel regression (RE) to investigate the impact of green lending on credit risk. Exploring China’s green

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<sup>2</sup> Introduced in 2007, the green credit policy in China requires banks to provide financial support only to those investment plans that have gone through environmental due diligence, or that aim at decreasing pollution (International Finance Corporation, 2018)

credit policy, this research finds that increasing the percentage of green loans in the overall loan portfolio, has a positive effect on the bank's environmental, risk and financial performance.

In developed countries such, as in France, banks are already starting to include the green factor in their loan pricing, attributing lower risk and lower pricing to green investments such as buying a green automobile. However, when comparing loans to buy an electric vehicle with loans for home energy efficiency retrofits, despite carrying similar borrower risk as both are targeted to the same borrower risk profile, the loan interest rates are higher for investments in energy efficiency renovation projects, thus reflecting a financing gap for these types of investments. Giraudet and Petronevich (2021) find the reason to be in that automobile loans come with an added collateralized asset, which lenders believe will increase the borrowers' willingness to pay. Other evidence from the syndicated loan market in developed and emerging markets shows, since the Paris agreement, carbon risk is priced with a premium which ideally should make green loans significantly cheaper than non-green loans. Yet, this premium does not include all risks related to indirect environmental footprints, known as scope 2 or scope 3 emissions. These are emissions caused as a result of non-green purchased energy, or emissions caused from suppliers or clients in the value chain. Therefore, even though green banks lend more to lower carbon emitting firms, they do not price their loans significantly lower as compared to higher carbon emitting firms, making access to finance for green firms more difficult (Ehlers, Packer and De Greiffic, 2021). Yet, evidence from the EU indicates that a carbon-neutral portfolio is negatively related to default risk and these results are robust regardless of the bank size (Umar, Ji, Mirza, Naqvi, 2021).

Considering the social component of the ESG framework relationship with firms as borrowers and financial institutions as lenders, the evidence is also mixed. One study finds that the decision of

the top management to improve the firm's social performance is endogenous, as it can be correlated with other unobserved variables such as organizational culture, board education, decision-making style, and values. Considering that these unobserved variables can also affect the financial performance of the firm, they are considered endogenous and will bias estimates (Castro, Arin and Canela, 2010). Yet, Bouslah et al. (2012) shows that social dimensions such as employee relations and human rights are more relevant to reduce firm risk.

Considering only the governance component, researchers face endogeneity challenges while establishing the causal direction between firms who incorporate ESG initiatives into their business model and their risk management. Does firm robust leadership and governance serve as a driver of ESG performance, or is it that firms with strong ESG or CSR performance bring on board robust leadership and governance policies (Gillan, Koch and Starks, 2021)?

A few papers look into all three components: environmental, social and governance and examine their relationship with the financial and risk performance. In Romanian banks, Nitescu and Cristea (2020) find that banks with higher ROA or leverage multiplier are more likely to incorporate ESG factors in their risk management strategy decision-making. Moreover, in these cases, the board is also more likely to decide on higher involvement of the bank in social responsibility activities.

Another study using principal component analysis shows that CSR would negatively impact bank financial performance in the short run, but then positively impact it in the longer run for Chinese banks. Green credit would however alleviate this negative relationship, through improving risk control (Zhou, Sun, Luob and Liao, 2021). Scholtens and Dam (2007) analyze the performance of

banks that adopted the Equator principles<sup>3</sup> by using single and multi-factor approaches which include local market indexes, world financials index and constant maturity default-free bond index, and then estimating these equations using the OLS method. Their findings show how larger firms with developed CSR policies are those that adopted the Equator principles, though there was no significant evidence of differences in financial performance between adopters and non-adopters. However, other evidence from Flammer (2015), using a regression discontinuity approach, suggests that firms with close call ESG proposals have higher financial performance due to higher ESG announcement returns. ESG considerations also affect managers' supplier selection and ultimately manager evaluation. Managers' negative reaction to poor ESG practices is emphasized more than their positive reaction to good ESG practices (Yuanzhu, Chung, K.Lim, Ye Kumar, Hua Tan, 2021).

The sustainability performance level<sup>4</sup> of the countries in which firms operate, also seems to play a role in their financial performance. Evidence from 22 countries suggests that firms in countries with higher sustainability rankings, find it more difficult to differentiate themselves from their counterparts in countries with lower sustainability rankings (Xiaoa, et al., 2017). This suggests that firms in emerging markets, who get to be early adopters, can better leverage the benefits of adopting sustainability practices, through creating a competitive advantage, and improving their credit risk score (Razak, Ibrahim and Ng., 2020). Interestingly in emerging markets, firms in manufacturing were most prone to adopt social efficiency practices, and firms in the financial sectors have lower adoption rates (Wange, Lin and Tian, 2020).

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<sup>3</sup> A risk management framework, initially launched in 2003 in Washington D.C. adopted by financial institutions worldwide as part of their environmental and social risk assessments of project finance applications (The Equator Principles Financial Institutions, 2020).

<sup>4</sup> "To pursue sustainability is to create and maintain the conditions under which humans and nature can exist in productive harmony to support present and future generations." U.S. Environmental Protection Agency (EPA)

Overall, previous literature indicates mixed evidence regarding the association of financial and credit risk performance of firms with the firm ESG performance. Firms that implement green projects can obtain lower cost of funding, but it seems that the green premium is still not high enough to lower the yields. Some papers point to the effect of firm size (Fan, Peng, Qang and Xu, 2021) and the short-term versus the long-term aspect of the ESG investments indicating that larger firms adopt ESG practices and perform better in the longer term, thus lowering credit risk (Dhruba, 2018). Other papers indicated no significant impact of the ESG practices in the company's credit risk or financial performance regardless of the size of the firm (Umar, Ji, Mirza, Naqvi, 2021). Papers that examined the social and governance components separately, pointed to endogeneity issues which make it challenging to understand the relationship with the financial performance (Castro, Arin and Canela, 2010; Gillan, Koch and Starks, 2021).

### **III. Research Question and Hypotheses**

#### **3.1. Research Question**

The academic ESG-related literature is focused on publicly listed firms and financial institutions in developed countries such as in the EU or the US, or large emerging markets such as China, and are often focused on one aspect of the ESG. Other non-publicly listed firms and financial institutions in developing countries are overlooked with regards to the correlation between ESG performance and financial and credit risk performance. This paper will focus specifically on the financial institutions in developing countries. Therefore, the main research questions this paper will analyze are: What is the relationship between the ESG performance of financial institutions and their credit risk and financial institution profitability? How does this relationship depend on the sustainability ratings of the countries where these financial institutions operate?

The original contribution of this paper is to answer these research questions by looking at 616 financial institutions in 75 developing countries from Africa; East Asia and the Pacific; Eastern Europe and Central Asia; Latin America and the Caribbean; the Middle East and North Africa; South Asia for a period of at least three years over the past two decades. I also incorporate contextual factors in the analysis, such as country Global Sustainable Competitiveness Index.

### **3.2. Research Hypotheses**

The theoretical frameworks devoted to explaining the ESG-financial and credit risk relationship can be grouped into five major theories, which I use to develop the hypotheses tested in this paper.

#### *1) Resource productivity theory*

Porter and Van der Linde (1995), developed a model in which designing and setting environmental standards can encourage innovation which ultimately lowers costs, increases firm resource productivity and competitiveness. Therefore, firms which innovate following environmental standards, will eventually lower, rather than increase their costs, hence improving financial performance. Considering that the credit risk performance of a business loan portfolio depends on their payment capacity, thus their financial performance, banks lending to such companies under environmentally related covenants, will have a better risk profile and financial performance.

#### *2) Natural-resource-based view of the firm*

Hart (1995) in his theory states that firms which develop strategic capabilities such as pollution prevention, product stewardship and sustainable development, undertake environmental practices which lead to sustained competitive advantages.

#### *3) Instrumental stakeholder theory*

Jones (1995) developed a theory that states a firm can improve its financial performance by improving its social performance. The reason is that a better social performance will improve the firm's relationships with other internal and external stakeholders, who will respond positively. Internal stakeholders such as employees will work more productively under better social conditions. External stakeholders such as investors will respond positively by investing in stocks.

#### *4) Institutional theory*

March and Olsen (1984) in their theory consider the influence from regulators on the firm strategic decisions. In order to gain legitimacy and survive in the market, firms need to conform to policy changes and sustainability initiatives. Three main mechanisms are identified in this process: isomorphism – pressure from regulators who also control resources; mimetic isomorphism – strategy imitations among firms to reduce regulatory compliance uncertainty; normative isomorphism – pressure from media and other external players such as NGOs (Di Maggio and Powell, 1983). Considering increasing regulatory pressure towards improving ESG practices, this theory predicts firms as more inclined towards adopting these practices to avoid fines, or reputational risks, hence eventually performing better financially and improving their risk profiles.

#### *5) Friedman Theory*

According to Friedman (1962), a firm's social performance is seen as an expense and beyond the interests of shareholders. The main business responsibility is to generate profits. Therefore, it will either negatively impact the firm's financial performance, or not have any effect on it.

Except for the Friedman Theory, the other four of the five theories above are consistent and support the main hypotheses in this paper formulated in three parts listed below:

Hypothesis 1(a): Financial institutions with higher ESG scores, have a more solid credit risk profile than financial institutions with a lower ESG score.

Hypothesis 1(b): The ESG and credit risk relationship is stronger if the financial institution operates in a country with a high GSCI sustainability score.

Hypothesis 1(c): Financial institutions with higher ESG scores are more profitable than financial institutions with a lower ESG score.

## **IV. Data**

The main dataset for this paper is the Microfinance Information Exchange (MIX) (MIX Market, 2020) market, hosted by the World Bank. The MIX Market data consists of the Financial Performance, Social Performance and the Metadata datasets, which are merged based on the key variables of the financial institution ID and fiscal year. The initial merged dataset contains information from 3,114 financial institutions (banks, credit unions, NBFIs, NGOs, cooperative, rural banks) from 123 countries in Africa; East Asia and the Pacific; Eastern Europe and Central Asia; Latin America and the Caribbean; the Middle East and North Africa; and South Asia in the period 1999-2019, with a total of 42,573 observations. In order to obtain information regarding country sustainability, the dataset from The Global Sustainable Competitiveness Index (Global Sustainability Competitiveness Index, 2021) (GSCI) is used, which pulls data from public domains, including the World Bank. It is a non-commercial project of SolAbility Sustainable Intelligence. GSCI has been published since 2012 and is calculated based on present and past performance in 131 quantitative indicators derived from recognized international organizations (UN, World Bank, IMF). Countries are given a score on sustainable competitiveness, natural capital, resource intensity, social capital, intellectual capital and governance.

To create the final sample, the four datasets were merged, thus dropping 86 duplicate observations, and 17,699 unmatching observations. The sample selected for this analysis will include annual data from only developing countries, excluding countries in the EU, therefore dropping 24 observations which corresponded to financial institutions in Poland and Bulgaria. Moreover, 514 observations belong to financial institutions for which there are only 1 or 2 data points, meaning they have reported for only 1 or 2 years. In order to identify clearer patterns in the data, these observations are dropped and only institutions with data for 3 or more years are kept.

The final sample for analysis has 1,648 observations from 616 financial institutions in 75 developing countries in the six regions mentioned above, for the period 2007-2018. After cleaning the data, financial institutions in the dataset have reported data for an average of 5 years. The panel dataset is not balanced since the years in which the financial institutions have reported are different. However, for the scope of this paper which estimates correlations among the data, this limitation does not highly impact the analysis. A disadvantage of the dataset is that the sample may not be representative of all financial institutions in the countries analyzed. However, these institutions combined serve a significant portion of households and businesses in these countries. I perform a means comparisons test between the observations that are dropped and those that are kept after merging the financial performance with social performance datasets. The results (see Appendix 10.1.) indicate that there are significant differences in means of PAR90, PAR30, Bank Size, GLP Size, ROA, PM, Capital Asset Ratio, Region, Country, Legal and Profit Status. There are no significant means differences regarding Bank efficiency, Deposits to Loans, ROE, Debt to Equity. Considering the mixed results regarding significant differences, the generalizability of the results from our sample are limited.

## V. Empirical Model Specification

This paper uses the Ordinary-Least-Squares (OLS) and probit models. The following sections will introduce the variables used in the regressions for these models, specify the main empirical relationship among the examined variables and provide summary statistics and correlation matrices for the variables included in regressions.

### 5.1. Variables

#### 5.1.1. Dependent Variables

##### *Credit Risk*

In order for banks to further lend to sustainable businesses and their projects, it is important to understand how applying the ESG criteria in lending practices correlates with the credit risk metrics of their loan portfolio. Credit risk is an important risk metrics for financial institutions which ties directly to their core lending business model. Considering provisioning regulations, failure to properly assess credit risk can be detrimental to the asset quality and profitability of the financial institutions (Luqman, 2014; Bank for International Settlements, 2018). The paper uses Portfolio at Risk over 90 days or otherwise called Non-Performing Loan (NPL) ratio, to assess the borrower credit risk. NPL is a metrics which is commonly used in previous research (Cui et al., 2018; Ferri 2007; Messai & Jouini 2013) as the best proxy to capture credit risk. The rationale is that loans that are not paid for 90 or more days, are considered as non-performing and have a higher probability of default, than loans which are not paid by 30 days. Also, this is a better measure than the restructuring rate of the portfolio, since loans can get restructured for reasons other than default, such as change of investment plan. Robustness checks will be performed using

Portfolio at Risk over 30 days metrics. Portfolio at Risk over 90 days in the mix Market dataset is defined:

$$\text{Portfolio at Risk over 90 days}_{it} = \frac{\text{Outstanding Balance of the portfolio overdue}_{it>90 \text{ days}} + \text{renegotiated portfolio}_{it}}{\text{Gross Loan Portfolio}_{it}},$$

where  $i$  is the financial institution and  $t$  is the fiscal year.

### *Profitability*

Profitability is a factor that is important for the performance and survival of financial institutions. A financial institution which has continuous losses will need additional capital injections in order to remain solvent and meet capital requirements (Basel III, 2011). Metrics such as Return on Assets (ROA) and Return on Equity (ROE) are used to measure profitability of financial institutions (Cui et al., 2018; Ferri, 2007). Robustness checks will also be conducted using the profit margin ratio.

$$\text{Return on Equity}_{it} = \frac{(\text{Net Operating Income}_{it} - \text{Taxes}_{it})}{\text{Average Total Equity}_{it}}$$

$$\text{Return on Assets}_{it} = \frac{(\text{Net Operating Income}_{it} - \text{Taxes}_{it})}{\text{Average Total Assets}_{it}}$$

$$\text{Profit Margin}_{it} = \frac{\text{Net Operating Income}_{it}}{\text{Financial Revenue}_{it}}$$

### 5.1.2. Independent variables

#### ***Financial Performance Metrics of the Financial Institutions***

##### *Bank Size*

Studies show that institutional size with different risk appetites can also be a predictor of credit risk (Tran & Phan, 2020; Cui, 2018). The dataset has a wide range of financial institutions of different asset and loan portfolio sizes and therefore, I use variables capturing the balance sheet

size of financial institutions as controls in this paper. Different metrics are used to capture the size of the financial institutions, where the most common in academic finance literature is the logarithm of total assets (Bogan, 2012; Crespi and Migliavacca, 2020). Robustness checks will be conducted using the ratio of total assets of a financial institution with the average of total assets of financial institutions. Similarly, bank portfolio size metrics will be defined as the logarithm of total Gross Loan Portfolio (GLP) of each financial institution. Robustness checks are conducted using the ratio of GLP of a financial institution with the average GLP of all financial institutions.

$$Bank\ Size_{it} = \log(Total\ Assets)$$

$$Bank\ Portfolio\ Size_{it} = \log(Total\ GLP_{it})$$

Robustness Checks variable definition:

$$Bank\ Size_{it} = \frac{Total\ Assets_{it}}{\sum_{i=1}^n Total\ Assets/n}, \text{ where } n \text{ is the total number of financial institutions in the dataset}$$

$$Bank\ Portfolio\ Size_{it} = \frac{Total\ GLP_{it}}{\sum_{i=1}^n Total\ GLP/n}, \text{ where } n \text{ is the total number of financial institutions in the dataset.}$$

### *Bank Liquidity*

Bank liquidity also is associated with NPL ratios in financial institutions and therefore used as a control variable in this paper. High bank liquidity can increase banks' risk appetite for excessive and irresponsible lending, which then can lead to higher NPL ratio (Amir, 2019; Rachman et al., 2018). Since the NPL ratio is captured at the end of the year, deposits-to-loans ratio is used in this paper as a proxy for liquidity risk, as this is a measure which compares banks' loans to their deposits for the same period of time. A high ratio indicates a high bank liquidity.

$$\text{Deposits-to-Loan Ratio}_{it} = \frac{\text{Deposits}_{it}}{\text{Gross Loan Portfolio}_{it}}$$

*Profitability (see above in Section 5.1.1.)*

### *Solvency*

Solvency is a factor which can positively or negatively affect NPL, depending on the capital requirements and the type of financial institution and this thus important to control for. Banks with higher solvency can afford taking more risks, as they have more capital to absorb the losses from default (Olarewaju, 2020; Wood & Skinner, 2018). However, more risks can lead to higher defaults, and bigger losses, which can also quickly lower the solvency rate. Solvency is best defined as the ratio of capital to total assets. Even though utilizing risk-weighted assets instead of total assets is a metrics in compliance with regulatory requirements, this paper will follow the common practice in literature, which uses total assets when considering institutions from different countries, where the definition of risk-weighted assets is different and also changes across time.

$$\text{Capital-to-Asset Ratio}_{it} = \frac{\text{Total Equity}_{it}}{\text{Total Assets}_{it}}$$

Another solvency metric that I will use to run a robustness check is the debt-to-equity ratio, which shows how leveraged a bank is (Bank for International Settlements, 2013). Considering that assets equal the sum of liabilities and equity, then highly leveraged banks tend to be undercapitalized, or just capitalized enough to comply with regulations.

$$\text{Debt-to-equity}_{it} = \frac{\text{Total Liabilities}_{it}}{\text{Total Equity}_{it}}$$

### *Bank efficiency*

Bank efficiency management will impact NPLs, considering that resources are also needed to monitor and conduct proper due diligence on borrowers (Berger and DeYoung, 1997). Cost-to-income ratio is a proxy commonly used in literature to measure the efficiency of a financial institution (Deb, 2019; Olarewaju, 2020), where:

$$\text{Bank Efficiency}_{it} = \frac{\text{Operating Costs}_{it}}{\text{Net Operating Income}_{it}}$$

### ***Environmental, Social and Governance Performance Metrics of the Financial Institutions***

The ESG indicators that are used in this paper align with the indicators that are considered as material for commercial banks to be disclosed, as assessed by the Sustainability Accounting Standards Board (SASB) (SASB, 2018) and the Global Reporting Initiative (GRI) (GRI, 2021).

#### *Bank Social Performance*

Bank social performance indicator is the sum of 19 social indicators, as listed in the summary table below, which are represented by dummy variables in the dataset. These indicators capture the existence of social-oriented goals of the financial institution, financial inclusion by also offering services to poor and low-income clients, as well as financing women empowerment projects, as well as projects focused on education and health.

#### *Bank Environmental Performance*

Bank environmental performance indicator is the sum of 4 environmental indicators, which are represented by dummy variables in the dataset. These indicators consist of the financial institution undertaking activities related to raising awareness of environmental impact; including clauses in

loan contracts that require clients to improve environmental practices and mitigate environmental risks; uses specific tools to evaluate environmental risks of clients, as well as offers green loans.

### *Bank Governance Performance*

Bank governance performance indicator is the sum of 21 governance indicators, which are represented by dummy variables in the dataset. These indicators consist of having more or at least 50% of females on board; board orientation towards social and environmental goals; having anti-harassment and anti-discrimination policies; applying quality-oriented staff incentives; existence of a transparent organizational culture; application of client protection policies related to data security and full transparency of financial services; having a client complaint mechanism in place; going through frequent auditing and having bank, loan and social performance ratings.

Different variations of the ESG-capturing variables are provided within this universe of indicators presented in *Table 1*. In the models that will be presented in the Results section, the bank ESG performance is proxied by the log of the total ESG score variable (continuous), a categorical variable with different cutoff points such as the median, and quartiles of the logged ESG score. Moreover, some models utilize individual indicators, or groups of indicators such as governance, social or environmental, in order to zoom in and see which granular indicators better explain the credit risk performance of the financial institutions.

*Table 1 – Description of the ESG Indicators*

<b>Environmental Indicators</b>
<b>1.</b> The institution conducts activities related to raising awareness of environmental impacts, such as: running training sessions and discussions, displaying posters, distributing flyers, etc.
<b>2.</b> The institution includes clauses in loan contracts that require clients to improve environmental practices/mitigate environmental risks.

3. Environmental policies and initiatives > The institution uses specific tools to evaluate the environmental risks of clients' activities (categorizing client risk levels by sector, surveying environmental impacts, use of an exclusion list, etc.)
4. The institution offers specific loans linked to environmentally friendly products and/or practices.
<b>Social Indicators</b>
1. The institution has set goals and has explicitly designed products, services, and procedures to accomplish the improvement of adult education
2. The institution has set goals and has explicitly designed products, services, and procedures to increase the youth opportunities
3. The institution has set goals and has explicitly designed products, services, and procedures to improve children's schooling
4. The institution has set goals and has explicitly designed products, services, and procedures towards health improvement
5. The institution has set goals and has explicitly designed products, services, and procedures towards gender equality and women's empowerment
6. The institution has set goals and has explicitly designed products, services, and procedures to improve access to water and sanitation
7. The institution has set goals and has explicitly designed products, services, and procedures towards housing.
8. The institution has set goals and has explicitly designed products, services, and procedures to increase access in financial services.
9. The institution has set goals and has explicitly designed products, services, and procedures to reduce poverty.
10. The institution has set goals and has explicitly designed products, services, and procedures to generate employment.
11. The institution has set goals and has explicitly designed products, services, and procedures to develop start up enterprises.
12. The institution has set goals and has explicitly designed products, services, and procedures towards growth of existing businesses.
13. The institution targets very poor clients.
14. The institution targets poor clients.
15. The institution targets low-income clients.
16. The institution collects data to measure client poverty levels.
17. The institution offers nonfinancial services aimed at improving either the entrepreneurial skills of clients or the performance of their enterprises. This category includes education related to running a business but not financial literacy as such.
18. The institution offers nonfinancial services aimed at (a) improving the social position/independence of women, (b) creating awareness of problems related to gender, or (c) providing resources or tools for addressing such problems.
19. The institution offers nonfinancial services aimed at improving knowledge in basic health/nutrition education.
<b>Governance Indicators</b>
1. The board of the financial institution is oriented towards social missions and goals.

<b>2.</b> Social performance management (SPM) champions are members of the board of directors of the financial institution that are assigned to oversee integration of social performance management practices within an institution. SPM committees are formal entities within the board that meet on a regular basis to discuss topics related to institutional SP.
<b>3.</b> Board members of the financial institution have experience or training related to managing social performance at microfinance institutions.
<b>4.</b> There are 50% or more female board members in the financial institution.
<b>5.</b> The financial institution has quality of interaction with clients based on client feedback mechanism as basis of staff incentives.
<b>6.</b> The financial institution has quality of social data collection as basis of staff incentives.
<b>7.</b> The financial institution has portfolio quality as basis of staff incentives.
<b>8.</b> The financial institution has human resource policies in place for social protection (medical insurance and/or pension contribution).
<b>9.</b> The financial institution has human resource safety policies in place.
<b>10.</b> The financial institution has human resource anti-harrasement policies in place.
<b>11.</b> The financial institution has human resource non-discrimination policies in place.
<b>12.</b> The financial institution has human resource grievance resolutions in place.
<b>13.</b> The financial institution performs internal audits to verify over-indebtedness prevention.
<b>14.</b> The financial institution provides full disclosure of prices, terms, and conditions.
<b>15.</b> The financial institution has a functioning client complaint mechanism in place.
<b>16.</b> The financial institution offers privacy data clause in loan contracts.
<b>17.</b> The financial institution conducts client protection assessment.
<b>18.</b> The financial institution has microfinance rating.
<b>19.</b> The financial institution has long-term loans rating.
<b>20.</b> The financial institution has short-term loans rating.
<b>21.</b> The financial institution has overall social performance rating.

### *Country Sustainability*

Country sustainability is measured by the variable of Total Country Score, which is the sum of the score in the categories of sustainable competitiveness, natural capital, resource intensity, social capital, intellectual capital and governance, for each country in which the financial institutions are located. The Total Country Score variable values range from 214.416 to 314.349, where a higher score indicates better sustainability performance. I use the natural logarithm of the total country score in regressions. In order to assess how the ESG performance of financial institutions changes depending on the country sustainability performance, I add an interaction variable  $\text{Log ESG} \times \text{Country Sustainability}$ , taking the logarithm of the product of the total ESG score and the total GSCI score. As seen from the literature review, the evidence is mixed. Xiaoa et al. (2017)

finds that firms located in countries with higher sustainability rankings score lower than their counterparties in countries with lower sustainability ranking, as they find it harder to differentiate themselves from other firms. On the other hand, Crespi and Migliavacca (2020) find that the improvement of ESG scores is enhanced by the economic and social development of the country where their operations are located.

## **5.2.Descriptive Statistics**

### **5.2.1. Summary Statistics**

*Table 2* shows the variable specifics in terms of number of observations, minimum values, maximum values, average values and standard deviation of the variables included in the regressions. The NPL or Portfolio at Risk 90 days ratio is on average 3.9%, which is higher than the developed countries benchmark (North America region NPL = 1.30%; EU NPL = 2.54%) (World Bank, 2021; ECB,2021). Average bank Gross Loan Portfolio is \$92 million and each bank is on average less than 0.5% of total banks across the years, in terms of loan portfolio and total assets, meaning that no institution dominates the dataset in terms of size. Due to multicollinearity between logarithm of bank total asset size and logarithm of bank total portfolio size as reflected from the variance inflation factor analysis, I only include the logarithm of bank total portfolio size in regressions as my analysis is focused on the financial institution portfolio. Average capital asset ratio of total observations is 28%, with ROA of 1.8% and ROE of 25.6%. The average ESG score is 19.792, implying that on average the observations satisfy at least 19 ESG indicators, out of 44 included in the final dataset, with financial institutions reaching the lowest score of 4 and the highest of 34. No financial institution incorporates all 44 ESG indicators in their operations.

Understanding the legal and form structures of the financial institutions in the sample and controlling for them in the regressions is also important to account for different regulations,

business models and capital mixes (Bogan, 2012). From *Table 3* below, out of 1648 observations in the regression, 54% come from Non-profit financial institutions, and 45% come from For-profit financial institutions. Moreover, 38% of observations correspond to Non-banks (NBFI); 36% are NGOs; 14% are Banks; 8% are credit unions or cooperatives; 1% are rural banks and 2% are classified as other in terms of their legal status. *Table 4* shows a geographic distribution of the sample, where 37.5% are from Latin America and the Caribbean, followed by South Asia (23.12%) and Eastern Europe and Central Asia (15.41%).

Table 2 – Summary Statistics

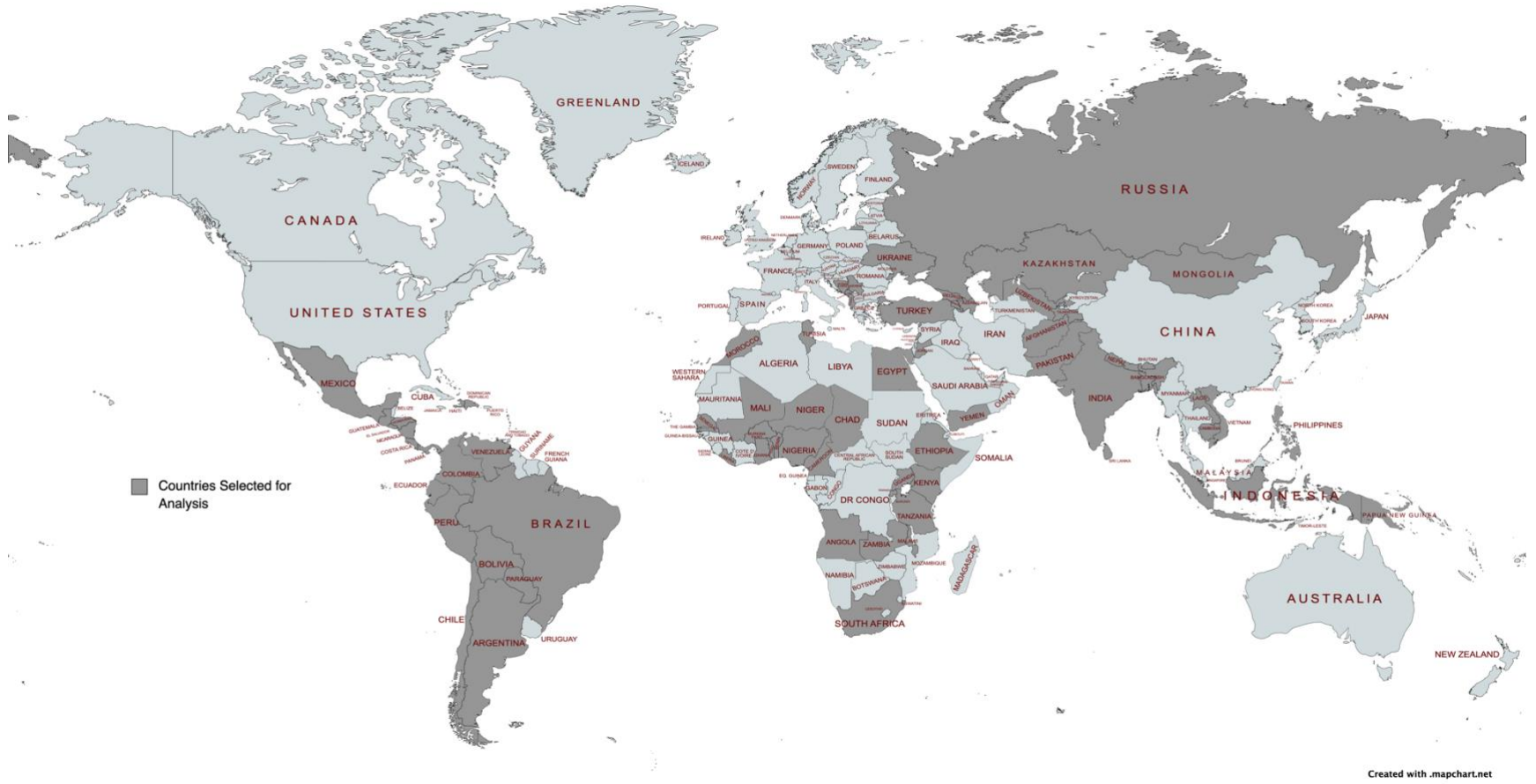
Regression Variables	Mean	Std.	Min	Max
Portfolio at Risk 90 Days	0.039	0.073	0	0.902
ESG	19.792	5.915	4	34
ESG*log Country Sust.	110.067	32.676	22.011	188.829
Log Bank Portfolio Size	16.761	1.863	10.757	22.477
Bank Efficiency	17.500	526.367	-3485.259	20505.440
Deposits to Loans	0.271	0.421	0	4.958
Return on Assets	0.018	0.083	-1.454	0.278
Return on Equity	0.256	6.933	-31.692	276.974
Profit Margin	0.065	0.454	-6.264	1.549
Capital Asset Ratio	0.280	0.281	-1.871	7.116
Debt to Equity Ratio	4.317	7.651	-122.650	116.010
Log Total Country Score	5.566	0.095	5.368	5.751
<i>Region</i>				
East Asia & the Pacific	0.118	0.323	0	1
Eastern Europe & Central Asia	0.154	0.361	0	1
Latin America & the Caribbean	0.375	0.484	0	1
Middle East & North Africa	0.036	0.187	0	1
South Asia	0.231	0.422	0	1
Country	32.955	18.127	1	75
<i>Legal Status</i>				
Credit Union	0.084	0.278	0	1
NBFI	0.382	0.486	0	1
NGO	0.359	0.480	0	1
Other	0.021	0.144	0	1
Rural Bank	0.012	0.107	0	1
<i>Profit Status</i>				
Profit	0.448	0.497	0	1
Unknown	0.010	0.101	0	1
Total Observations	1648			

Note: Nonprofit institutions and also financial institutions in Africa are not in the chart as they are omitted categorical variables in the regression output.

Table 3 – Legal and Profit Status Summary Statistics

Last known legal status	Last known profit status			
	Non-profit	Profit	Unknown	Total
Bank	13	221	0	234
Credit Union / Cooperative	135	3	1	139
NBFI	153	470	6	629
NGO	571	12	9	592
Other	21	13	1	35
Rural Bank	0	19	0	19
Total	893	738	17	1648

Figure 1. Map of Selected Countries



*Table 4. – Regional Summary Statistics*

Region	Freq.	Percent
Africa	140	8.50
East Asia and the Pacific	195	11.83
Eastern Europe and Central Asia	254	15.41
Latin America and The Caribbean	618	37.50
Middle East and North Africa	60	3.64
South Asia	381	23.12
Total	1648	100.00

### **5.2.2. Correlation Matrix and Multicollinearity Tests**

As seen from the correlation matrix in *Table 5*, Portfolio at Risk 90 days, which will be a proxy for credit risk is positively correlated with Environmental and Social Performance, but negatively correlated with Governance, which leads to a net negative correlation with ESG, which is a sum of the three. Moreover, Portfolio at Risk 90 days is positively correlated with Bank Portfolio Size, Bank Efficiency, Return on Equity and Total Country Sustainability. Whereas the correlations with Bank Size, Return on Assets (ROA), Profit Margin, Capital Asset Ratio and Debt to Equity Ratio are negative. ESG is positively correlated with bank efficiency, liquidity, ROA and size indicators, but negatively correlated with other profitability and solvency indicators.

More granular correlation matrixes are conducted (please see Appendix 10.2), which include all 44 ESG indicators, as well as the components of country sustainability index. Variance Inflation Factors (VIFs) are also used to measure multicollinearity among variables included in the regression (please see Appendix 10.2). None of the ESG granular indicators or the country GSCI components have a VIF score larger than 5, therefore they are all kept in the regressions. However, the variables measuring bank asset size and portfolio size showed VIF above 5, where bank asset size was dropped, as it has higher VIF score. Correcting for multicollinearity helps avoid the lowering of statistical significance of independent variables used in the regressions.

*Table 5 – Correlation Matrix*

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(1) Portfolio at Risk 90 Days	1.000																
(2) Portfolio at Risk 30 Days	0.947	1.000															
(3) Environmental Goals	0.047	0.021	1.000														
(4) Social Goals	0.004	-0.011	0.149	1.000													
(5) Governance	-0.064	-0.080	0.029	0.202	1.000												
(6) ESG	-0.021	-0.044	0.287	0.862	0.644	1.000											
(7) ESG x Log Country Sust.	-0.021	-0.043	0.291	0.863	0.639	0.998	1.000										
(8) Log Bank Size	0.017	-0.009	0.224	-0.012	0.139	0.096	0.098	1.000									
(9)Log Bank Portfolio Size	0.015	-0.019	0.239	-0.010	0.162	0.111	0.114	0.984	1.000								
(10) Bank Efficiency	0.001	0.027	0.010	-0.001	0.007	0.005	0.005	0.011	0.014	1.000							
(11) Deposits to Loans	0.001	0.005	0.009	0.009	0.089	0.052	0.047	0.328	0.261	-0.018	1.000						
(12) Return on Assets	-0.251	-0.250	-0.012	0.003	0.032	0.016	0.016	0.168	0.187	-0.006	-0.040	1.000					
(13) Return on Equity	0.163	0.156	0.062	-0.032	-0.014	-0.021	-0.022	0.027	0.028	-0.001	-0.016	-0.168	1.000				
(14) Profit Margin	-0.327	-0.315	0.007	-0.030	0.034	-0.004	-0.003	0.130	0.161	-0.002	0.006	0.760	-0.286	1.000			
(15) Capital Asset Ratio	-0.063	-0.029	-0.095	-0.011	-0.098	-0.071	-0.072	-0.243	-0.249	-0.012	-0.196	0.312	-0.109	0.142	1.000		
(16) Debt to Equity	-0.125	-0.119	0.045	-0.048	0.055	-0.002	0.002	0.111	0.113	0.006	0.135	0.007	-0.009	0.089	-0.225	1.000	
(17) Total Country Sustainability	0.006	0.028	0.040	-0.123	-0.182	-0.174	-0.120	0.018	0.039	0.009	-0.101	0.017	-0.030	0.021	-0.012	0.066	1.000

### 5.3. Empirical Model

This paper aims at answering the research questions: What is the relationship between the ESG performance of financial institutions and their credit risk and financial performance? How does this relationship depend on the country sustainability ratings?

#### 5.3.1. OLS Model Specifications

Therefore, the empirical model will be specified in a way that includes the variables mentioned in section 5.1. which serve as proxy for the indicators of interest. The OLS model equation is constructed as below:

$$\text{Portfolio at risk over 90 days}_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 Y_{it} + \beta_3 Z_i + \beta_4 X * Z + \gamma_r + \tau_l + \nu_p + \varepsilon_i, \quad (1)$$

where,  $i$  corresponds to each financial institution and  $t$  denotes the year.  $X$  represents the financial institution ESG-related variable, which can be the total ESG score, or separate ESG components;  $Y$  represents financial institution financial indicator variables;  $Z$  represents the natural logarithm of the country ESG score;  $X*Z$  represents the interaction term between the ESG score and the GSCI score, which is expressed as the natural logarithm of the product of the two scores; and  $\gamma_r$ ,  $\tau_l$ ,  $\nu_p$  represent each the region, legal status and profit status fixed effects respectively. Time fixed effects are not included, as the testparm joint test confirms they are not needed as the coefficients for the year dummies are all 0 (see Appendix 10.4). Robustness checks models will use Portfolio at risk over 30 days as a dependent variable.

To assess the relationship between ESG performance and profitability of financial institutions, the following OLS model is specified:

$$\text{Profitability}_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 Y_{it} + \beta_3 Z_i + \beta_4 X * Z + \gamma_r + \tau_l + \nu_p + \varepsilon_i, (2)$$

where, i corresponds to each financial institution and t denotes the year. ESG represents variations of the financial institution sustainability performance; Y represents additional financial institution financial variables; Z represents the country ESG score; X\*Z represents the interaction term between the ESG score and the GSCI score, which is expressed as the natural logarithm of the product of the two scores; and  $\gamma_r, \tau_l, \nu_p$  represent each the region, legal status and profit status fixed effects respectively. Robustness checks are conducted for the score of separate ESG component groups: governance, social and environmental performance scores.

### 5.3.2. Probit Model Specification

The OLS models assume a linear relationship, which may not always hold true. Therefore, a probit model is used for robustness checks, where a new binary variable is generated to capture credit risk: lowPAR90, which takes the value 1 if Portfolio at Risk 90 days is lower of equal than the sample median (0.0199) and it takes the value 0 otherwise.

$$\text{Low Par 90}_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 Y_{it} + \beta_3 Z_i + \beta_4 X * Z + \gamma_r + \tau_l + \nu_p + \varepsilon_i, (3)$$

where, i corresponds to each financial institution and t denotes the year. X represents the financial institution ESG-related variable, which can be the total ESG score, or separate ESG components; Y represents financial institution financial indicator variables; Z represents the country ESG score; X\*Z represents the interaction term between the ESG score and the GSCI score, which is expressed as the natural logarithm of the product of the two scores; and  $\gamma_r, \tau_l, \nu_p$  represent each the region, legal status and profit status fixed effects respectively. The probit model is also run using Low Par 30 as a dependent variable.

In order to assess the relationship between ESG performance and profitability, the following probit model is specified, where a new variable High Profitability is created, which takes the value 1 if the profitability is higher or equal than the median, and 0 otherwise. Moreover, other ESG cutoff points for independent variables are created by using quartiles based on the ESG score distribution.

$$\mathbf{High\ Profitability}_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 Y_{it} + \beta_3 Z_i + \beta_4 X * Z + \gamma_r + \tau_l + \nu_p + \varepsilon_i, \quad (4)$$

where,  $i$  corresponds to each financial institution and  $t$  denotes the year.  $ESG$  represents the sustainability performance of the financial institutions;  $Y$  represents additional control financial institution variables;  $Z$  represents the country ESG score;  $X*Z$  represents the interaction term between the ESG score and the GSCI score, which is expressed as the natural logarithm of the product of the two scores; and  $\gamma_r, \delta_c, \tau_l, \nu_p$  represent each the region, legal status and profit status fixed effects respectively.

Marginal effects are computed in all probit models, in order to assess the magnitude of the associations between the dependent and independent variables.

### 5.3.3. Model Specification Tests

Standard errors are clustered at the level of the financial institution as there are multiple observations for a specific financial institution. Moreover, I find heteroskedasticity present when testing for it and conduct OLS and FE regressions using robust standard errors.

As shown in section 6.1. of results, some model variations include fixed effects to control for specific regional, legal status and profit status factors that could affect credit risk and profitability of financial institutions (i.e., regulations, policy, cultural factors etc). After comparing the xtreg

fixed effect and random effects regressions by performing a Hausman test, the result turned a p-value of 0.0000, which indicates that the fixed effects specification is a better model (see Appendix 10.3). A fixed effects model can take in consideration regional, or other financial institution differences, such as their legal and profit status. Therefore, I consider the variations including fixed effects among the primary specified models. However, the random effects models are still present in all the results tables, as they can also fit the data, considering potential correlations between independent variables, and other non-observed regional, country or financial institution effects. The  $R^2$  of the main regressions varied from 0.011 to 0.1695, indicating low-to-moderate explanatory power of model specification. The sample size of a minimum of 1648 observations is adequate for a power of 0.8 as shown in the power test. Some model variations have a higher number of observations which is above 2500.

## **VI. Results**

### **6.1. Results**

#### **6.1.1. Results Corresponding to Model Specifications (1) & (3) – ESG Total Score**

*What is the relationship between the ESG performance of financial institutions and their credit risk? How does this relationship depend on country sustainability ratings?*

Results shown from *Table 6* at the OLS models (1), (2) and (3) indicate that the **ESG score** variable is negatively associated with Portfolio at Risk 90 days (PAR90), indicating that higher ESG score is associated with lower PAR90, thus better credit risk profile. However, this relationship is not statistically significant and has a small magnitude. The assumptions for a continuous ESG variable may be too strong; therefore, in the models (4)-(10) I relax these assumptions and consider ESG as

a categorical variable with two different versions of cutoff points. In models (4)-(6), *High ESG Score* is a dummy variable which takes the value 1 if the ESG score is above the median, and 0 otherwise.

These coefficients are still not significant. Therefore, for the models (7)-(10), the ESG score is divided in quartiles, with the first quartile grouping the financial institutions with the lowest ESG performance, and the fourth quartile grouping those with the highest ESG performance. The first quartile is the omitted reference quartile. Results show that the *Third ESG Quartile* coefficients are negative and significant, even when controlling for financial institution financial performance data (model (8)) and also when including the regional, legal status and profit status fixed effects and controlling for country sustainability score (model (9)). As model (9) accounts for regulation, cultural, legal and profit form differences among different regions and financial institutions, this will be the main specified model.

The results from this model indicate significant evidence that for the financial institutions in the third ESG quartile ( $20 < \text{ESG score} \leq 24$ ), their credit risk performance as measured by PAR90 is better than financial institutions in the first ESG quartile – the omitted quartile, holding the other variables at their means.

These results are consistent with the probit model (*Table 7*), model (7)-(10) where the linear OLS assumptions are relaxed. Financial institutions in the third ESG quartile have a higher probability to predict Low PAR90 loans, as compared to the first ESG quartile. In the probit model, financial institutions in the second ESG quartile are also significantly positively associated with Low PAR90

if I do not include fixed effects. However, in model (10) when the interaction term is included, these coefficients for the second and third ESG quartiles cease to be significant.

In both, the OLS and probit models, the Fourth ESG Quartile results are not significant. This shows that there seems to be a 'sweet' spot for financial institutions where their ESG performance is associated with better credit risk profile of their portfolios, while controlling for other regional or financial institution characteristics. If they perform at a minimum level (First ESG Quartile) or are top performers (Fourth ESG Quartile), then the marginal effects will not relate with significant credit risk improvement.

The **Log Country Score** is negative, indicating that financial institutions that operate in countries with a higher sustainability performance, are associated with lower PAR90, but it is only significant in OLS models when fixed effects are included, without the interaction variable, such as in model (9). It also appears significant in all of the probit models, reflecting the same association with credit risk as in the OLS models.

In order to understand how the country sustainability score may impact the ESG score of the financial institutions, the interaction term is included and from the results it can be seen that in all OLS models (1)-(10), this coefficient is positive, but significant, indicating that the effect of individual financial institutions ESG efforts towards improving credit risk portfolio performance is weaker in countries where there is already a good sustainability framework in place, but not in a significant way. The sign of the association aligns with previous findings in the literature (Xiao, et al., 2017), which suggests that financial institutions in countries with lower level of sustainability performance have more space and potential to leverage their ESG efforts towards credit risk improvement. However, differently from those studies, I do not find this association significant.

These results are also confirmed by the probit models, where the interaction term is also not significant.

### ***Interpreting heterogeneous institutional effects on credit risk performance***

***ROE and profit margin*** are both significant variables in all OLS regressions, where ROE is positively associated with PAR90, while profit margin is negatively associated. This means that financial institutions with lower ROE and higher profit margins have lower credit risk profiles. The profit margin results differ from the literature, according to which higher risk should generate higher profit margins. However, to gain better clarity, one should also consider the composition of the financial institutions' income, by accounting for donations or fee income, which is outside the scope of this paper. The profit margin results are consistent in the probit models as well, while the ROE probit coefficients are not significant.

***Bank portfolio size*** is positive and significant. A larger portfolio size is associated with higher credit risk. The effect is larger when including fixed effects. These results are also confirmed by the probit models, as well as OLS robustness checks (see Appendix 10.7), where bank portfolio size is defined as the ratio of the financial institution GLP to the average GLP of financial institutions in the sample.

***Efficiency, deposits-to-loans and ROA*** coefficients are not significant in the OLS primary specified models. When linearity assumptions are relaxed in the probit models, there is evidence of a significant relationship of deposits-to-loans and debt-to-equity variables with credit risk in all the variations (1) to (10) in *Table 7*. Moreover, a higher deposit-to-loan ratio is associated with higher PAR90. In order to interpret the reasons for this, further research can be conducted in terms of

portfolio diversification or other unobserved variables in this regression which may impact credit risk.

*Capital-to-asset ratio* coefficients are negative, but not significant, in the OLS models. In the probit *Table 7*, the coefficients are negative and significant only in model (2) where there are no fixed effects included and point to lower capitalized FIs being associated with a lower probability for a low PAR90. However, when controlling for regional effects of other regulation heterogeneity captured by legal status or profit status fixed effects, these coefficients again become not significant.

Overall, our main specification model indicates there is evidence of a positive relationship between a better ESG performance and a solid credit risk profile for financial institutions in the third ESG quartile ( $20 < \text{ESG score} \leq 24$ ). This evidence is also confirmed by the probit model, which pointed to higher ESG scores having a higher predicted probability for lower PAR90. In addition, a financial institution operating in a country with a high sustainability score is associated with higher probability of having a more solid credit risk profile when the interaction term between ESG and country GSCI scores is not included, and the ESG coefficient magnitude of second and third ESG quartile financial institutions is lower. These main results align with the hypothesis 1( a) of this paper which states that financial institutions with higher ESG scores, have a more solid credit risk profile than financial institutions with a lower ESG score. However, there is no significant evidence to confirm hypothesis 1 (b) assumption that this positive relationship is stronger if the financial institution operates in a country with a high GSCI sustainability score.

Table 6 – OLS Model For Equation (1)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	PAR90	PAR90	PAR90	PAR90	PAR90	PAR90	PAR90	PAR90	PAR90	PAR90
ESG	-.000064 (.000452)	-.000357 (.000376)	-.001231 (.001353)							
High ESG Score				.000114 (.004243)	-.003793 (.003764)	-.006172 (.004984)				
Second ESG Quartile							-.007175 (.006541)	-.007574 (.006323)	-.005105 (.006388)	-.008089 (.007759)
Third ESG Quartile							-.008846* (.005314)	-.013916*** (.005152)	-.011827** (.004989)	-.017068** (.008271)
Fourth ESG Quartile							-.001275 (.006145)	-.005562 (.005043)	-.005379 (.004933)	-.011073 (.010989)
Log ESGxCount. Sust.			.016068 (.018879)			.002976 (.005821)				.009594 (.008049)
Log Country Score			-.067375 (.045406)			-.05332 (.037645)			-.062309** (.030004)	-.058377 (.039053)
Log Bank Portfolio		.003057 (.002001)	.005629** (.002361)		-.000471 (.001711)	.005562** (.002355)		-.00034 (.001709)	.00159 (.001974)	.005457** (.002357)
Bank Efficiency		0 (1.000e-06)	-1.000e-06 (1.000e-06)		0 (1.000e-06)	-1.000e-06 (1.000e-06)		1.000e-06 (1.000e-06)	0 (1.000e-06)	-1.000e-06 (1.000e-06)
Deposits to Loans		-.000712 (.007954)	-.002957 (.007247)		.007682 (.006238)	-.002405 (.007274)		.007754 (.006166)	.006666 (.006728)	-.001823 (.007151)
ROA		-.031812 (.076867)	-.057497 (.076385)		.043605 (.02968)	-.058447 (.076471)		.043504 (.029874)	.040379 (.031886)	-.059635 (.076195)
ROE		.000751** (.000341)	.00074** (.00034)		.00101*** (.000178)	.000738** (.000341)		.000998*** (.000176)	.000998*** (.000183)	.000733** (.00034)
Profit Margin		-.044709** (.02012)	-.042595** (.019048)		-.039202*** (.0055)	-.042543** (.019064)		-.039066*** (.0055)	-.039123*** (.00525)	-.042043** (.01896)
Capital-to-Asset		-.003024 (.007543)	-.005719 (.007538)		-.01552 (.014696)	-.006182 (.007662)		-.016329 (.014791)	-.019875 (.015448)	-.006589 (.007637)
Debt-to-Equity		-.001051* (.000562)	-.001061* (.000555)		-.000457 (.000333)	-.001058* (.000557)		-.000464 (.000335)	-.00046 (.000338)	-.001065* (.000565)
_cons	.040846*** (.008746)	.003764 (.031714)	.193336 (.20854)	.040778*** (.003741)	.055488* (.02994)	.20655 (.216165)	.0441*** (.004879)	.057132* (.030369)	.356** (.168345)	.18708 (.206946)
Observations	1829	1648	1648	2816	2553	1648	2816	2553	2553	1648
R-squared	.000024	.128581	.166824	0	.118322	.166998	.00168	.120828	.143614	.169534
Regional FE	NO	NO	YES	NO	NO	YES	NO	NO	YES	YES
Legal Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES	YES
Profit Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES	YES

Robust standard errors are in parentheses

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Table 7 – Probit Model Marginal Effects for Equation (3)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Low PAR90	Low PAR90	Low PAR90	Low PAR90	Low PAR90	Low PAR90	Low PAR90	Low PAR90	Low PAR90	Low PAR90
ESG	.0119** (.0047)	.0117** (.0051)	-.0113 (.0214)							
High ESG Score				-.0096 (.0494)	.0168 (.0534)	-.0472 (.0966)				
Second ESG Quartile							.261*** (.0778)	.2284*** (.084)	.1171 (.088)	.1463 (.1195)
Third ESG Quartile							.2384*** (.0775)	.2681*** (.0844)	.1776** (.0884)	.2158 (.145)
Fourth ESG Quartile							.0768 (.0626)	.1094 (.0676)	.0875 (.0704)	.1615 (.1774)
Log ESGxCountry Sust.			.2324 (.3488)			.1021 (.1339)				-.1188 (.1785)
Log Country Score			1.3799** (.5667)			1.5184*** (.4671)			1.3459*** (.3535)	1.7074*** (.4835)
Log Bank Portfolio		.0055 (.0179)	-.0534** (.0213)		.0077 (.0137)	-.054** (.0212)		.0057 (.0138)	-.0429*** (.0161)	-.0532** (.0213)
Bank Efficiency		0 (.0001)	0 (.0001)		0 (.0001)	0 (.0001)		-0.0001 (.0001)	0 (.0001)	0 (.0001)
Deposits to Loans		-.3468*** (.075)	-.3301*** (.0999)		-.4843*** (.0617)	-.3267*** (.1)		-.4907*** (.0621)	-.4635*** (.0804)	-.3407*** (.1003)
ROA		1.2304** (.5949)	1.8169*** (.6148)		-.1161 (.309)	1.8049*** (.6152)		-.1067 (.3092)	-.1664 (.3161)	1.8372*** (.6144)
ROE		-.0043 (.0171)	-.0093 (.0281)		-.011 (.0247)	-.0094 (.028)		-.0118 (.0254)	-.0256 (.0279)	-.0095 (.0285)
Profit Margin		.1677 (.1129)	.1429 (.1186)		.1831** (.0846)	.144 (.1187)		.1794** (.0844)	.2358*** (.0875)	.1362 (.1185)
Capital-to-Asset		-.2728** (.1172)	-.1302 (.1235)		-.145 (.0982)	-.1328 (.1234)		-.1232 (.0986)	.0469 (.1056)	-.1223 (.1236)
Debt-to-Equity		.0161*** (.0051)	.0171*** (.0052)		.0123*** (.004)	.0172*** (.0052)		.0126*** (.004)	.0123*** (.0039)	.0173*** (.0052)
_cons	-.2991*** (.0976)	-.2926 (.3141)	-8.3494*** (2.6259)	-.1122*** (.0415)	-.1129 (.2367)	-8.1998*** (2.576)	-.2384*** (.0539)	-.2082 (.2413)	-6.8353*** (1.9364)	-7.5519*** (2.5857)
Observations	2004	1749	1749	3115	2724	1749	3115	2724	2724	1749
Pseudo R <sup>2</sup>	.0023	.0283	.118	0	.023	.118	.0041	.0265	.0988	.119
Regional FE	NO	NO	YES	NO	NO	YES	NO	NO	YES	YES
Legal Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES	YES
Profit Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES	YES

Standard errors are in parentheses

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

### 6.1.2. Results Corresponding to Model Specifications (1) & (3) –Score of Individual ESG Components

After obtaining significant results of positive ESG performance and PAR90 regarding the institutions that are included in the second ESG quartile, I investigate further zooming into the specific components of social, environmental and governance performance of ESG, adding a granular color to this analysis. The approach followed is the same initially with the OLS model, using a linear assumption where different continuous and discrete ESG components variations are included. Then, the linearity assumption is relaxed and probit models are specified. The social and governance scores of financial institutions are in quartiles, whereas the environmental score is represented in three groups, due to lower environmental core variation in the data (score of 1 to score of 4). The first quartiles of each represent the omitted reference variables. *Table 8* and *Table 9* show the respective OLS and probit results.

In *Table 8*, with the OLS specification, models (1) - (3) use the **social, environmental and governance scores** as continuous variables. There is significant evidence of governance coefficients being positively associated with credit risk performance in models (1) and (2). However, when fixed effects are added, then the coefficient becomes insignificant. Models (4)-(7) regress PAR90 against dummy variables High Social, High Environmental and High Governance using their respective medians as cutoff points. There are significant results reported in model (5) for the social and governance components being positively associated with better credit risk performance.

Models (7)-(9) break these indicators even further into quartiles and thirds (in the environmental performance score). Significant results for the third environmental group and the fourth governance quartile are reported, which point to again a positive relationship of their performance with credit

risk performance. However, considering the low variation of these smaller subgroups, model (6) is considered as the primary specified model in this group of regressions.

Models (1) - (3) of the probit specifications in *Table 9* points to significant relationship of the governance performance captured by continuous score variables and credit risk, which is in line with the previous OLS model, where financial institutions with strong governance perform better in terms of credit risk. Yet, governance coefficients become insignificant once fixed effects are added in the models. The same pattern is seen when using dummy variables and quartiles in the models (4)-(7) and (8)-(10) respectively. Moreover, in models (5) and (6), high social and high governance performance are associated with lower PAR90. When the interaction variable is added in the regressions, these coefficients are not significant.

The findings regarding the **country sustainability score** significant and positively related with credit risk performance in the main model specified (6) which included fixed effects, but not the interaction term, in line with previous results.

*Table 10* in Appendix 10.5 reports results of even more **granular OLS regressions** of PAR90 against 44 individual ESG indicators, which are used to construct the ESG scores used in this paper. Financial institutions which have social goals to offer more housing products; support job creation; target the Low-Middle Income (LMI) communities are associated with higher PAR90 levels.

Whereas financial institutions that finance start up projects; take social non-financial initiatives such as health education and adult education programs; have gender equality policy goals; have employee social-oriented and grievance HR policies and have protection clauses against client over-indebtedness are associated with lower PAR90 levels.

Table 8 – OLS Model For Equation (1) – Individual ESG Components

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	PAR90	PAR90	PAR90	PAR90	PAR90	PAR90	PAR90	PAR90	PAR90	PAR90
Social	.000398 (.000812)	.00003 (.000651)	-.001601 (.001669)							
Environmental	.002761 (.003594)	.002326 (.002907)	.001553 (.002872)							
Governance	-.001418** (.00059)	-.00154*** (.000576)	-.002349 (.001485)							
Log ESGxCountry Sust.			.023601 (.020401)				.008324 (.007481)			.017134 (.014728)
Log Country Score			-.073603 (.04648)			-.061181** (.030127)	-.056087 (.036851)			-.065423* (.034765)
High Social				-.004922 (.004367)	-.006415* (.003464)	-.006268* (.003233)	-.006526 (.00457)			
High Environmental				.004946 (.004293)	.004495 (.004066)	.003592 (.004272)	.000259 (.004903)			
High Governance				-.00528 (.0042)	-.007824** (.003664)	-.007133* (.003875)	-.009811 (.00665)			
2 <sup>nd</sup> Quartile Social								-.001359 (.006534)	-.003576 (.005032)	-.006981 (.009461)
3 <sup>rd</sup> Quartile Social								-.006688 (.005472)	-.008044 (.005153)	-.013469 (.011631)
4 <sup>th</sup> Quartile Social								-.003904 (.006576)	-.008439 (.005186)	-.015731 (.013805)
2 <sup>nd</sup> Third Environment								-.00119 (.005971)	-.000161 (.005169)	-.002312 (.005426)
3 <sup>rd</sup> Third Environment								.010002* (.005531)	.009695** (.004851)	.00304 (.006325)
2 <sup>nd</sup> Quartile Governance								.002139 (.006825)	.002318 (.006084)	-.001481 (.007766)
3 <sup>rd</sup> Quartile Governance								-.005759 (.006433)	-.005434 (.00585)	-.00961 (.009762)
4 <sup>th</sup> Quartile Governance								-.00866 (.007343)	-.01202* (.006265)	-.017696 (.011146)
_cons	.042493*** (.007793)	.006346 (.032634)	.176473 (.208093)	.043132*** (.004979)	.059048** (.029577)	.350382** (.168392)	.181378 (.221867)	.043734*** (.007069)	.060474** (.029011)	.1697 (.227016)
Observations	1829	1648	1648	2816	2553	2553	1648	2816	2553	1648
R-squared	.004133	.132283	.169061	.002103	.12206	.145024	.169506	.004319	.124432	.171722
Regional FE	NO	NO	YES	NO	NO	YES	YES	NO	NO	YES
Legal Status FE	NO	NO	YES	NO	NO	YES	YES	NO	NO	YES
Profit Status FE	NO	NO	YES	NO	NO	YES	YES	NO	NO	YES

Robust standard errors are in parentheses

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Table 9 – Probit Marginal Effects For Equation (3) – Individual ESG Components

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Low_PAR90	Low_PAR90	Low_PAR90	Low_PAR90	Low_PAR90	Low_PAR90	Low_PAR90	Low_PAR90	Low_PAR90	Low_PAR90
Social	.005 (.0066)	.0085 (.0072)	-.0017 (.0227)							
Environmental	-.0361 (.0295)	-.0454 (.033)	-.0399 (.0377)							
Governance	.0336*** (.01)	.027** (.011)	-.0186 (.0248)							
Log ESGxCountry Sust.			.1896 (.3562)				-.0231 (.1386)			.2078 (.2233)
Log Country Score			1.4266** (.5704)			1.3188*** (.3533)	1.5963*** (.4675)			1.3952*** (.5035)
High Social				.093** (.0452)	.1196** (.0488)	.0707 (.0523)	.0633 (.0886)			
High Environmental				-.1468*** (.0502)	-.139** (.0549)	-.044 (.0579)	-.0236 (.0669)			
High Governance				.134*** (.0485)	.1438*** (.0523)	.069 (.0544)	.0455 (.0785)			
2 <sup>nd</sup> Quartile Social								.166*** (.0638)	.0849 (.0691)	-.1266 (.1247)
3 <sup>rd</sup> Quartile Social								.1848*** (.066)	.1443** (.0719)	-.0991 (.1513)
4 <sup>th</sup> Quartile Social								.1479** (.0638)	.1562** (.0691)	-.1093 (.1832)
2 <sup>nd</sup> Third Environment								-.0521 (.0634)	-.0552 (.0689)	-.0273 (.0756)
3 <sup>rd</sup> Third Environment								-.172*** (.0638)	-.1624** (.0693)	-.061 (.0908)
2 <sup>nd</sup> Quartile Governance								-.042 (.0731)	-.0191 (.0781)	-.0971 (.1012)
3 <sup>rd</sup> Quartile Governance								.1873** (.0788)	.2212*** (.0856)	.0071 (.1202)
4 <sup>th</sup> Quartile Governance								.1226 (.0751)	.1453* (.0804)	-.1509 (.1462)
_cons	-.327*** (.1048)	-.3586 (.3166)	-8.3071*** (2.6314)	-.1481*** (.0499)	-.1991 (.2379)	-6.661*** (1.9336)	-7.6561*** (2.5827)	-.2278*** (.0684)	-.2005 (.2428)	-8.2822*** (2.6167)
Observations	2004	1749	1749	3115	2724	2724	1749	3115	2724	1749
Pseudo R <sup>2</sup>	.0052	.0305	.1188	.0039	.0274	.0986	.1183	.007	.0291	.1197
Regional FE	NO	NO	YES	NO	NO	YES	YES	NO	NO	YES
Legal Status FE	NO	NO	YES	NO	NO	YES	YES	NO	NO	YES
Profit Status FE	NO	NO	YES	NO	NO	YES	YES	NO	NO	YES

Standard errors are in parentheses

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

### **6.1.3. Results Corresponding to Model Specifications (2) & (4) – ESG Total Score**

*What is the relationship between the ESG performance of financial institutions and their profitability? How does this relationship depend on country sustainability ratings?*

The ratios of *Return on Assets* (ROA), *Return on Equity* (ROE) and *Profit Margin* (PM) will be used as proxies of profitability. The OLS regressions reported in *Table 10*, and *Table 11* where ROA and ROE are dependent variables respectively do not show significant results on the ESG coefficients of interest in multiple variations. Therefore, I relax the linearity assumption and create dummy variables for ROA, ROE and PM using their respective means, as shown in *Table 12* and *Table 13*, which are also considered as the main results tables for this research question. Robustness checks with PM for both OLS and probit models are conducted in Section 6.2.

Results in *Table 12* show that the relationship between ESG and ROA is positive and significant in models (1) - (3). Financial institutions that have a higher ESG performance, have higher probabilities to have a higher ROA, all other controls held at their means. This result is positive also when adding fixed effects.

Models (4) - (6) where the ESG median is used as a cutoff point to create the dummies generate significant and positive coefficients when controls are added in models (5) and (6) reflecting that high ESG scores have higher probability to lead to higher ROA, other variable means being held constant. However, in the last three models (7) – (9) where High ROA is regressed against ESG Quartiles, only the Fourth ESG Quartile coefficient is positive and significant in model (9), at 10% significance level.

The *Log Country Sustainability* variable is not significant in any of the models in this table, thus not presenting any significant relationship with ROA. The interaction variable between GSCI and ESG is also not significant in any case.

Results in *Table 13* indicate positive and significant relationship of *ESG as a continuous variable, as well as ESG as a dummy variable* with ROE. Financial institutions with higher ESG scores have a higher probability of also generating higher ROE. Results with discrete variations of ESG are only significant if we do not control for fixed effects. Also, the Log Country Sustainability and interaction variables are again not significant.

Observing the empirical specification, it seems that to answer this second question related to the third and fourth hypothesis, probit models using *ESG score as a continuous variable* provide a better fit, consistent throughout different dependent variables indicating profitability such as ROA, ROE, and also PM (without fixed effects) as it will be shown in the next section with robustness checks.

*Capital-to-asset ratio* in both tables has significant coefficients, indicating that financial institutions which are higher capitalized, have higher ROA, but lower ROE. Moreover, in the models which do not include fixed effects, *Bank Portfolio Size* coefficients are positive and significant, showing that larger institutions are associated with higher ROA and ROE. These mixed results of the profitability indicators in the OLS and probit models are in line with the mixed evidence where ESG performance can either be considered an investment or an expense depending on the type of institution or time frame. The short-term or long-term aspects are not included in the model, as the data is unbalanced.

Overall, results indicate there is a positive relationship between ESG score and profitability, therefore confirming hypothesis 1(c).

Table 10 – OLS Model for Equation (2) – ROA

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROA	ROA	ROA	ROA	ROA	ROA	ROA	ROA	ROA
ESG	.000186 (.000399)	.000131 (.000401)	.000546 (.001391)						
High ESG Score				-.006793 (.005901)	-.003957 (.005701)	-.005369 (.005745)			
Second ESG Quartile							.001105 (.006911)	.004571 (.005997)	.01125 (.008033)
Third ESG Quartile							-.002877 (.007259)	-.002449 (.006926)	.002914 (.009745)
Fourth ESG Quartile							-.006285 (.008173)	-.001983 (.007775)	.007723 (.012376)
Log ESGxCountry Sust.			-.00755 (.019472)			.006426 (.007091)			-.004677 (.008754)
Log Country Score			.006837 (.042151)			-.005806 (.041245)			.005632 (.04167)
Log Bank Portfolio		.012584*** (.002554)	.012717*** (.00252)		.012531*** (.002926)	.012804*** (.002506)		.012539*** (.002884)	.012884*** (.002528)
Bank Efficiency		-1.000e-06 (1.000e-06)	-1.000e-06 (1.000e-06)		0 (2.000e-06)	-1.000e-06 (1.000e-06)		0 (2.000e-06)	-1.000e-06 (1.000e-06)
Deposits to Loans		-.010672 (.008509)	-.014813 (.011762)		-.004588 (.006485)	-.014646 (.011726)		-.004523 (.006532)	-.014863 (.011778)
Capital-to-Asset		.113042** (.048283)	.109513** (.047639)		.109043*** (.035066)	.109328** (.047565)		.109465*** (.035066)	.109681** (.047623)
Debt-to-Equity		.000779 (.000744)	.000791 (.000727)		.0003 (.000324)	.000787 (.000726)		.000305 (.000324)	.000806 (.000724)
_cons	.013858* (.008378)	-.228483*** (.054032)	-.208572 (.247849)	.01826*** (.00366)	-.22271*** (.053511)	-.24448 (.242387)	.016889*** (.005179)	-.225137*** (.052963)	-.222917 (.243269)
Observations	1870	1749	1749	2897	2724	1749	2897	2724	1749
R-squared	.000174	.162175	.184599	.000619	.066273	.184937	.000616	.066438	.186528
Regional FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Legal Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Profit Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES

Robust standard errors are in parentheses

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Table 11 – OLS Model for Equation (2) - ROE

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROE	ROE	ROE	ROE	ROE	ROE	ROE	ROE	ROE
ESG	-.021966 (.02539)	-.031902 (.03406)	-.069867 (.079008)						
High ESG Score				-.358045 (.330155)	-.382282 (.357994)	-.427091 (.412082)			
Second ESG Quartile							-.597975 (.556353)	-.71878 (.658694)	-1.115435 (1.02924)
Third ESG Quartile							-.515684 (.554021)	-.638687 (.659103)	-1.165492 (1.165626)
Fourth ESG Quartile							-.589323 (.552584)	-.597543 (.566212)	-1.25588 (1.222529)
Log ESGxCountry Sust.			.512671 (.736468)			-.154697 (.194229)			
Log Country Score			-1.960912 (1.234905)			-1.205638 (.785813)			
Log Bank Portfolio		.046253 (.052513)	.061536 (.05871)		.029295 (.04326)	.05805 (.059268)		.030554 (.041997)	.049014 (.06095)
Bank Efficiency		-.000039 (.000032)	-.000042 (.000038)		-.000025 (.000023)	-.000033 (.00003)		-.000024 (.000021)	-.000028 (.000025)
Deposits to Loans		-.592882 (.513333)	-.571475 (.460804)		-.401839 (.380368)	-.538204 (.430197)		-.403278 (.379532)	-.517982 (.406623)
Capital-to-Asset		-2.919333 (3.330707)	-2.837772 (3.280575)		-2.127436 (2.322888)	-2.87311 (3.315938)		-2.149606 (2.340322)	-2.881952 (3.314321)
Debt-to-Equity		-.029347 (.048031)	-.027667 (.048305)		-.022842 (.018817)	-.02757 (.048166)		-.023272 (.019127)	-.0288 (.04903)
_cons	.668035 (.652077)	1.209042 (2.43935)	7.9402 (5.405699)	.406962 (.329169)	.788232 (1.793047)	8.319258 (5.553961)	.629597 (.551777)	1.023749 (1.992301)	7.195026 (5.064114)
Observations	1870	1750	1750	2897	2726	1750	2897	2726	1750
R-squared	.0004	.014777	.01783	.00096	.012187	.018029	.001755	.01318	.019595
Regional FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Legal Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Profit Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES

Robust standard errors are in parentheses

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Table 12 – Probit Marginal Effects for Equation (4) – ROA

	(1) High ROA	(2) High ROA	(3) High ROA	(4) High ROA	(5) High ROA	(6) High ROA	(7) High ROA	(8) High ROA	(9) High ROA
ESG	.0088* (.0047)	.0125** (.0051)	.0381* (.0209)						
High ESG Score				.0686 (.0493)	.107** (.0534)	.1934** (.0934)			
Second ESG Quartile							.022 (.0775)	.0802 (.084)	.1619 (.1158)
Third ESG Quartile							.0683 (.0772)	.1322 (.0842)	.2272 (.1408)
Fourth ESG Quartile							.0623 (.0621)	.1042 (.0672)	.3286* (.1718)
Log ESGxCountry Sust.			-.522 (.3387)			-.1197 (.1286)			-.2054 (.172)
Log Country Score			.1033 (.5508)			-.3441 (.4509)			-.2265 (.4664)
Bank Portfolio Size		.1337*** (.0178)	.1478*** (.0209)		.1*** (.0138)	.1503*** (.0208)		.0996*** (.0138)	.1502*** (.0209)
Bank Efficiency		-.0001 (.0001)	-.0001 (.0001)		-.0001 (.0001)	-.0001 (.0001)		-.0001 (.0001)	-.0001 (.0001)
Deposits to Loans		-.4005*** (.0807)	-.3135*** (.0991)		-.3543*** (.0639)	-.328*** (.0989)		-.3538*** (.064)	-.3249*** (.0994)
Capital-to-Asset		1.491*** (.1726)	1.497*** (.1776)		1.3206*** (.1333)	1.5263*** (.1775)		1.3239*** (.1339)	1.5073*** (.1783)
Debt-to-Equity		-.0086* (.0046)	-.008* (.0046)		-.0106*** (.004)	-.0079* (.0045)		-.0105*** (.004)	-.0079* (.0046)
_cons	-.0705 (.0973)	-2.6961*** (.327)	.2306 (2.5446)	.0382 (.0414)	-1.9378*** (.2475)	-.0981 (2.5003)	.0409 (.0534)	-1.942*** (.2509)	-.0915 (2.5119)
Observations	2004	1800	1800	3115	2800	1800	3115	2800	1800
Pseudo R <sup>2</sup>	.0013	.0696	.0856	.0005	.0601	.086	.0003	.0599	.0857
Regional FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Legal Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Profit Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES

Standard errors are in parentheses

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Table 13 – Probit Marginal Effects for Equation (4) – ROE

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	High ROE	High ROE	High ROE	High ROE	High ROE	High ROE	High ROE	High ROE	High ROE
ESG	.0183*** (.0047)	.015*** (.0051)	.0406* (.0209)						
High ESG Score				.1074** (.0493)	.123** (.0527)	.1763* (.0976)			
Second ESG Quartile							.0638 (.0775)	.0826 (.0826)	.0795 (.1143)
Third ESG Quartile							.1551** (.0773)	.1149 (.0834)	.1223 (.1396)
Fourth ESG Quartile							.0844 (.0621)	.1241* (.0663)	.2716 (.1706)
Log ESGxCountry Sust.			-.5354 (.3401)			-.092 (.1364)			-.1072 (.1721)
Log Country Score			.465 (.548)			-.3222 (.4691)			.0371 (.4601)
Bank Portfolio Size		.1716*** (.0173)	.1796*** (.0203)		.1357*** (.0132)	.226*** (.0219)		.1356*** (.0133)	.181*** (.0203)
Bank Efficiency		-.0001 (.0001)	-.0001 (.0001)		-.0001 (.0001)	-.0001 (.0001)		-.0001 (.0001)	-.0001 (.0001)
Deposits to Loans		-.1863** (.0768)	-.1207 (.0963)		-.1399** (.0589)	-.2368** (.1059)		-.1395** (.059)	-.1259 (.0965)
Capital-to-Asset		-.1788* (.1075)	-.1357 (.1113)		-.1829** (.0928)	-.1655 (.1146)		-.1853** (.0929)	-.1362 (.1114)
Debt-to-Equity		.002 (.0041)	.0026 (.0041)		-.0015 (.0026)	-.0023 (.0046)		-.0015 (.0026)	.0025 (.0041)
_cons	-.2276** (.0975)	-2.9747*** (.304)	-1.849 (2.5001)	.0109 (.0414)	-2.1832*** (.2291)	-1.141 (2.5736)	.0091 (.0533)	-2.1869*** (.2325)	-2.439 (2.4686)
Observations	2004	1800	1800	3115	2800	1686	3115	2800	1800
Pseudo R <sup>2</sup>	.0055	.0547	.0709	.0011	.0351	.1141	.001	.0346	.0707
Regional FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Legal Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Profit Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES

Standard errors are in parentheses

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

#### **6.1.4. Results Corresponding to Model Specifications (2) & (4) –Individual ESG Components**

After obtaining significant results for the ESG score coefficients when in the form of a continuous variable, from the Probit models, I investigate further to understand which of the ESG components is associated with profitability metrics. *Table 14* and *Table 15* report probit marginal effects for High ROA and High ROE as dependent variables.

Both tables show positive and significant relationship between environmental performance and high ROA and ROE respectively in models (1) – (3). Governance performance is also significant and positively associated with high ROE in the models (1) - (3) and with high ROA in model (2) without fixed effects. Financial institutions that focus their efforts in environmental and governance performance, have a higher probability of achieving higher profitability metrics. Moreover, the Fourth Social Quartile coefficients are significant for ROE and ROA in all (7)-(9) models. The Second Quartile Environment and Third Quartile Governance is also significantly and positively associated with High ROE.

Country sustainability score is not significant in these regressions. However, the interaction variable is significant in model (9) for both high ROA and ROE. Its sign is negative, showing the relationship between ESG quartiles and profitability indicators is weaker in countries with higher sustainability score. Robustness checks will be conducted in Section 6.2 with PM as a dependent variable. The OLS regressions for individual ESG components also do not produce significant results (see Appendix 10.6).

*Table 14 - Probit Marginal Effects For Equation (4) – Individual ESG Components (High ROA)*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	High ROA	High ROA	High ROA	High ROA	High ROA	High ROA	High ROA	High ROA	High ROA
Social	.005 (.0066)	.0068 (.0071)	.0274 (.0222)						
Environmental	.0702** (.0297)	.0614* (.0334)	.0797** (.0369)						
Governance	.0073 (.01)	.0182* (.011)	.0363 (.0242)						
Log ESGxCount Sust			-.4303 (.3472)			-.1032 (.133)			-.4326** (.2156)
Log Country Score			.0247 (.5542)			-.3505 (.4516)			.01 (.4878)
High Social				.0736 (.0451)	.1097** (.0488)	.1069 (.0862)			
High Environm.				.0249 (.0501)	.0157 (.0546)	.0551 (.0648)			
High Governance				-.0117 (.0483)	.0494 (.0521)	.1225 (.0759)			
2 <sup>nd</sup> Quartile Social							.1096* (.0634)	.0948 (.0688)	.2147* (.1208)
3 <sup>rd</sup> Quartile Social							.0691 (.0656)	.1126 (.0719)	.3085** (.1465)
4 <sup>th</sup> Quartile Social							.1669*** (.0634)	.1755** (.0686)	.4047** (.1785)
2 <sup>nd</sup> Third Environment							.0596 (.0634)	.0692 (.0688)	.0485 (.0725)
3 <sup>rd</sup> Third Environment							.0221 (.0636)	.0134 (.0693)	.1304 (.0896)
2 <sup>nd</sup> Quartile Governance							.0205 (.0729)	.0113 (.0784)	.1071 (.0977)
3 <sup>rd</sup> Quartile Governance							.0403 (.0788)	.1257 (.0854)	.2382** (.1155)
4 <sup>th</sup> Quartile Governance							.0022 (.0749)	.0517 (.0806)	.269* (.1417)
_cons	-.1238 (.1048)	-2.6643*** (.3282)	.001 (2.5549)	.0413 (.0497)	-1.9526*** (.2489)	-.2281 (2.5106)	-.0341 (.068)	-1.9653*** (.2532)	.2764 (2.5423)
Observations	2004	1800	1800	3115	2800	1800	3115	2800	1800
Pseudo R <sup>2</sup>	.0029	.0706	.0864	.0007	.0606	.0858	.0022	.062	.0875
FI Controls	NO	YES	YES	NO	YES	YES	NO	YES	YES
Regional FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Legal Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Profit Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES

*Standard errors are in parentheses*

*\*\*\* p<.01, \*\* p<.05, \* p<.1*

Table 15 - Probit Marginal Effects For Equation (4) – Individual ESG Components (High ROE)

	(1) High ROE	(2) High ROE	(3) High ROE	(4) High ROE	(5) High ROE	(6) High ROE	(7) High ROE	(8) High ROE	(9) High ROE
Social	-.0026 (.0066)	.0041 (.0071)	.0213 (.0222)						
Environmental	.1742*** (.0303)	.0934*** (.0332)	.113*** (.0368)						
Governance	.0386*** (.0102)	.0274** (.011)	.0425* (.0243)						
Log ESGxCount Sust			-.3917 (.348)			-.1382 (.1341)			-.5247** (.2172)
Log Country Score			.3314 (.5513)			.0523 (.4457)			.4791 (.483)
High Social				.0869* (.0451)	.0893* (.0483)	.0936 (.0861)			
High Environm.				.1076** (.0501)	.0614 (.054)	.1468** (.0642)			
High Governance				.0302 (.0484)	.0914* (.0517)	.2091*** (.0755)			
2 <sup>nd</sup> Quartile Social							.0762 (.0634)	.0768 (.0681)	.2303* (.1203)
3 <sup>rd</sup> Quartile Social							.0512 (.0657)	.0729 (.0707)	.3107** (.1459)
4 <sup>th</sup> Quartile Social							.1422** (.0635)	.1416** (.0679)	.4246** (.1784)
2 <sup>nd</sup> Third Environment							.2101*** (.0637)	.1344** (.0683)	.1302* (.0723)
3 <sup>rd</sup> Third Environment							.113* (.0637)	.0774 (.069)	.2556*** (.0894)
2 <sup>nd</sup> Quartile Governance							.0801 (.0729)	.0161 (.0774)	.1536 (.0967)
3 <sup>rd</sup> Quartile Governance							.2486*** (.0793)	.2339*** (.0848)	.3859*** (.1151)
4 <sup>th</sup> Quartile Governance							.0459 (.075)	.0695 (.0802)	.3579** (.1411)
_cons	-.4445*** (.106)	-2.9145*** (.3058)	-2.1335 (2.5109)	-.0461 (.0497)	-2.2276*** (.2305)	-2.3302 (2.4702)	-.1519** (.0681)	-2.2214*** (.235)	-1.7463 (2.5085)
Observations	2004	1800	1800	3115	2800	1800	3115	2800	1800
Pseudo R <sup>2</sup>	.0181	.0578	.0737	.0023	.036	.0742	.0068	.0385	.077
FI Controls	NO	YES	YES	NO	YES	YES	NO	YES	YES
Regional FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Legal Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Profit Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES

Standard errors are in parentheses

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

## 6.2. Robustness Checks and Other Tests

### 6.2.1. Robustness Checks Corresponding to Model Specifications (1) and (3)

I perform robustness Checks using Portfolio at Risk 30 days (PAR30) as a dependent variable in the OLS and probit models. The results from *Table 16* and *Table 17* are consistent with the results with PAR 90. There is evidence of positive relationship between the Third ESG Score Quartile and PAR30 in both the OLS and probit models (7) – (9). Again, probit models also find the Second ESG Quartile coefficients significant. This reaffirms previous results that there seems to be a ‘sweet’ ESG focus spot on financial institutions, which will lead to higher probabilities of lower PAR30. The probit model also finds the ESG Score as a continuous variable in models (1) and (2), where a higher ESG score is associated with better credit performance as measured by PAR30. Once fixed effects or the interaction term are added, this coefficient become insignificant.

The Log Country Sustainability Score is positive in the probit model, where it also seems to lower the Third ESG Quartile marginal effects magnitude, consistent with findings in our primary specification model. There is no evidence however in significant association of country sustainability and PAR 30 in the OLS model. The interaction term is also not significant in any of the regressions.

*Table 18 and Table 19* contain results from robustness regressions of PAR30 against individual ESG components. The results are consistent with findings with PAR90. The OLS model shows that high governance scores are positively associated with better credit risk performance. The probit model confirms previous results where higher social and governance performance are associated with higher probability for lower PAR30, while higher environmental performance

is associated with higher PAR30. Interestingly, the high environment score coefficient becomes insignificant when adding fixed effects in model (3). The log country sustainability score is significant and positive only in the probit model, whereas the interaction term is not significant.

In *Table 11* (see Appendix 10.5), I perform even more granular robustness checks regression using PAR30 as dependent variable. I find that consistent results with PAR90 regressions. Financial institutions that take social non-financial incentives such as adult education programs; have methods to account for poverty records of their clients; offer health-related financial products; have employee social-oriented and grievance HR policies and have protection clauses against client over-indebtedness are associated with lower PAR30 levels.

Also, consistent results with PAR90, show that financial institutions which have social goals to offer more housing products; support job creation; target the Low-Middle Income (LMI) communities and have rating systems for short-term loans are associated with higher PAR30 levels.

Table 16 – OLS Model for Equation (1) – PAR 30

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	PAR30	PAR30	PAR30	PAR30	PAR30	PAR30	PAR30	PAR30	PAR30	PAR30
ESG	-.000453 (.000483)	-.00064 (.000416)	-.001676 (.001512)							
High ESG Score				.00004 (.005)	-.003486 (.004397)	-.004328 (.006043)				
Second ESG Quartile							-.010052 (.007279)	-.009658 (.007177)	-.00391 (.007208)	-.005934 (.008669)
Third ESG Quartile							-.011408* (.006267)	-.016386*** (.006048)	-.01023* (.005827)	-.014242 (.009575)
Fourth ESG Quartile							-.001887 (.006821)	-.005716 (.005726)	-.004816 (.005521)	-.009309 (.012263)
Log ESGxCount. Sust.			.020923 (.021519)			-.001022 (.007213)				.005372 (.009616)
Log Country Score			-.061798 (.049352)			-.039301 (.041885)				-.044072 (.042893)
Bank Portfolio Size		.002245 (.00215)	.005068** (.002523)		-.002455 (.001942)	.004941* (.002515)		-.002285 (.00193)	.000068 (.002181)	.004884* (.002522)
Bank Efficiency		4.000e-06*** (1.000e-06)	3.000e-06*** (1.000e-06)		4.000e-06*** (1.000e-06)	3.000e-06*** (1.000e-06)		5.000e-06*** (1.000e-06)	4.000e-06*** (1.000e-06)	3.000e-06*** (1.000e-06)
Deposits to Loans		.002515 (.009482)	-.002953 (.008152)		.015628** (.007049)	-.002447 (.008235)		.015696** (.006932)	.006256 (.007337)	-.001936 (.008087)
ROA		-.063266 (.088457)	-.093 (.086632)		.041931 (.035106)	-.094072 (.08681)		.041816 (.035358)	.036783 (.038949)	-.095214 (.086523)
ROE		.000867** (.000344)	.00086** (.000339)		.001179*** (.000181)	.000861** (.000339)		.001162*** (.00018)	.001172*** (.000185)	.000857** (.000339)
Profit Margin		-.044844** (.021233)	-.042406** (.019817)		-.039086*** (.005761)	-.042307** (.019824)		-.03891*** (.005764)	-.039594*** (.005534)	-.041923** (.01974)
Capital-to-Asset		.007029 (.009754)	.003737 (.009228)		-.01374 (.016005)	.00329 (.009196)		-.014846 (.016154)	-.016198 (.016638)	.002975 (.009299)
Debt-to-Equity		-.001044* (.000553)	-.00108** (.000538)		-.000441 (.000327)	-.001075** (.00054)		-.000451 (.000331)	-.000442 (.000337)	-.001079** (.000547)
_cons	.062184*** (.00955)	.03332 (.03484)	.153016 (.23292)	.0561*** (.0043)	.100643*** (.03401)	.18557 (.239136)	.060527*** (.005405)	.102778*** (.03436)	.344816* (.192645)	.164855 (.231527)
Observations	1841	1651	1651	2827	2556	1651	2827	2556	2556	1651
R-squared	.000945	.118498	.168322	0	.095967	.167747	.00225	.09893	.15497	.169299
Regional FE	NO	NO	YES	NO	NO	YES	NO	NO	YES	YES
Legal Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES	YES
Profit Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES	YES

Robust standard errors are in parentheses

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Table 17 – Probit Model Marginal Effects for Equation (3) – PAR30

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	LowPAR30	LowPAR30	LowPAR30	LowPAR30	LowPAR30	LowPAR30	LowPAR30	LowPAR30	LowPAR30
ESG	.0179*** (.0047)	.0161*** (.0052)	-.008 (.0216)						
High ESG Score				.0234 (.0494)	.0514 (.0535)	-.0321 (.097)			
Second ESG Quartile							.3384*** (.078)	.3289*** (.0844)	.2197* (.1203)
Third ESG Quartile							.3252*** (.0777)	.3482*** (.0846)	.2633* (.1462)
Fourth ESG Quartile							.1158* (.0628)	1663** (.068)	.1726 (.1792)
Log ESGxCountry Sust.			.2562 (.3525)			1.293*** (.4717)			-.0668 (.1806)
Log Country Score			1.1935** (.5727)						1.4951*** (.4882)
Bank Portfolio Size		.0215 (.0182)	-.0264 (.0217)		.0251* (.0138)	-.0269 (.0216)		.0231* (.0139)	-.0243 (.0217)
Bank Efficiency		0 (.0001)	0 (.0001)		0 (.0001)	0 (.0001)		0 (.0001)	0 (.0001)
Deposits to Loans		-.3553*** (.0754)	-.2732*** (.0999)		-.5093*** (.0623)	-.271*** (.1001)		-.5169*** (.0628)	-.2877*** (.1004)
ROA		1.7401*** (.624)	2.3231*** (.6588)		-.0262 (.3007)	2.3188*** (.659)		-.018 (.3011)	2.3576*** (.6594)
ROE		-.0034 (.0093)	-.0051 (.0134)		-.0072 (.015)	-.0051 (.0134)		-.0069 (.0162)	-.0048 (.0133)
Profit Margin		.1298 (.1134)	.1157 (.1206)		.1859** (.0842)	.1162 (.1207)		.1801** (.084)	.1045 (.1205)
Capital-to-Asset		-.7618*** (.1706)	-.5219*** (.1824)		-.3753*** (.1205)	-.5261*** (.1823)		-.3467*** (.1211)	-.5124*** (.1828)
Debt-to-Equity		.0085* (.0046)	.0106** (.0047)		.01*** (.0038)	.0107** (.0047)		.0103*** (.0038)	.0109** (.0046)
_cons	-.3983*** (.0978)	-.4765 (.3286)	-8.2309*** (2.6614)	-.1314*** (.0415)	-.3441 (.2424)	-8.1197*** (2.6108)	-.2806*** (.0541)	-.4753* (.2471)	-7.5264*** (2.6223)
Observations	2004	1749	1749	3115	2724	1749	3115	2724	1749
Pseudo R <sup>2</sup>	.0052	.0376	.1297	.0001	.0265	.1297	.0069	.0324	.1319
Regional FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Legal Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Profit Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES

Standard errors are in parentheses

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Table 18 – OLS Model for Equation (1) – Individual ESG Components- PAR 30

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	PAR30	PAR30	PAR30	PAR30	PAR30	PAR30	PAR30	PAR30	PAR30
Social	.000271 (.000874)	-.000127 (.00072)	-.001839 (.001817)						
Environmental	.001067 (.003895)	.001271 (.003187)	.00034 (.003137)						
Governance	-.00213*** (.0007)	-.001976*** (.000697)	-.002806 (.001721)						
Log ESGxCountry Sust.			.026891 (.023087)			.005994 (.008301)			.017029 (.016368)
Log Country Score			-.066467 (.050357)			-.044685 (.040929)			-.05642 (.039187)
High Social				-.007571 (.004676)	-.008714** (.003964)	-.003866 (.005227)			
High Environm.				.0044 (.004958)	.004786 (.004731)	-.001805 (.005448)			
High Governance				-.006812 (.004581)	-.009154** (.004137)	-.012588* (.007087)			
2 <sup>nd</sup> Quartile Social							-.007748 (.00713)	-.009515 (.005802)	-.007091 (.010178)
3 <sup>rd</sup> Quartile Social							-.010883* (.00651)	-.011659* (.006278)	-.009848 (.012519)
4 <sup>th</sup> Quartile Social							-.010621 (.007165)	-.014716** (.005889)	-.015907 (.01484)
2 <sup>nd</sup> Third Environment							-.004314 (.006567)	-.00168 (.005924)	-.003969 (.006052)
3 <sup>rd</sup> Third Environment							.010331* (.006152)	.010362* (.005507)	.000052 (.006972)
2 <sup>nd</sup> Quartile Governance							.003415 (.007415)	.002731 (.006769)	-.001162 (.008671)
3 <sup>rd</sup> Quartile Governance							-.00872 (.007157)	-.008174 (.006655)	-.012388 (.010718)
4 <sup>th</sup> Quartile Governance							-.010158 (.008011)	-.01345* (.007056)	-.021676* (.012627)
_cons	.066035*** (.008836)	.034906 (.035749)	.138292 (.233002)	.060935*** (.005623)	.106202*** (.033713)	.159792 (.243854)	.064657*** (.007846)	.109132*** (.033282)	.142357 (.250691)
Observations	1841	1651	1651	2827	2556	1651	2827	2556	1651
R-squared	.004965	.12155	.169726	.002813	.100499	.171275	.006666	.10433	.173223
FI Controls	NO	YES	YES	NO	YES	YES	NO	YES	YES
Regional FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Legal Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Profit Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES

Robust standard errors are in parentheses

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Table 19 – Probit Marginal Effects for Equation (3) – Individual ESG Components- PAR 30

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	LowPAR30	LowPAR30	LowPAR30	LowPAR90	LowPAR30	LowPAR30	LowPAR30	LowPAR30	LowPAR30
Social	.0071 (.0066)	.0125* (.0072)	-.0003 (.0229)						
Environmental	-.0105 (.0296)	-.0367 (.0332)	-.0306 (.0382)						
Governance	.0447*** (.0101)	.0316*** (.011)	-.0139 (.025)						
Log ESGxCountry Sust.			.2214 (.3601)			-.0118 (.1397)			.0755 (.2248)
Log Country Score			1.2263** (.576)			1.4127*** (.4722)			1.3588*** (.5088)
High Social				.1218*** (.0452)	.1505*** (.0489)	.1014 (.0891)			
High Environm.				-.1213** (.0502)	-.1025* (.055)	.0169 (.0676)			
High Governance				.145*** (.0485)	.1555*** (.0524)	.0807 (.0788)			
2 <sup>nd</sup> Quartile Social							.2179*** (.0639)	.1378** (.0693)	-.023 (.1253)
3 <sup>rd</sup> Quartile Social							.232*** (.0662)	.1934*** (.0721)	.0457 (.1522)
4 <sup>th</sup> Quartile Social							.2026*** (.0639)	.2171*** (.0693)	.0663 (.1846)
2 <sup>nd</sup> Third Environment							.0188 (.0635)	.0211 (.0691)	.0554 (.076)
3 <sup>rd</sup> Third Environment							-.1905*** (.0639)	-.1677** (.0695)	-.0645 (.0919)
2 <sup>nd</sup> Quartile Governance							0 (.0733)	.0146 (.0784)	-.0488 (.1018)
3 <sup>rd</sup> Quartile Governance							.2222*** (.0789)	.2445*** (.0858)	.0635 (.1209)
4 <sup>th</sup> Quartile Governance							.1981*** (.0753)	.2165*** (.0806)	.0084 (.1469)
_cons	-.4612*** (.1051)	-.5365 (.3302)	-8.153*** (2.6679)	-.182*** (.05)	-.4397* (.2439)	-7.4123*** (2.6182)	-.3169*** (.0687)	-.4795* (.2492)	-7.8003*** (2.6514)
Observations	2004	1749	1749	3115	2724	1749	3115	2724	1749
Pseudo R <sup>2</sup>	.0086	.0396	.1302	.0043	.0313	.1304	.01	.0347	.1313
FI Controls	NO	YES	YES	NO	YES	YES	NO	YES	YES
Regional FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Legal Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Profit Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES

Standard errors are in parentheses

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

### **6.2.2. Robustness Checks Corresponding to Model Specifications (2) & (4)**

I perform robustness checks using Profit Margin (PM) as a dependent variable in the OLS and probit models. The results from the OLS models are again insignificant (see *Tables 12* and *14* in Appendix 10.6), which is consistent with the OLS results with ROA and ROE as dependent variables. The probit marginal effects results from *Table 20* and *Table 21* are consistent with the results with ROA and ROE if no controls are included. Models (1) shows evidence of positive relationship between ESG score and high PM. The regressions on ESG components show in a consistent way that governance performance is positively related to PM. Financial institutions which focus on environmental and governance performance, have higher probability of achieving higher PM. The Log Country Sustainability is not significant, whereas the interaction variable is only significant and negative in model (9) of the OLS specification in *Table 14* in the Appendix, again pointing to a weakening effect of the sustainability variables.

Overall, all robustness checks for the four main OLS and probit specifications (1) - (4) consistently show that financial institutions operating in the Third ESG Quartile, and have high governance and social performance, have better credit risk performance. Country sustainability is positively associated with lower credit risk but weakens the magnitude of the ESG coefficients. Moreover, financial institutions that have higher environmental and governance performance, are associated with higher profitability metrics. Country sustainability performance is positive and significant on probit models associated with credit risk, and not significant in models with profitability metrics as dependent variable. The interaction variable is significant only on the probit model with fixed effects, and its sign shows a weakening of the effect of the sustainability coefficients.

Table 20 – Probit Marginal Effects for Equation (4) – PM

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	High PM	High PM	High PM	High PM	High PM	High PM	High PM	High PM	High PM
ESG	.0083*	.0081	.0128						
	(.0047)	(.0052)	(.0211)						
High ESG Score				.0171	.05	.1095			
				(.0493)	(.0538)	(.0948)			
Second ESG Quartile							.088	.1131	.1542
							(.0775)	(.0848)	(.1183)
Third ESG Quartile							.0943	.1187	.1928
							(.0772)	(.085)	(.1436)
Fourth ESG Quartile							.0418	.0718	.2127
							(.0621)	(.0679)	(.175)
Log ESGxCountry Sust.			-.1679			-.0771			-.1635
			(.3414)			(.1302)			(.1747)
Log Country Score			-.3402			-.4583			-.3624
			(.562)			(.4608)			(.4766)
Bank Portfolio Size		.2432***	.2479***		.189***	.2485***		.1883***	.2495***
		(.019)	(.0221)		(.0142)	(.022)		(.0143)	(.0221)
Bank Efficiency		-.0001	-.0001		-.0001	-.0001		-.0001	-.0001
		(.0001)	(.0001)		(.0001)	(.0001)		(.0001)	(.0001)
Deposits to Loans		-.0408	-.0207		-.0357	-.0279		-.0353	-.029
		(.0762)	(.0943)		(.0599)	(.0942)		(.06)	(.0945)
Capital-to-Asset		1.9919***	2.0506***		1.6732***	2.0607***		1.6832***	2.0592***
		(.1865)	(.1938)		(.1384)	(.1934)		(.1388)	(.1942)
Debt-to-Equity		-.0061	-.0058		-.0067*	-.0057		-.0065*	-.0056
		(.0048)	(.0048)		(.0039)	(.0048)		(.0039)	(.0048)
_cons	-.0803	-4.7172***	-2.0026	.0382	-3.6184***	-1.9373	0	-3.6492***	-1.8346
	(.0972)	(.3526)	(2.5982)	(.0414)	(.2581)	(2.5567)	(.0533)	(.2616)	(2.5695)
Observations	2004	1800	1800	3115	2800	1800	3115	2800	1800
Pseudo R <sup>2</sup>	.0011	.1032	.1208	0	.0758	.1212	.0005	.0763	.1214
Regional FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Legal Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Profit Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES

Standard errors are in parentheses

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Table 21 – Probit Marginal Effects for Equation (4) –Individual ESG Components (High PM)

	(1) High PM	(2) High PM	(3) High PM	(4) High PM	(5) High PM	(6) High PM	(7) High PM	(8) High PM	(9) High PM
Social	-.0075 (.0066)	-.0032 (.0072)	.0008 (.0225)						
Environmental	.0842*** (.0297)	.0386 (.0338)	.0396 (.0373)						
Governance	.0298*** (.0101)	.0281** (.0112)	.0271 (.0245)						
Log ESGxCountry Sust.			-.1327 (.3502)			-.0969 (.1349)			-.159 (.2183)
Log Country Score			-.3792 (.5653)			-.4322 (.4621)			-.41 (.4978)
High Social				.0327 (.045)	.0734 (.0491)	.0403 (.0878)			
High Environm.				.0019 (.05)	-.0176 (.0551)	.0295 (.0657)			
High Governance				.0391 (.0483)	.0887* (.0526)	.148* (.0771)			
2 <sup>nd</sup> Quartile Social							.0909 (.0634)	.092 (.0694)	.0738 (.1239)
3 <sup>rd</sup> Quartile Social							.0284 (.0656)	.1138 (.0725)	.149 (.1503)
4 <sup>th</sup> Quartile Social							.1059* (.0633)	.1229* (.0692)	.0907 (.1826)
2 <sup>nd</sup> Third Environment							.0545 (.0633)	.0306 (.0694)	.0037 (.0737)
3 <sup>rd</sup> Third Environment							-.0146 (.0636)	-.0421 (.07)	.0867 (.0911)
2 <sup>nd</sup> Quartile Governance							.0048 (.0727)	-.062 (.079)	-.0333 (.0988)
3 <sup>rd</sup> Quartile Governance							.0936 (.0787)	.0749 (.0863)	.0694 (.1172)
4 <sup>th</sup> Quartile Governance							.0551 (.0748)	.0817 (.0814)	.2163 (.1434)
_cons	-.2234** (.1049)	-4.7229*** (.3543)	-2.0715 (2.6117)	.0093 (.0497)	-3.6795*** (.2599)	-1.9508 (2.5705)	-.0519 (.0679)	-3.6956*** (.2641)	-1.6229 (2.6)
Observations	2004	1800	1800	3115	2800	1800	3115	2800	1800
Pseudo R <sup>2</sup>	.0061	.1052	.1221	.0003	.0769	.1221	.0016	.0778	.1238
FI Controls	NO	YES	YES	NO	YES	YES	NO	YES	YES
Regional FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Legal Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Profit Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES

Standard errors are in parentheses

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

## **VII. Limitations and Further Research**

### **7.1. Research Limitations**

The limitations mentioned in this section consider the potential of the data to answer the research questions. While the variable selection has been justified by previous literature and theory, a disadvantage of the dataset is that it involves self-reported data which may include selection bias, since only institutions with at least 3 years of self-reported data were included. In addition, due to statistical significance on some of the variables between the observations that are kept in the sample and those that are dropped after merging the datasets, the results of this paper have limited generalizability.

Another dataset limitation consists of the fact that the panel is imbalanced, which makes it difficult to observe the same financial institutions over the same periods of time in order to identify any time variations and patterns. If this would be a causal paper, an imbalanced panel would lead to attrition bias. Endogeneity concerns can also present biases. However, considering it is a paper that assesses correlations, the causal direction is not essential to the results presented.

### **7.2. Areas for Future Research**

One of the reasons for the previous mentioned limitations is the scarcity of ESG data for financial institutions in developing countries. However, the availability of this information is growing and there is a large potential for further research, where more ESG granular data, such as loan-level data is gathered.

Moreover, additional ESG indicators can be analyzed such as green loans, climate risk data for financial institutions, additional governance data regarding proxy voting for larger companies etc. As there are current efforts to standardize ESG reporting by SASB, TCFD or GRI<sup>5</sup>, the expectation is that this data will become available in a short period of time, making it possible to conduct causal empirical research to answer the research questions more accurately. Another area for future research is the financial institution readiness to implement ESG strategy. Asking what characteristics of financial institutions make a financial institution more prone than another in having better ESG performance, can bring insightful results while financial institutions work on their readiness to implement ESG practices.

## **VIII. Conclusion and Implications**

In the context of climate change, risks such as climate risk, or reputational and regulatory risks have become more material for businesses, and ultimately for financial institutions, as they reconsider their lending practices strategy. In the context of financial institutions (FI), in order for an FI to further lend to sustainable businesses and finance their projects, it is important to understand how applying the ESG criteria in lending practices correlates with the credit risk metrics of their loan portfolio and how that translates into profitability metrics for the FI. For FIs operating in developing countries, this is even more relevant considering how highly exposed to physical climate risk these countries are.

This paper contributes to the existing literature by analyzing the relationship between the ESG factors and credit risk metrics from financial institutions in 75 developing countries in the areas of

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<sup>5</sup> Refer to Section I. Introduction.

Africa; Eastern Europe and Central Asia, East Asia and the Pacific, Latin America and the Caribbean; the Middle East and North Africa and South Asia, using the Mix Market datasets from the World Bank and building an ESG index with scores for each financial institution. The analysis is conducted at the financial institution level also considering their financial metrics such as size, profitability, liquidity, efficiency and solvency. Heterogeneous effects of this relationship are examined at the country level, by using the Global Sustainable Competitiveness Index 2021, which scores the countries on sustainable competitiveness, natural capital, resource intensity, social capital, intellectual capital and governance.

The findings are grouped around two research questions regarding the relationship of ESG indicators with credit risk, and the relationship of ESG indicators with the profitability of financial institutions.

From the group of regressions answering the first question, I find there is evidence of a positive relationship, between a better ESG performance and a solid credit risk profile for financial institutions in the third ESG quartile, as also confirmed by robustness checks with PAR30. More specifically, financial institutions with a better social and governance performance are associated with better credit risk performance. In addition, a financial institution operating in a country with a high sustainability score is associated with higher probability of having a more solid credit risk profile. Yet, the magnitude of ESG coefficients can get smaller as shown by the interaction term of ESG with the country sustainability, though this variable is not significant in most cases. This can imply that ESG performance in financial institutions that operate in countries with lower sustainability score, can lead to higher probabilities to strengthen their credit risk profile, but not in a statistically significant way.

Specific indicators such as taking social non-financial incentives such as adult education programs; having methods to account for poverty records of their clients; offering health-related financial products; having employee social-oriented and grievance HR policies and having protection clauses against client over-indebtedness are associated with more solid credit risk profiles. Whereas financial institutions which have social goals to offer more housing products; support job creation; target the Low-Middle Income (LMI) communities and have rating systems for short-term loans are associated with higher credit risk levels.

Results from the second group of regressions answering the second question, indicate that financial institutions with a better ESG performance are associated with higher profitability metrics such as ROA, ROE and PM. More specifically, financial institutions that focus their efforts in environmental and governance performance, have a higher probability of achieving higher profitability metrics. Country sustainability score is significant only on the probit model specifications.

These results from both groups of regression largely support hypothesis 1 (a) and 1(c) pointing to evidence of positive relationship of ESG performance with a solid credit risk profile and higher profitability. No significant evidence was found to accept hypothesis 1 (b) where, in instances where the interaction term was significant, country sustainability seems to have a weakening effect only with respect to credit risk.

The conclusions from this paper can have important implications in financing green projects in developing countries. Focusing on achieving a better and strategic ESG performance, can lead banks to better assess risk and indirectly improve ESG practices of businesses in the private sector,

giving firms access to lower cost financing. The positive results of this relationship at the loan portfolio level can open further doors for banks to develop other financial products such as green or sustainability-linked bonds in those countries where such green finance products are missing. Last, but not least, the results from this paper point to a promising area of further research in analyzing ESG and sustainability in the context of being a potentially significant predictor of the credit risk and financial institution stability in developing countries. Sustainability can be seen under credit risk lenses, while also making financial sense. Ultimately, such research can have policy implications in designing policies that lower the barriers towards mobilizing capital and reaching climate goals.

## IX. Bibliography

- Agudelo, L., Andrés, M., Jóhannsdóttir, L., & Davídsdóttir, B. (2019). A literature review of the history and evolution of corporate social responsibility. *International Journal of Corporate Social Responsibility*, 18-19.
- Amir, M. K. (2019). Does Excess Bank Liquidity Impact Non-Performing Loan? A Study on Bangladeshi Economy. *International Journal of Business and Technopreneurship*, 9(3), 1-12.
- Bank for International Settlements. (2013). *Basel III: The Liquidity Coverage Ratio and liquidity risk monitoring tools*. Bank for International Settlements.
- Bank for International Settlements. (2018). *Basel III: Accounting Provisions and Capital Requirements*. Bank for International Settlements.
- Benker, J. (2021). Reframing Business Sustainability Decision-Making with Value-Focussed Thinking. *Journal of Business Ethics*, <https://doi-org.proxy.library.cornell.edu/10.1007/s10551-020-04611-4>, 441-456.
- Berger, A. N., & DeYoung, R. (1997). Problem loans and cost efficiency in commercial banks. *Journal of Banking & Finance*, 21(6), 849–870.
- Cucinelli, D. (2015). The impact of non-performing loans on bank lending behavior: Evidence from the Italian banking sector. *Eurasian Journal of Business and Economics*, 8(16), 59–71.
- Bogan, Vicki L., 2012. "Capital Structure and Sustainability: An Empirical Study of Microfinance Institutions," *The Review of Economics and Statistics*", MIT Press, vol. 94(4), pages 1045-1058, November.
- Bouslah, K., Kryzanowski, L., & M, Z. B. (2013). The impact of the dimensions of social performance on firm risk. *Journal of Banking and Finance*, 37(4), 1258–1273. <https://doi-org.proxy.library.cornell.edu/10.1016/j.jbankfin.2012.12.004>
- Caroline Flammer. (2015). Does Corporate Social Responsibility Lead to Superior Financial Performance? A Regression Discontinuity Approach. *Management Science*, 61(11), 2549–2568.
- Carroll, A. B. (2015). Corporate Social Responsibility: The Centerpiece of Competing and Complementary Frameworks. *Organizational Dynamics*, 87-96.
- Corporate Finance Institute. (n.d.). *CFI*. Retrieved from What is Credit Risk?: <https://corporatefinanceinstitute.com/resources/knowledge/finance/credit-risk/>
- Corporate Financial Institute. (n.d.). *What is Financial Performance*. Retrieved from <https://corporatefinanceinstitute.com/resources/knowledge/finance/financial-performance/>
- Crespi, F., & Migliavacca, M. (2020). The Determinants of ESG Rating in the Financial Industry: The Same old Story or a Different Tale? *Sustainability MDPI*.
- Cui, Y. ( 1 ), Geobey, S. ( 1 ), Weber, O. ( 1 ), & Lin, H. ( 2 ). (n.d.). The impact of green lending on credit risk in China. *Sustainability (Switzerland)*, 10(6). <https://doi-org.proxy.library.cornell.edu/10.3390/su10062008>
- Deb, A. (2019). Operational efficiency and size of commercial banks: A study of the Indian banking sector. Retrieved from SSRN 3430375.
- Dhruba, P. 2018. Managing Credit Risk and Improving Access to Finance in Green Energy Projects. ADBI Working Paper 855. *Tokyo: Asian Development Bank Institute*. Available: <https://www.adb.org/publications/managing-credit-risk-improving-access-financegreen-energy-projects>

- Dieu Thi Thanh Tran, & Ha Thi Thu Phan. (2020). Bank Size, Credit Risk and Bank Profitability in Vietnam. *Malaysian Journal of Economic Studies*, 57(2), 233–251. <https://doi-org.proxy.library.cornell.edu/10.22452/MJES.vol57no2.4>
- DiMaggio, P. J., & Powell, W. W. (1983). The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organisational Fields. *American Sociological*, 48, 147-160. <https://doi.org/10.2307/2095101>
- U.S. Environmental Protection Agency (EPA) <https://www.epa.gov/sustainability/learn-about-sustainability>
- Ehlers, T., Packer, F., & de Greiff, K. (2021). The pricing of carbon risk in syndicated loans: Which risks are priced and why? *Journal of Banking and Finance*. <https://doi-org.proxy.library.cornell.edu/10.1016/j.jbankfin.2021.106180>
- European Central Bank. (2021). *ECB publishes supervisory banking statistics for the first quarter of 2021*. Retrieved from ECB publishes supervisory banking statistics for the first quarter of 2021
- Fan, H. P. (<https://doi-org.proxy.library.cornell.edu/10.1016/j.jdeveco.2021.102683>). Greening through finance? . *Journal of Development Economics*, 152.
- Ferri, G. (2009). Are New Tigers Supplanting Old Mammoths in China's Banking System? Evidence from a Sample of City Commercial Banks. *Journal of Banking and Finance*, 33(1), 131–140.
- Fink, L. (2021). *Larry Fink's 2021 letter to CEOs*. Retrieved January 2022, from <https://www.blackrock.com/corporate/investor-relations/larry-fink-ceo-letter>
- Food and Agriculture Organization. (2021). *The impact of disasters and crises on agriculture and food security: 2021*. FAO, Rome.
- Friedman, M. (1962). *Capitalism and freedom*. Chicago: University of Chicago Press.
- Friedman, M. (1970, September 13). A Friedman doctrine-- The Social Responsibility of Business Is to Increase Its Profits. *New York Times*. <https://www.nytimes.com/1970/09/13/archives/a-friedman-doctrine-the-social-responsibility-of-business-is-to.html>
- Gillan, S. L., Koch, A., & Starks, L. T. (2021). Firms and social responsibility: A review of ESG and CSR research in corporate finance. *Journal of Corporate Finance*, 66. <https://doi-org.proxy.library.cornell.edu/10.1016/j.jcorpfin.2021.101889>
- Giraudet, L.-G., Petronevich, A., & Faucheux, L. (2021). Differentiated green loans. *Energy Policy*, 149. <https://doi-org.proxy.library.cornell.edu/10.1016/j.enpol.2020.111861>
- Global Sustainability Competitiveness Index. (2021). *Global Sustainability Competitiveness Index*. Retrieved October 2021, from SolAbility: <https://solability.com/the-global-sustainable-competitiveness-index/the-index>
- GRI. (2021). *Material Topics 2021 Universal Standard*. Global Reporting Initiative.
- Hart, S. L. (1995). A Natural-Resource-Based View of the Firm. *The Academy of Management Review*, 20(4), 986–1014. <https://doi.org/10.2307/258963>
- International Finance Corporation. (2018). *Creating Green Bond Markets-Insights, Tools and Innovations from Emerging Markets*. IFC Sustainable Banking Network.
- Jones, T. M. (1995). Instrumental Stakeholder Theory: A Synthesis of Ethics and Economics. *The Academy of Management Review*, 20(2), 404–437. <https://doi.org/10.2307/258852>
- Luqman, Olawale, The Effect of Credit Risk on the Performance of Commercial Banks in Nigeria (December 10, 2014). Available at SSRN: <https://ssrn.com/abstract=2536531> or <http://dx.doi.org/10.2139/ssrn.2536531>
- Lydenberg, S. D. (2005). *Corporations and Public Interest*. San Francisco: Berret Koehler Publishers.

- March, J. G., & Olsen, J. P. (1984). The new institutionalism: organizational factors in political life. *American Political Science Review*, 78(3), 734–749.
- Messai, A. S., & Jouini, F. (2013). Micro and macro determinants of non-performing loans. *International Journal of Economics and Financial Issues*, 3(4), 852-n/a. Retrieved from <https://www-proquest-com.proxy.library.cornell.edu/scholarly-journals/micro-macro-determinants-non-performing-loans/docview/1448347783/se-2>
- MIX Market. (2020, December). *MIX Market*. Retrieved October 2021, from World Bank: <https://datacatalog.worldbank.org/search/dataset/0038647>
- Nitescu, D.-C., & Cristea, M.-A. (2020). Environmental, Social and Governance Risks--New Challenges for the Banking Business Sustainability. *Amfiteatru Economic*, 22(55), 692–706. [https://doi-org.proxy.library.cornell.edu/http://www.amfiteatruconomic.ro/Arhiva\\_EN.aspx](https://doi-org.proxy.library.cornell.edu/http://www.amfiteatruconomic.ro/Arhiva_EN.aspx)
- Olarewaju, O. M. (2020). Investigating the factors affecting nonperforming loans in commercial banks: The case of African lower middle-income countries. *African Development Review*, 32(4), 744–757. <https://doi-org.proxy.library.cornell.edu/10.1111/1467-8268.12475>
- Pickens, R. A. (2020). Voluntary Sustainability Reporting and Firm Environmental Ratings as Environmental Governance Mechanisms. *Doctor of Philosophy Dissertation*.
- Porter, M. E. (1991, April). "America's Green Strategy." . *Scientific American* 264, 264(4).
- Porter, M. E., & Van der Linde, C. (1995). Toward a new conception of the environment-competitiveness relationship. *Journal of Economic Perspectives*, 9(4), 97–118.
- Rachman, R. A., Kadarusman, Y. B., Anggriono, K., & Setiadi, R. (2018). Bank-specific Factors Affecting Non-performing Loans in Developing Countries: Case Study of Indonesia. *The Journal of Asian Finance, Economics and Business*, 5(2), 35–42. <https://doi.org/10.13106/JAFEB.2018.VOL5.NO2.35>
- Razak, L. A., Ibrahim, M. H., & Ng, A. (2020). Which Sustainability Dimensions Affect Credit Risk? Evidence from Corporate and Country-Level Measures. *Journal of Risk & Financial Management*, 13(12), 1–22.
- Reisinger, A., Howden, M., & Vera, C. (2020). *The Concept of Risk in the IPCC Sixth Assessment Report: A Summary of Cross-Working Group Discussions*. Geneva, Switzerland: Intergovernmental Panel on Climate Change.
- Roberto Garcia-Castro, Miguel A. Ariño, & Miguel A. Canela. (2010). Does Social Performance Really Lead to Financial Performance? Accounting for Endogeneity. *Journal of Business Ethics*, 92(1), 107–126. <https://doi-org.proxy.library.cornell.edu/10.1007/s10551-009-0143-8>
- Roland Craigwell, & Chanelle Maxwell. (2006). Non-Interest Income and Financial Performance at Commercial Banks in Barbados. *Savings and Development*, 30(3), 309–328.
- SASB. (2018). *COMMERCIAL BANKS Sustainability Accounting Standard Industry Standard*. Sustainability Accounting Standards Board.
- Scholtens, B., & Dam, L. (2007). Banking on the Equator. Are Banks that Adopted the Equator Principles Different from Non-Adopters? *World Development*, 35(8), 1307–1328. <https://doi-org.proxy.library.cornell.edu/10.1016/j.worlddev.2006.10.013>
- Sternberg, E. (2000). *Just business: business ethics in action. (2nd ed.)*. Oxford: Oxford: Oxford University Press.
- The Equator Principles Financial Institutions. (2020). *The Equator Principles* . EPFI.
- Umar, M., Ji, X., Mirza, N., & Naqvi, B. (2021). Carbon neutrality, bank lending, and credit risk: Evidence from the Eurozone. *Journal of Environmental Management*, 296. <https://doi-org.proxy.library.cornell.edu/10.1016/j.jenvman.2021.113156>
- UN. (1987). *United Nations*. Retrieved October 2021, from <https://www.un.org/en/academic-impact/sustainability>

- UN. (2015). *SDGs*. Retrieved from Sustainable Development Goals: <https://sdgs.un.org/goals>
- UN. (2021). *UN Climate Change Conference 26*. Retrieved from <https://ukcop26.org>
- United Nations Climate Change. (2015). *The Paris Agreement*. Retrieved 2022, from UNCC: <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>
- Wang, X., Lin, H., & Tian, M. (2020). Corporate Sustainability Performance of Chinese Firms: An Empirical Analysis from a Social Responsibility Perspective. *Emerging Markets Finance and Trade*, 56(9), 2027–2038.
- Wood, A., & Skinner, N. (2018). Determinants of non-performing loans: Evidence from commercial banks in Barbados. *The Business & Management Review*, 9(3), 44–64.
- World Bank. (2021). *Global Financial Development Database*. World Bank.
- World Bank. (2020). *Global Financial Development Report 2019 / 2020: Bank Regulation and Supervision a Decade after the Global Financial Crisis*. World Bank Group.
- World Meteorological Organization. (2021). *State of Global Climate 2021 WMO Provisional Report*. WMO.
- Xiao, C., Wang, Q., van der Vaart, T., & van Donk, D. P. (2018). When Does Corporate Sustainability Performance Pay off? The Impact of Country-Level Sustainability Performance. *Ecological Economics*, 146, 325–333. <https://doi-org.proxy.library.cornell.edu/10.1016/j.ecolecon.2017.11.025>
- Zhan, Y., Chung, L., Lim, M. K., Ye, F., Kumar, A., & Tan, K. H. (2021). The impact of sustainability on supplier selection: A behavioural study. *International Journal of Production Economics*, 236. <https://doi-org.proxy.library.cornell.edu/10.1016/j.ijpe.2021.108118>
- Zhou, G., Sun, Y., Luo, S., & Liao, J. (2021). Corporate social responsibility and bank financial performance in China: The moderating role of green credit. *Energy Economics*, 97. <https://doi-org.proxy.library.cornell.edu/10.1016/j.eneco.2021.105190>

## X. Appendix

### 10. 1. Means Comparison

	obs1	obs2	Mean2	Dif	St Err	t value	p value
PAR 90	9309	3425	.046	.008	.003	3.25	.001***
PAR 30	11640	3441	.064	.013	.003	4.45	0***
Bank Size	15304	3731	0	0	0	.45	.667
Bank Portfolio Size	15745	3832	0	0	0	.45	.67
Bank Efficiency	13817	3665	10.44	-6.50	3.91	-1.65	.097*
Deposits to Loans	11365	3532	.69	3.62	6.75	.55	.592
ROA	11664	3500	.012	-.009	.003	-2.85	.005**
ROE	11617	3497	.132	.043	.554	.1	.938
PM	13816	3662	19.71	-23.18	11.37	-2.05	.042**
Capital Asset Ratio	15200	3707	.302	.046	.022	2.1	.036**
Debt to Equity	14572	3688	4.63	2.77	3.26	.85	.395
Region	16237	3856	3.94	-.55	.04	-15.45	0.00***
Country	16237	3856	53.68	3.16	.57	5.50	0.00***
Legal Status	16237	3856	3.09	.05	.02	2.30	.022**
Profit Status	16237	3856	1.51	.04	.01	3.35	.001***

## 10.2. Correlation Matrices

*Table 2. Matrix of Correlations – Social Factors*

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(1) Soc. Adult Education	1.00																		
(2) Soc. Youth Opportunities	0.48	1.00																	
(3) Soc. Child Education	0.49	0.41	1.00																
(4) Soc. Health Education	0.49	0.41	0.60	1.00															
(5) Soc. Gender Equality	0.33	0.34	0.33	0.38	1.00														
(6) Soc. Water Access	0.44	0.48	0.50	0.52	0.30	1.00													
(7) Soc. Housing Loans	0.32	0.36	0.36	0.34	0.26	0.44	1.00												
(8) Soc. Financial Access	0.11	0.24	0.12	0.11	0.17	0.19	0.26	1.00											
(9) Soc. Poverty Reduction	0.22	0.24	0.26	0.26	0.34	0.19	0.21	0.28	1.00										
(10) Soc. Job Creation	0.23	0.28	0.21	0.23	0.26	0.19	0.20	0.26	0.44	1.00									
(11) Soc. StartUp Funding	0.32	0.31	0.32	0.29	0.24	0.29	0.24	0.20	0.27	0.33	1.00								
(12) Soc. Business Growth	0.20	0.21	0.20	0.17	0.24	0.16	0.22	0.31	0.34	0.39	0.40	1.00							
(13) Soc. Targeting Very Poor	0.19	0.17	0.24	0.22	0.20	0.21	0.10	0.08	0.22	0.09	0.15	0.03	1.00						
(14) Soc. Targeting Poor	0.16	0.14	0.20	0.18	0.30	0.17	0.13	0.12	0.31	0.09	0.10	0.11	0.48	1.00					
(15) Soc. Targeting LMI	0.10	0.08	0.09	0.06	0.20	0.08	0.14	0.21	0.30	0.18	0.09	0.23	0.14	0.35	1.00				
(16) Soc. Poverty Measure	0.12	0.05	0.13	0.16	0.18	0.13	0.06	0.07	0.21	0.05	0.08	0.07	0.20	0.29	0.15	1.00			
(17) Soc. Women Empowerm.	0.23	0.14	0.19	0.26	0.37	0.19	0.06	-0.05	0.14	0.07	0.11	-0.00	0.27	0.25	0.08	0.24	1.00		
(18) Soc. Other Education	0.24	0.13	0.20	0.24	0.25	0.19	0.09	0.08	0.16	0.06	0.10	0.06	0.22	0.25	0.14	0.22	0.43	1.00	
(19) Soc. Health Services	0.14	0.07	0.20	0.36	0.18	0.18	0.07	-0.05	0.07	0.05	0.07	-0.02	0.15	0.12	0.02	0.14	0.37	0.33	1.00

*Table 3. Matrix of Correlations – Environmental Factors*

Variables	(1)	(2)	(3)	(4)
(1) Env. Awareness Policy	1.00			
(2) Env. Loan Contract Clauses	0.00	1.00		
(3) Env. Risk Assessment	-0.05	0.19	1.00	
(4) Env. Green Loans	-0.09	-0.02	0.04	1.00

*Table 4. Matrix of Correlations – Governance Factors*

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
(1) 50% Females Board	1.00																				
(2) SPM Champ Board	-0.12	1.00																			
(3) SPM Member. Board	-0.05	0.27	1.00																		
(4) Gov. Board Soc. Exp.	-0.18	0.25	0.20	1.00																	
(5) Cust. Service Quality Staff Incentives	-0.01	0.03	0.09	0.02	1.00																
(6) Soc. Data Collection Staff Incentives	-0.01	0.09	0.08	-0.01	0.46	1.00															
(7) Portf. Quality Staff Inc	-0.07	0.13	0.07	0.04	0.26	0.20	1.00														
(8) Gov. HR Soc. Policy	-0.25	0.38	0.10	0.14	-0.01	0.04	0.21	1.00													
(9) Gov. HR Safety Pol.	-0.13	0.21	0.17	0.74	0.05	0.01	0.06	0.17	1.00												
(10) Gov. Anti-harrasm.	-0.15	0.22	0.17	0.76	0.00	-0.02	0.04	0.16	0.79	1.00											
(11) Gov. Non-discrimin.	0.07	-0.05	0.00	-0.21	0.11	0.06	0.11	0.10	-0.07	-0.07	1.00										
(12) Gov. HR Grievance	-0.15	0.23	0.15	0.79	0.01	-0.02	0.05	0.16	0.76	0.83	-0.12	1.00									
(13) Gov. Client Protect	-0.22	0.31	0.16	0.29	-0.04	0.02	0.26	0.49	0.24	0.26	-0.06	0.27	1.00								
(14) Gov. Client Transp.	-0.17	0.19	0.06	0.10	0.02	0.05	0.20	0.32	0.09	0.10	0.05	0.10	0.35	1.00							
(15) Client Complaint Mechanism	-0.12	0.20	0.20	0.19	0.11	0.11	0.24	0.25	0.15	0.16	0.06	0.18	0.35	0.41	1.00						
(16) Data Protection	-0.16	0.22	0.12	0.12	0.05	0.08	0.24	0.34	0.11	0.12	0.04	0.13	0.45	0.57	0.48	1.00					
(17) ClientProt. Assessm.	-0.03	0.07	0.07	0.21	0.00	-0.02	-0.01	0.03	0.11	0.21	-0.08	0.16	0.07	0.03	0.04	0.02	1.00				
(18) Micro Fin Rating	-0.05	0.07	0.07	0.20	0.03	-0.01	0.00	0.02	0.12	0.15	-0.10	0.16	0.07	0.03	0.06	0.04	0.70	1.00			
(19) ST Loan Rating	-0.08	0.06	0.08	0.21	0.03	-0.02	0.01	0.03	0.10	0.17	-0.11	0.18	0.07	0.03	0.06	0.05	0.72	0.76	1.00		
(20) LT Loan Rating	-0.06	0.03	0.03	0.15	-0.01	-0.03	0.01	0.00	0.04	0.10	-0.10	0.14	0.05	0.02	0.04	0.03	0.47	0.50	0.71	1.00	
(21) Social Perf. Rating	-0.06	0.06	0.06	0.18	0.03	-0.04	0.01	0.03	0.10	0.16	-0.08	0.19	0.06	0.03	0.05	0.04	0.65	0.69	0.72	0.65	1.00

*Table 5. Variance Inflation Factor – Social Factors  
for PAR90 Regression*

	VIF	1/VIF
Soc. Health Education	2.079	.481
Soc. Child Education	1.85	.54
Soc. Water Access	1.753	.57
Soc. Adult Education	1.673	.598
Soc. Youth Opportunities	1.607	.622
Soc. Targeting Poor	1.606	.623
Soc. Women Empowerm	1.532	.653
Soc. Gender Equality	1.507	.663
Soc. Poverty Reduction	1.502	.666
Soc. Business Growth	1.414	.707
Soc. Job Creation	1.4	.714
Soc. Housing Loans	1.389	.72
Soc. Targeting Very Poor	1.385	.722
Soc. StartUp Funding	1.38	.725
Soc. Other Education	1.366	.732
Soc. Health Services	1.344	.744
Soc. Targeting LMI	1.264	.791
Soc. Financial Access	1.241	.806
Soc. Poverty Measure	1.179	.848
Mean VIF	1.499	.

*Table 6. Variance Inflation Factor – Environmental  
Factors for PAR90 Regression*

	VIF	1/VIF
Env. Risk Assessment	1.039	.962
Env. Loan Contract Clauses	1.037	.964
Env. Green Loans	1.011	.989
Env. Awareness Policy	1.01	.99
Mean VIF	1.025	.

*Table 7. Variance Inflation Factor – Governance  
Factors for PAR90 Regression*

	VIF	1/VIF
ST Loan Rating	4.235	.236
Gov. Anti-harrasm.	4.136	.242
Gov. HR Grievance	4.058	.246
Gov. Board Soc. Exp.	3.522	.284
Gov. HR Safety Pol.	3.11	.322
Micro Fin Rating	3.003	.333
Social Perf. Rating	2.753	.363
ClientProt. Assess	2.597	.385
LT Loan Ratin	2.322	.431
Data Protection	1.779	.562
ClientProt. Assessmt	1.717	.582
Gov. Client Transp.	1.545	.647
Gov. HR Soc. Policy	1.489	.672
Client Complaint Mechanism	1.43	.699
Cust. Service Quality Staff Incentives	1.376	.727
Gov. Board Soc. Exp.	1.303	.767
Soc. Data Collection Staff Incentives	1.295	.772
Portf. Quality Staff Inc	1.199	.834
Gov. Non-discrimin.	1.194	.837
SPM Champ Board	1.161	.861
50% Female Board	1.114	.898

*Table 8. Variance Inflation Factor – All FI Controls for PAR90 Regression*

	VIF	1/VIF
Log Bank Size	41.194	.024
Log Bank GLP	40.372	.025
Return on Assets	2.796	.358
Profit Margin	2.699	.371
Deposits to Loans	1.435	.697
Capitalassetratio	1.372	.729
Return on Equity	1.116	.896
iRegion	1.112	.9
Log Country Score	1.087	.92
Debt to Equity Ratio	1.086	.921
Log ESGxCountry Sust	1.044	.958
Bank Efficiency	1.001	.999
Mean VIF	8.026	.

### 10.3. Fixed Effects VS. Random Effects

*Table 9. Hausman Text RE vs. FE*

	(1) PAR90 (w/o FE)	(2) PAR90 (with FE)
ESG	-.001 (.001)	-0.00003 (.001)
Bank Portfolio Size	.004*** (.001)	.002 (.003)
Bank Efficiency	0 (0)	0 (0)
Deposits to Loans	-.001 (.006)	-.003 (.009)
Return on Assets	-.116*** (.032)	-.235*** (.043)
Return on Equity	0** (0)	0 (0)
Profit Margin	-.023*** (.005)	-.014** (.006)
Capital Asset Ratio	-.004 (.006)	-.003 (.007)
Debt to Equity Ratio	-.001*** (0)	0* (0)
Log Country Score	-.055 (.042)	
Log ESGxCountry Sust.	.009 (.016)	.004 (.017)
_cons	.198 (.213)	-.016 (.137)
Observations	1648	1648
r2_w	.109	.118
Profit Status FE	YES	NO
Legal Status FE	YES	NO
Regional FE	YES	NO

*Standard errors are in parentheses*

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Hausman Specification	Coef.
Chi-square test value	51.817
P-value	0

## 10.4. Time FE Test

- ( 1) 2008.FiscalYear = 0
- ( 2) 2009.FiscalYear = 0
- ( 3) 2010.FiscalYear = 0
- ( 4) 2011.FiscalYear = 0
- ( 5) 2012.FiscalYear = 0
- ( 6) 2013.FiscalYear = 0
- ( 7) 2014.FiscalYear = 0
- ( 8) 2015.FiscalYear = 0
- ( 9) 2016.FiscalYear = 0
- (10) 2017.FiscalYear = 0
- (11) 2018.FiscalYear = 0

F( 11, 1152) = 5.68  
 Prob > F = 0.0000

## 10.5. Granular OLS Regressions with ESG Individual Indicators

*Table 10. OLS Regression for Model Specification (1) – PAR90*

	(1) PAR90	(2) PAR90	(3) PAR90
Soc. Adult Education	-.007 (.005)	-.009* (.004)	-.011** (.005)
Soc. Youth Opportunities	.004 (.005)	.006 (.005)	.003 (.005)
Soc. Child Education	-.002 (.005)	-.004 (.005)	-.005 (.005)
Soc. Health Education	.003 (.005)	.001 (.005)	-.003 (.004)
Soc. Gender Equality	-.004 (.004)	-.006 (.004)	-.01** (.005)
Soc. Water Access	.011 (.008)	.004 (.006)	.003 (.005)
Soc. Housing Loans	.016*** (.006)	.016*** (.005)	.014*** (.005)
Soc. Financial Access	-.009 (.009)	-.008 (.007)	-.011 (.008)
Soc. Poverty Reduction	-.002 (.01)	.002 (.006)	-.004 (.008)
Soc. Job Creation	.012** (.006)	.014*** (.005)	.01* (.005)
Soc. StartUp Funding	-.014* (.008)	-.01 (.006)	-.008 (.006)
Soc. Business Growth	-.005 (.007)	-.011 (.007)	-.012 (.008)
Soc. Targeting Very Poor	.006 (.007)	.007 (.006)	.005 (.006)
Soc. Targeting Poor	-.007 (.008)	-.012 (.008)	-.013 (.008)
Soc. Targeting LMI	.015** (.007)	.014** (.006)	.012* (.006)
Soc. Poverty Measure	-.011 (.007)	-.005 (.006)	-.006 (.006)
Soc. Women Empowerment	.007 (.007)	.007 (.006)	.001 (.006)
Soc. Other Education	.005 (.006)	.006 (.005)	.003 (.005)

Soc. Health Services	-.015**	-.013**	-.015**
	(.008)	(.007)	(.007)
Env. Awareness Policy	-.002	-.001	-.003
	(.007)	(.006)	(.005)
Env. Loan Contract Clauses	.008	.004	-.008
	(.006)	(.005)	(.006)
Env. Risk Assessment	-.005	-.006	.007
	(.006)	(.006)	(.006)
Env. Green Loans	.008	.008	-.003
	(.008)	(.006)	(.009)
50% Females Board	.006	-.001	.003
	(.005)	(.009)	(.005)
SPM Champ Board	-.001	.004	-.002
	(.007)	(.005)	(.006)
SPM Member. Board	.003	.001	-.002
	(.006)	(.006)	(.006)
Gov. Board Soc. Exp	-.011	-.004	-.002
	(.009)	(.009)	(.009)
Cust. Service Quality Staff Incentives	.001	-.001	-.003
	(.006)	(.005)	(.005)
Soc. Data Collection Staff Incentives	-.011	-.008	-.006
	(.007)	(.006)	(.006)
Portf. Quality Staff Incentives	.001	.001	-.002
	(.007)	(.007)	(.007)
Gov. HR Soc. Policy	-.013	-.014**	-.014**
	(.008)	(.006)	(.007)
Gov. HR Safety Pol.	-.003	-.001	-.004
	(.008)	(.006)	(.006)
Gov. Anti-harassment	.004	.003	.003
	(.007)	(.007)	(.007)
Gov. Non-discrimination.	.01	.007	.006
	(.008)	(.007)	(.007)
Gov. HR Grievance	-.009	-.014**	-.019***
	(.006)	(.007)	(.007)
Gov. Client Protect	.006	.007	.001
	(.007)	(.005)	(.006)
Gov. Client Transp.	.01	.009	.006
	(.008)	(.008)	(.007)
Client Complaint Mechanism	.001	-.004	-.004
	(.006)	(.006)	(.006)
Data Protection	-.001	.001	-.002
	(.007)	(.007)	(.008)
Client Prot. Assessment	-.047**	-.035	-.03
	(.023)	(.023)	(.024)
Micro Fin Rating	-.033	-.029	-.024
	(.022)	(.021)	(.023)
ST Loan Rating	.044*	.035	.017
	(.026)	(.026)	(.03)
LT Loan Rating	-.007	-.011	-.009
	(.026)	(.026)	(.027)
Social Perf. Rating	.029	.026	.025
	(.02)	(.02)	(.021)
_cons	.026***	-.009	.193
	(.009)	(.032)	(.22)
Observations	1829	1648	1648
R-squared	.062	.184	.213
FI Controls	NO	YES	YES
GSCI Controls	NO	NO	YES
Regional FE	NO	NO	YES
Legal Status FE	NO	NO	YES
Profit Status FE	NO	NO	YES

*Robust standard errors are in parentheses*

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Table 11. OLS Regression for Model Specification (1) – PAR30

	(1) PAR30	(2) PAR30	(3) PAR30
Soc. Adult Education	-.008 (.006)	-.011** (.006)	-.014** (.006)
Soc. Youth Opportunities	.007 (.006)	.008 (.005)	.004 (.006)
Soc. Child Education	-.003 (.007)	-.003 (.007)	-.005 (.006)
Soc. Health Education	.006 (.007)	.004 (.006)	0 (.006)
Soc. Gender Equality	-.004 (.005)	-.007 (.005)	-.011** (.005)
Soc. Water Access	.008 (.008)	.001 (.007)	.001 (.006)
Soc. Housing Loans	.016** (.007)	.015*** (.006)	.013** (.006)
Soc. Financial Access	-.009 (.01)	-.008 (.008)	-.013 (.009)
Soc. Poverty Reduction	-.002 (.011)	.002 (.008)	-.006 (.009)
Soc. Job Creation	.012* (.007)	.014** (.006)	.01* (.006)
Soc. StartUp Funding	-.013 (.008)	-.008 (.007)	-.006 (.007)
Soc. Business Growth	-.006 (.008)	-.012 (.008)	-.014 (.008)
Soc. Targeting Very Poor	.005 (.008)	.005 (.007)	.002 (.007)
Soc. Targeting Poor	-.01 (.009)	-.014* (.008)	-.015* (.009)
Soc. Targeting LMI	.018** (.008)	.017** (.007)	.014** (.006)
Soc. Poverty Measure	-.013* (.008)	-.005 (.006)	-.006 (.006)
Soc. Women Empowerment	.008 (.007)	.007 (.007)	.001 (.007)
Soc. Other Education	.005 (.007)	.006 (.005)	.003 (.006)
Soc. Health Services	-.021** (.008)	-.017** (.007)	-.018** (.008)
Env. Awareness Policy	-.003 (.008)	0 (.007)	-.003 (.007)
Env. Loan Contract Clauses	.005 (.007)	.002 (.005)	.001 (.005)
Env. Risk Assessment	-.006 (.007)	-.007 (.006)	-.009 (.006)
Env. Green Loans	.005 (.008)	.005 (.007)	.003 (.006)
50% Females Board	.008* (.005)	.005 (.005)	.003 (.006)
SPM Champ Board	-.003 (.007)	-.001 (.006)	-.006 (.007)
SPM Member. Board	.003 (.007)	0 (.007)	-.002 (.006)
Gov. Board Soc. Exp	-.013 (.011)	-.008 (.011)	-.004 (.01)
Cust. Service Quality Staff Incentives	-.002 (.007)	-.005 (.006)	-.007 (.006)
Soc. Data Collection Staff Incentives	-.009	-.005	-.003

	(.008)	(.007)	(.007)
Portf. Quality Staff Incentives	0	.001	-.002
	(.007)	(.007)	(.007)
Gov. HR Soc. Policy	-.013	-.015**	-.016**
	(.008)	(.007)	(.007)
Gov. HR Safety Pol.	-.003	0	-.004
	(.01)	(.007)	(.007)
Gov. Anti-harassment	.005	.005	.004
	(.008)	(.008)	(.008)
Gov. Non-discrimination.	.013	.01	.007
	(.008)	(.008)	(.008)
Gov. HR Grievance	-.011	-.014*	-.02**
	(.007)	(.007)	(.008)
Gov. Client Protect	.004	.004	-.002
	(.008)	(.006)	(.007)
Gov. Client Transp.	.014	.014*	.011
	(.009)	(.009)	(.008)
Client Complaint Mechanism	-.002	-.006	-.006
	(.007)	(.007)	(.007)
Data Protection	.001	.002	-.003
	(.008)	(.008)	(.008)
Client Prot. Assessment	-.064*	-.052	-.044
	(.038)	(.038)	(.039)
Micro Fin Rating	-.047	-.043	-.037
	(.035)	(.034)	(.035)
ST Loan Rating	.074**	.065*	.045
	(.037)	(.037)	(.04)
LT Loan Rating	.013	.01	.011
	(.039)	(.04)	(.04)
Social Perf. Rating	.051*	.049*	.046
	(.03)	(.03)	(.031)
_cons	.041***	.016	.162
	(.011)	(.036)	(.245)
Observations	1841	1651	1651
R-squared	.065	.174	.213
FI Controls	NO	YES	YES
GSCI Controls	NO	NO	YES
Regional FE	NO	NO	YES
Legal Status FE	NO	NO	YES
Profit Status FE	NO	NO	YES

*Robust standard errors are in parentheses*

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

## 10.6. Results for OLS Model Specification (2)

Table 12. OLS Regression for Model Specification (2) – PM Robustness Check

	(1) PM	(2) PM	(3) PM	(4) PM	(5) PM	(6) PM	(7) PM	(8) PM	(9) PM
ESG	-.00076 (.002221)	-.001642 (.00239)	.00188 (.007562)						
High ESG Score				-.033183 (.026875)	-.024703 (.026995)	-.015058 (.034499)			
Second ESG Quartile							.022077 (.034398)	.026455 (.028918)	.079079 (.050102)
Third ESG Quartile							-.007103 (.037432)	-.018814 (.034229)	.046798 (.058563)
Fourth ESG Quartile							-.024019 (.037795)	-.022342 (.035702)	.051936 (.072185)
Log ESGxCountry Sust.			-.04856 (.101316)			-.003935 (.037608)			-.067066 (.045717)
Log Country Score			.17321 (.254829)			.132543 (.254727)			.194479 (.258543)
Log Bank Portfolio		.047764*** (.009834)	.040332*** (.009666)		.05338*** (.009963)	.0406*** (.00964)		.046918*** (.008549)	.041366*** (.009661)
Bank Efficiency		-2.000e-06 (5.000e-06)	0 (5.000e-06)		1.000e-06 (8.000e-06)	0 (5.000e-06)		2.000e-06 (7.000e-06)	0 (5.000e-06)
Deposits to Loans		-.021442 (.057022)	-.062197 (.077056)		-.010928 (.063664)	-.06179 (.076563)		.056121 (.049733)	-.064433 (.07673)
Capital-to-Asset		.341055** (.163959)	.325182** (.164184)		.447264** (.199366)	.324722** (.164596)		.392239** (.171751)	.327729** (.164261)
Debt-to-Equity		.007015 (.00571)	.007034 (.005693)		.003665 (.002943)	.007022 (.005693)		.002216 (.001876)	.007142 (.005704)
_cons	.072328* (.043485)	-.831467*** (.181706)	-1.249786 (1.475404)	.066394*** (.019328)	-.966879*** (.19758)	-1.361154 (1.438009)	.05251* (.027763)	-.762957*** (.168268)	-1.232099 (1.412215)
Observations	1931	1799	1799	2988	2799	1799	2988	2608	1799
R-squared	.000089	.06205	.076038	.000547	.043056	.076111	.000678	.124003	.078349
Regional FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Legal Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Profit Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES

Robust standard errors are in parentheses

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Table 13. OLS Regression for Model Specification (2) – ESG Components - ROE

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ROE	ROE	ROE	ROE	ROE	ROE	ROE	ROE	ROE
Social	-.058508 (.057381)	-.06114 (.061484)	-.163839 (.164868)						
Environmental	.438987 (.403912)	.402092 (.384701)	.390685 (.356372)						
Governance	-.017784 (.025409)	-.031607 (.036306)	-.160873 (.157694)						
Log ESGxCountry Sust			1.62679 (1.710002)			-.159736 (.144238)			2.022308 (1.91913)
Log Country Score			-2.918393 (2.014079)			-1.03152 (.756622)			-3.43523 (2.429453)
High Social				-.19869 (.202021)	-.262337 (.259439)	-.352519 (.382019)			
High Environm.				.231641 (.236355)	.225347 (.240632)	.347856 (.320305)			
High Governance				-.306701 (.324176)	-.299298 (.333543)	-.324853 (.408734)			
2 <sup>nd</sup> Quartile Social							-.239529 (.285101)	-.328749 (.359557)	-1.518863 (1.481774)
3 <sup>rd</sup> Quartile Social							-.273528 (.275573)	-.40151 (.408015)	-1.903915 (1.85728)
4 <sup>th</sup> Quartile Social							-.323842 (.348266)	-.402604 (.402735)	-2.278442 (2.126305)
2 <sup>nd</sup> Third Environment							.021224 (.075235)	-.04298 (.10962)	-.110551 (.161482)
3 <sup>rd</sup> Third Environment							.558806 (.521165)	.577453 (.539332)	.710293 (.623319)
2 <sup>nd</sup> Quartile Governance							-.578216 (.499608)	-.595092 (.491086)	-1.031381 (.891739)
3 <sup>rd</sup> Quartile Governance							-.422033 (.514417)	-.48616 (.557317)	-1.227956 (1.217903)
4 <sup>th</sup> Quartile Governance							-.949544 (.865437)	-.960489 (.870035)	-1.750199 (1.546422)
_cons	.222084 (.249427)	1.629677 (2.786135)	5.477647 (4.741541)	.283031 (.235326)	.719798 (1.771705)	7.599925 (5.202851)	.714581 (.657592)	1.131065 (2.086027)	5.041359 (4.594723)
Observations	1870	1750	1750	2897	2726	1750	2897	2726	1750
R-squared	.005152	.018416	.022831	.001227	.012504	.018859	.004135	.015761	.025789
FI Controls	NO	YES	YES	NO	YES	YES	NO	YES	YES
Regional FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Legal Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Profit Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES

Robust standard errors are in parentheses

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Table 14. OLS Regression for Model Specification (2) – ESG Components – PM

	(1) PM	(2) PM	(3) PM	(4) PM	(5) PM	(6) PM	(7) PM	(8) PM	(9) PM
Social	-.007277 (.004674)	-.004951 (.004772)	-.000477 (.010471)						
Environmental	.015453 (.019573)	-.007045 (.018765)	-.003635 (.018972)						
Governance	.010072** (.004416)	.006172 (.004872)	.014365 (.009786)						
Log ESGxCountry Sust			-.082635 (.120977)			-.04819 (.038036)			-.206477** (.103961)
Log Country Score			.194136 (.261401)			.162662 (.255196)			.319447 (.269625)
High Social				-.019172 (.03019)	-.011985 (.033186)	-.005524 (.029059)			
High Environment				-.010792 (.024503)	-.025425 (.025016)	-.018542 (.028402)			
High Governance				.014795 (.027542)	.024306 (.027971)	.062847* (.033864)			
2 <sup>nd</sup> Quartile Social							-.017205 (.042357)	-.015408 (.039656)	.125274** (.061668)
3 <sup>rd</sup> Quartile Social							-.03083 (.03772)	-.009859 (.040381)	.150256* (.078275)
4 <sup>th</sup> Quartile Social							-.037558 (.036974)	-.037328 (.038679)	.103542 (.089577)
2 <sup>nd</sup> Third Environment							.002833 (.026848)	-.017106 (.026801)	-.02081 (.030625)
3 <sup>rd</sup> Third Environment							-.005382 (.036555)	-.020199 (.038563)	.020645 (.040075)
2 <sup>nd</sup> Quartile Governance							.048629 (.044886)	.04047 (.045854)	.08417 (.061529)
3 <sup>rd</sup> Quartile Governance							.077719* (.046537)	.070418 (.048013)	.132758* (.073592)
4 <sup>th</sup> Quartile Governance							.027361 (.047622)	.033433 (.050069)	.141151 (.088664)
_cons	.022113 (.03926)	-.836893*** (.185738)	-1.132314 (1.471011)	.050467** (.02515)	-.988927*** (.196271)	-1.181992 (1.47146)	.031818 (.04406)	-.990931*** (.189727)	-.880259 (1.488455)
Observations	1931	1799	1799	2988	2799	1799	2988	2799	1799
R-squared	.006965	.064695	.080421	.000364	.043308	.079692	.001654	.04422	.089324
FI Controls	NO	YES	YES	NO	YES	YES	NO	YES	YES
Regional FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Legal Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES
Profit Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES

Robust standard errors are in parentheses

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

## 10.7. Robustness Checks with Bank Size – Ratio of FI GLP to Average FI GLP

Table 15. OLS Regression for Model Specification (1) – PAR90

	(1) PAR90	(2) PAR90	(3) PAR90	(4) PAR90	(5) PAR90	(6) PAR90	(7) PAR90	(8) PAR90	(9) PAR90	(10) PAR90
ESG	-.000064 (.000452)	-.000305 (.000383)	-.000758 (.001352)							
High ESG Score				.000114 (.004243)	-.003765 (.003787)	-.006238 (.005026)				
Second ESG Quartile							-.007175 (.006541)	-.007585 (.006316)	-.005346 (.006385)	-.009202 (.007643)
Third ESG Quartile							-.008846* (.005314)	-.014041*** (.005142)	-.011854** (.004995)	-.017253** (.008255)
Fourth ESG Quartile							-.001275 (.006145)	-.005488 (.005054)	-.005659 (.004929)	-.01022 (.010964)
Log ESGxCount Sust			.011116 (.018712)			.005482 (.005934)				.011517 (.007868)
Log Country Score			-.05468 (.044716)			-.048282 (.037037)			-0.06115** (0.03019)	-.052828 (.038435)
Bank Portfolio Size		.003343 (.003566)	.007127* (.004133)		.000495 (.003094)	.00734* (.004158)		.000712 (.003084)	.00544 (.003738)	.007019* (.004115)
Bank Efficiency		0 (1.000e-06)	-1.000e-06 (1.000e-06)		0 (1.000e-06)	-1.000e-06 (1.000e-06)		1.000e-06 (1.000e-06)	0 (1.000e-06)	0 (1.000e-06)
Deposits to Loans		.001159 (.007701)	-.000994 (.007386)		.007241 (.006326)	-.000554 (.007406)		.007355 (.006254)	.006409 (.006672)	.00006 (.007282)
ROA		-.012394 (.076454)	-.024367 (.07406)		.042369 (.030408)	-.025303 (.074202)		.042558 (.030471)	.042996 (.030779)	-.02742 (.073929)
ROE		.000786** (.000335)	.000784** (.000342)		.001007*** (.000174)	.000779** (.000343)		.000995*** (.000171)	.001004*** (.00018)	.000773** (.000342)
Profit Margin		-.045128** (.020367)	-.044075** (.019481)		-.039282*** (.005421)	-.044054** (.01951)		-.039132*** (.005421)	-.039081*** (.005172)	-.043429** (.019363)
Capital-to-Asset		-.008139 (.008664)	-.013528 (.009106)		-.014493 (.01337)	-.013868 (.009202)		-.015539 (.013489)	-.021693 (.014282)	-.014236 (.009181)
Debt-to-Equity		-.001042* (.000583)	-.00105* (.000582)		-.000459 (.000332)	-.001049* (.000583)		-.000467 (.000335)	-.000459 (.000338)	-.001059* (.000591)
_cons	.040846*** (.008746)	.05378*** (.009633)	.255267 (.205182)	.040778*** (.003741)	.047454*** (.00719)	.255837 (.213007)	.0441*** (.004879)	.051278*** (.007769)	.376462** (.166764)	.236719 (.205029)
Observations	1829	1648	1648	2816	2553	1648	2816	2553	2553	1648
R-squared	.000024	.124429	.157213	0	.11821	.157769	.00168	.12079	.143898	.160601
Regional FE	NO	NO	YES	NO	NO	YES	NO	NO	YES	YES
Legal Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES	YES
Profit Status FE	NO	NO	YES	NO	NO	YES	NO	NO	YES	YES

Robust standard errors are in parentheses

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

