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Impact of sustainability on financial distress: Using profitability as moderator in the banking sector

Samiksha Kashyap[1+]
Shailesh Rastogi[2]
Neena Nanda[3]
Neha Parashar[4]
Asmita Dani[5]

[1,2]*Symbiosis Institute of Business Management, Nagpur, Symbiosis International (Deemed) University, India.*
[1]*Email: samiksha16kashyap@gmail.com*
[2]*Email: krishnasgdas@gmail.com*
[3]*Vivekanand Education Society's Institute of Management Studies and Research, Mumbai, India.*
[3]*Email: neena.nanda@ves.ac.in*
[4]*Symbiosis School of Banking and Finance, Symbiosis International (Deemed) University, Pune, India.*
[4]*Email: nehaparashar10@gmail.com*
[5]*Symbiosis International University, Pune, India.*
[5]*Email: director_academics@siu.edu.in*


(+ Corresponding author)

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ABSTRACT

Stakeholders in the banking sector are now prioritizing involvement. Nowadays, a solid investment plan considers ESG factors when making investment decisions to reduce risk and produce long-term advantages for investors. The main aim of this study is to appraise the impact of ESG on financial distress by using the net interest margin as a moderator in India's banking sector. This study uses twelve years (2012–2023) of data with cross-sectional units of twenty-three Indian banks. Quantile panel data regression analysis is used to investigate the results. The findings of this research include the observation that FD is unaffected by ESG and social scores. On the other hand, FD is impacted by environmental and governance scores. NIM affects the relationship between environmental score, social score, and FD. However, it does not affect the relationship between ESG, governance score, and FD. This study provides helpful insights for banks to improve their financial health.

Contribution/Originality: The inclusion of NIM as a moderating variable in this relationship has not been recognised in any study. It provides a deeper understanding of the complex relationships between these factors and how they impact the relationship between financial difficulty and ESG.

1. INTRODUCTION

The Environmental, Social, and Governance (ESG) aspects have gained more attention in the financial sector in recent years as they can directly impact a bank's financial performance and long-term sustainability. A crucial element of responsible banking practices is incorporating ESG factors into financial decision-making (Almubarak, Chebbi, & Ammer, 2023). The Indian banking industry is essential to the country's economic growth as the backbone of the nation's financial system. However, there are several financial crises, like the Asian Crisis of 1997-1998 and the 2008 Global Financial Crisis marked by a bank's incapability to fulfill its financial commitments with dire economic consequences (Jaiwani & Gopalkrishnan, 2023; Joshi, 2020). Traditional financial analysis frequently uses asset quality, capital adequacy, and liquidity ratios to determine the possibility of financial distress (FD). A

more thorough approach is offered by including ESG considerations which consider how non-financial factors might affect a bank's financial health (Hilbers, Leone, Gill, & Evens, 2000).

ESG stands for environmental, social, and governance. Initially, environmental structures pertain to preserve the natural world and encompass subjects like global warming, greenhouse gas emissions, contamination, disposal of trash, and water use. Social structures include what businesses do to support human rights, diversity, inclusion, consumer pleasure, and data security (Yurttadur, Celiktas, & Celiktas, 2019). The governance structure involves lobbying, corruption, audit committee structure, management compensation, and board composition. Several studies have proclaimed that involving ESG considerations can impact the financial distress of businesses (McGuire, Sundgren, & Schneeweis, 1988).

Financial distress in a monetary crisis means that businesses cannot make enough money to pay their debts. It has been extensively used in scholarly and professional domains (Tang, Li, Tan, & Shi, 2020). Financial distress can have high costs. Deterioration of stakeholder relations and disadvantage in market share competition are indirect costs also brought on by financial difficulties (Dmuchowski, Dmuchowski, Baczewska-Dąbrowska, & Gworek, 2023). A financial distress prediction approach can give CEOs and managers early warning messages to take preventative action and minimize damages (Kou, Peng, & Wang, 2014).

Research from recent years has connected better financial performance and risk mitigation to incorporate ESG factors into banking operations (Guillamon-Saorin, Kapelko, & Stefanou, 2018; Jia & Li, 2022). However, the precise effect of ESG on FD is still a topic of study as several factors affect both ESG and FD, and net interest margin (NIM) is one of those factors. NIM is the net interest income expressed as a percentage of average interest-earning assets. About the total amount of their (interest-earning) assets, net interest margin is the difference between the interest income that banks and other financial institutions create and the interest that is paid to their lenders (for example, on deposits) (Boubaker, Cellier, Manita, & Saeed, 2020; Dmuchowski et al., 2023). It resembles the gross margin of non-financial companies (Shi, Li, & Asal, 2023). In this paper, NIM is taken as a proxy for profitability.

There is still a problem in the real world as when considering the regulatory landscape and stakeholder expectations that are constantly shifting, understanding the relationship between ESG policies, FD, and NIM can offer essential insights into banks' resilience and long-term sustainability. The banking industry in India is encountering noteworthy obstacles to upholding financial stability and resilience among the escalating concerns around ESG issues. ESG practices have attracted much attention due to their potential impact on bank performance and sustainability (Al Barrak, Chebbi, Aljughaiman, & Albarrak, 2023). An in-depth comprehension of these dynamics is crucial since numerous studies have emphasized the association among ESG policies, profitability, and banks' financial distress. However, there is much more to learn about how ESG affects financial distress in Indian banks, especially when using NIM as a moderator.

The main objective of this paper is to investigate the relationship between ESG and FD with NIM as a moderating factor. This study analyses how ESG performance influences FD and whether NIM plays a significant role in this relationship. This study becomes crucial as it shows how ESG practices affect banks' general health and performance by analyzing the interactions between ESG parameters, financial distress, and NIM in the banking sector. Such knowledge is crucial for creating customized plans that complement the unique qualities of public and private sector banks guaranteeing long-term financial results and social influence.

This paper develops an understanding of the relationship between sustainability, financial distress, and profitability in the banking sector, offering insightful knowledge opportunities for academia, practitioners, and policymakers. Through the examination of sustainability practices as a mitigative measure against financial distress, the study emphasizes the relevance of ESG factors in building bank resilience. Furthermore, the introduction of profitability as a moderating variable emphasizes its dual role of enhancing financial stability and promoting sustainability. This research provides empirical evidence that shows how profitability might strengthen positive and reinforcing effects on the reduction of financial distress for banks, thereby helping them to integrate profitability-

driven sustainability strategies. Thus, it fills an important gap in the existing literature in emphasizing strategic alignments between financial health and ESG principles. Policymakers can leverage this research to encourage sustainability adoption in the banking sector, fostering a more stable and responsible financial ecosystem.

The study's primary motivation is to comprehend how environmental, social, and governance concerns affect banks' financial stability and drive research on the relationship between ESG and economic distress in the banking industry with NIM acting as moderator. We want to know about sustainable financial performance and efficient risk management techniques by investigating this relationship. The planned study also aims to close knowledge gaps about how ESG issues, specifically in the case of Indian banking institutions, interact with NIM to affect financial distress.

This study examines how ESG affects financial distress in the banking business using NIM as a moderator, which has important implications for the banking sector and academia. The study findings have significant implications for the regulatory bodies, bank managers, investors and customers of the banking industry. This study provides the regulatory bodies with suggestions for laws that support the integration of ESG principles in the banking industry which motivate banks toward sound projects without impacting their financial stability. This study helps bank managers balance their ESG investments to lessen financial suffering strategically and helps investors gain guidance on balancing economic and environmental aspects while making investment decisions. This study is helpful for customers selecting banks with strong ESG policies which is essential for long-term stability.

The rest of this paper is organized as follows: First, it includes the theoretical background and conceptual framework section, which focuses on conceptualizing or theorizing the conceptual model. The second section includes a review of the literature and the development of hypotheses. This part aims to drive home the point that the issue presented in the paper remains unsolved. The third part includes the data and methodology section with sample data, variables used and the proposed model. Then, the empirical results and discussions section gives the discussion and empirical analysis findings. Finally, it includes the conclusion section.

2. THEORETICAL BACKGROUND AND CONCEPTUAL FRAMEWORK

This paper supports the following four theories: stakeholder theory, legitimacy theory, resource-based theory, and overinvestment theory. To begin with, our study supports this as a stakeholder theory that demonstrates that participating in ESG activities positively impacts profit quality (Mutuc, Lee, & Tsai, 2019). This theory states that for businesses to achieve long-term profitability and competitiveness, they must consider stakeholders' and shareholders' objectives and interests (Donaldson & Preston, 1995). According to studies, businesses that participate in socially conscious initiatives can provide high-quality accounting reports, minimize their manipulation of profits, and preserve their good standing and reputation with stakeholders (Grimaldi, Caragnano, Zito, & Mariani, 2020; Hong & Andersen, 2011).

Prior, Surroca, and Tribó (2008) brought up the issue of societal legitimacy. This means that the management of enterprises may face a threat from society if they are involved in profit management. Legitimacy theory states that businesses will become more legitimate if their actions are consistent with accepted morals and values. Therefore, a company's ability to control earnings may suffer if it reports more ESG sustainability to society (Fadilah, Uzliawati, & Mulyasari, 2022). Engaging in ESG activities in sustainability disclosure can encourage businesses to tell the truth, improve openness and morale, reduce information asymmetry between the business and stakeholders, and lessen management's capacity to manipulate profits (Dawkins & Fraas, 2011; Prior et al., 2008). This makes the organization follow the rules and regulations which help improve its financial health, so this theory strongly supports our study.

According to Bhandari, Ranta, and Salo (2022) resource-based theory is widely recognized as a significant business theory that aims to elucidate the sources of sustained competitive advantage within organizations. The resource-based view contends that a company's internal resources and capabilities are its greatest assets for

enhancing performance and establishing a competitive edge (Newbert, 2007). The idea underscores the significance of financial resources, including cash flow, liquidity, and leverage, in assessing the success of a corporation within the framework of financial management (Barney, Ketchen Jr, & Wright, 2011). So this theory makes our study more robust as it shows making resources more useful can lead to improved financial performance.

Lastly, according to Duque-Grisales and Aguilera-Caracuel (2021) the overinvestment theory is that investing a substantial amount of money is necessary for some companies to achieve excellent ESG performance. Significant investment amounts have the potential to impact businesses' financial performance negatively. According to Rassier and Earnhart (2010) a company must invest heavily to raise its environmental production standards and comply with stricter regulations. This investment is frequently exorbitant and encourages the company to comply too much (Kou et al., 2014). Our study is more robust as this theory suggests that overinvestment can lead to decreased financial health.

3. LITERATURE REVIEW AND DEVELOPMENT OF HYPOTHESIS

The paper's literature review contains two parts. The first part is related to the previous literature on ESG and FD. As ESG and financial distress are prevalent problems in the corporate world, the literature examines how they affect businesses, investors, and the whole economy. The second part shows the ESG, FD, and NIM literature. This part shows the relationship between FD, NIM, and ESG based on existing literature.

3.1. ESG and Financial Distress

Boubaker et al. (2020) assessed the relationship between a bank's ESG performance and financial distress, lower default and financial distress risks, and improved the environment and corporate social responsibility (CSR). According to the stakeholder theory, increasing CSR investments can produce moral capital or goodwill. This moral capital and goodwill can lower the bank's exposure to risk and improve its financial stability by acting as an insurance protection mechanism. Kanoujiya, Singh, and Rastogi (2023) state that the FD rises as competition rises. On the other hand, ESG either increases FD or decreases financial stability in highly competitive environments. The results provide intriguing new information and substantially contribute to current ESG and FD understanding. The results suggest and advise all parties to view ESG initiatives as crucial for FD. Almubarak et al. (2023) studied Saudi companies and found that firms in financial hardship typically reveal more ESG practices. Binesh, E-Vahdati, and Ozdemir (2025) discovered that greater ESG involvement raises Z scores or lessens financial distress. This effect was most pronounced during the COVID-19 pandemic and when businesses were more innovative. Lohmann, Möllenhoff, and Lehner (2024) conclude that highly distressed firms exhibit high ESG activities.

According to Lee and Faff (2009) increasing the number of investors in socially conscious firms could potentially reduce the business's financial risk. They further argued that financial and non-financial considerations ought to guide investment decisions. They employed a sample of US chemical sector enterprises to investigate the connection between company productivity and CSR. Financial success, productivity, innovation, product or service quality, and reputation/image are the five criteria that determine a company's competitiveness (Kapelko, Oude Lansink, & Guillamon-Saorin, 2021). Using a sample of US companies, Guillamon-Saorin et al. (2018) studied the relationship between operational inefficiencies, financial health and CSR between 2004 and 2015. The companies argued that their involvement in CSR would improve their ability to access financial markets overall and improve the company's financial health, customer demand, reputation, wealth for shareholders (similar to insurance), and help in risk management. Cohen (2023) analyzed data from a sample of S&P 500 companies from 2019 to 2021 to see if ESG risk scores affected a company's chance of survival. Based on the results, a corporation's default risk and financial stability grow with more significant environmental and social risks. Additionally, Glover (2016) asserts

that default costs correlate with social and environmental risks and allocating resources to mitigate these risks could enhance the firm's total worth.

Furthermore, Jia and Li (2022) examined the connection between financial difficulty and corporate environmental performance using a sample of Australian businesses. They contend that there are four grounds for believing that financial stress and environmental performance are negatively correlated. First and foremost, improved environmental performance strengthens ties with many stakeholders which boosts the company's financial performance and sustainability and lowers the likelihood of financial difficulty (Attig, El Ghoul, Guedhami, & Suh, 2013). Second, enhanced environmental performance is correlated with adequate management quality, resource availability, and efficient resource allocation (Attig & Cleary, 2015). Businesses with superior resource allocation and management would be better able to secure funding and be less likely to have financial difficulties (Habib, Costa, Huang, Bhuiyan, & Sun, 2020). Thirdly, enterprises that exhibit good environmental performance will likely face less harsh sanctions from stakeholders in response to unfavourable environmental events. There is also a chance that unfavourable legislative and regulatory actions may be lessened for businesses with better environmental performance levels (Berman, Wicks, Kotha, & Jones, 1999; Godfrey, 2005). Chiaramonte, Dreassi, Girardone, and Piserà (2022) examine the effects of ESG scores on bank stability jointly and separately. We discover that the overall ESG score with its sub-pillars lessens bank fragility during times of financial difficulty using a sample of European banks. For banks with higher ESG ratings, this stabilizing effect is very substantial. The study further indicates that the longer ESG disclosures are made during a financial crisis, the more beneficial they are for stability.

The premise of the above literature on value relevance leads to the hypothesis. Our first hypothesis aligns with the body of existing academic research and theoretical foundations supporting ESG integration. The findings from the various studies concluded that the impact of ESG and their individual scores on financial distress in Indian banks is not assessed. Therefore, the need for a study is required based on this research gap and the first hypothesis is created:

H_1: FD is significantly and positively affected by ESG.

H_2: An individual's ESG score positively and significantly affects the FD.

3.2. ESG, Financial Distress, and Net Interest Margin

The study done by Loan, Anh, and Hoang (2024) investigates the potential effects of ESG disclosure on the return on equity (ROE), return on assets (ROA), and net interest margin (NIM) of 24 Vietnamese commercial banks. The study uses content analysis to examine twelve themes about ESG. The findings demonstrate how the disclosure of ESG policies, individual g.score, and individual e.score positively impact the financial performance of banks. Interestingly, at a 5% significance level, ESG, E, and G coefficients are the highest and have the most significant impact on ROE. However, the study has no proof that social disclosure and financial performance are statistically correlated. Çalı (2021) examines how asset and liability diversification affect bank performance while accounting for the ethical standing of the bank as shown by its ESG sustainability rating. The study's conclusions indicate that a bank's risk profile and profitability performance are significantly impacted by having an asset-focused portfolio. On the other hand, asset focus's adverse effects on return on assets and net interest margin are mitigated by having an asset-focused portfolio and a better ESG score. However, a bank's profitability is unaffected by a focus on liabilities. Nonetheless, the effect of liability focus on net interest margin and credit risk is growing if a bank has a higher ESG score and a liability-focused portfolio. This, in turn, suggests that higher-ESG banks are primarily affected by the degree of liabilities side diversification.

According to Aubuchon and Wheelock (2010) there has been a sharp rise in the significance of ESG-related obligations for businesses in recent years. The current study attempts to ascertain how ESG affects bank valuation with a focus on the moderating role of net interest margin. According to the report, when banks enhance their

NIM, ESG adds value to the bank. The NIM also moderates the relationship between the ESG and the bank's worth. According to Nugroho, Adam, Widiyanti, and Sulastri (2021) a financial crisis can be precipitated by several factors, including the Financial Stress Index (FSI). Regression analysis using pooled data was used to establish that although NIM was negative but not significant to financial stability, Non-Performing Loan (NPL), Capital Adequacy Ratio (CAR) and ROA were positively connected. As indicated by the declining NIM, bank productivity has declined, but an increasing number of other variables are maintaining overall financial stability (Attig & Cleary, 2015).

The premise presented in the literature on value relevance leads to the hypothesis. H_5- NIM positively and significantly affects the association of FD and ESG.

H_5: NIM significantly and positively affects the relationship between each individual's ESG score and FD.

In light of the discussions on theoretical development and literature review that were previously addressed, we would like to provide the conceptual framework that is illustrated in Figure 1 which this study evaluates empirically.

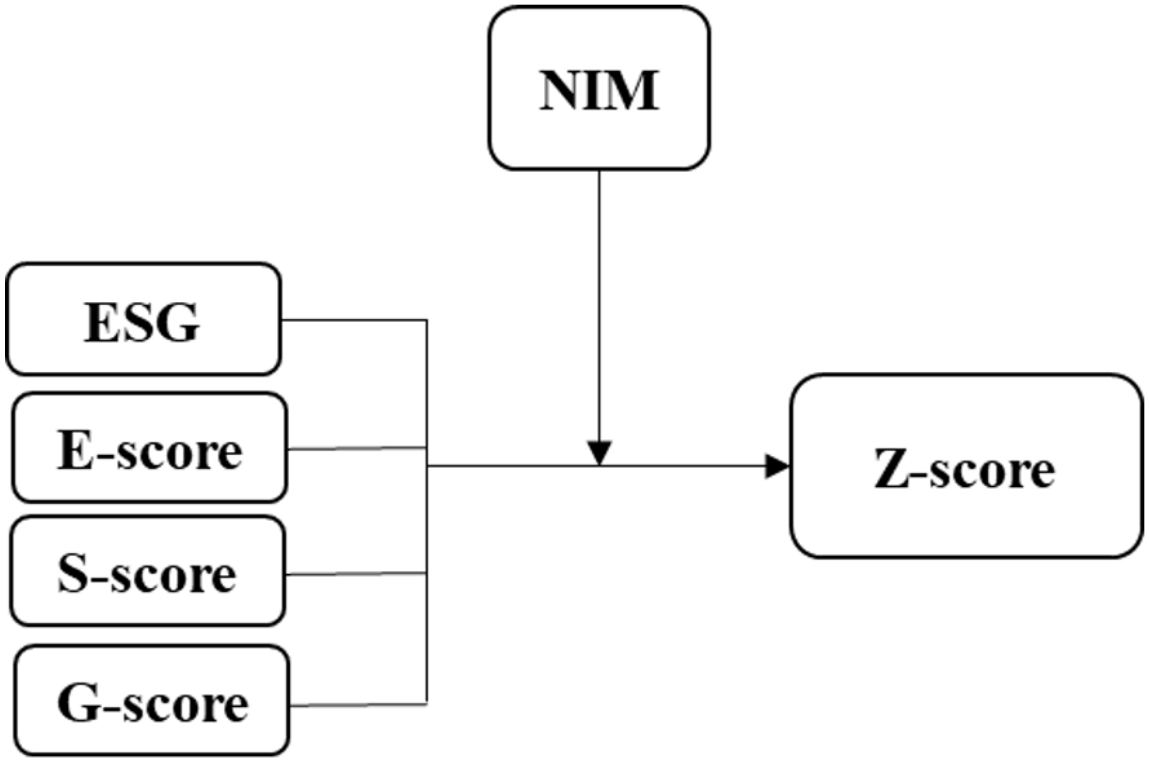

Figure 1. Analytical model.

Note: The Z-score represents the financial distress and the dependent variable of the study. In ESG, E-score, S-score, and G-score represent the sustainability and are independent variables of the study. NIM represents a bank's profitability and is used as a moderator in the study.

Table 1. Variables list.

Sr.no.	Variables	Type	Cod.	Des.	Cit.
1.	Environmental score	EV	e_score	An unweighted technique on the environmental index is applied to obtain bank-specific scores. This methodology has been customized to meet modern shareholders' requirements and wants.	Rastogi and Singh (2022)
2.	Social score	EV	s_score	The authors evaluate the business entity's score by using a dichotomous approach based on the social index they have developed.	Rastogi and Singh (2022)

Sr.no.	Variables	Type	Cod.	Des.	Cit.
3.	Governance score	EV	g_score	Based on the created index, the unweighted disclosure approach has been adopted to analyse the bank's governance disclosures.	Rastogi and Singh (2022)
4.	Environmental, social, and governance	EV	ESG	The ESG score is taken from the Bloomberg database. It is the summation of all the scores of ESG.	Jaiwani and Gopalkrishnan (2023)
5.	Financial distress	DV	z-score	The Altman z-score assesses the bank's financial distress. The higher value of the z-score is an indication of a lower FD.	Rastogi and Singh (2022)
6.	Net interest margin	MV	nim	It measured the profitability of the Indian banks. It is determined by the deduction of interest income from interest expenses.	Kanoujiya, Rastogi, and Bhimavarapu (2022)
7.	Size	CV	ln_asset	The total asset represents the size of the bank. The study used a natural logarithm of total assets.	Jaiwani and Gopalkrishnan (2023)
8.	Capital adequacy ratio	CV	CAR	CAR shows how much capital the bank has accessible. The proportion of equity to risk-weighted assets at the bank determines it.	Jaiwani and Gopalkrishnan (2023)
9.	Total loans to total assets	CV	TL_TA	The total loans are divided by the Indian banks total assets.	Citterio and King (2021)
10.	Competition	CV	li	It is used as a proxy for competition, representing the firm's dominance level in the market.	Kanoujiya et al. (2022)

Note: Var, cod., des., cit., denote the variable name, code, description of the variable, and citation. EV, DV, MV, and CV represent the explanatory, dependent, moderator, and control variables, individually.

4. DATA AND RESEARCH METHODOLOGY

4.1. Sample and Data

This study is based on 23 Indian banks which operate and deal in the Indian economy. The time used for this research is from 2010 to 2023 (fourteen years). In India, there are 34 scheduled commercial banks but this research only selects 23 banks as in 2021, the number of banks is merged (Akther, Rahman, & Rahman, 2023; Loan et al., 2024; Pinto, Rastogi, & Agarwal, 2024) and appropriate for the balanced panel data. The data for this research is extracted from Bloomberg and individual reports of the banks from the Reserve Bank of India (RBI) website. The sample of 23 Indian banks taken from the report and Bloomberg is utilized to study the impacts of ESG on the financial distress of banks.

4.2. Methodology

This study combines a time dimension spanning twelve years (2012–2023) with cross-sectional units consisting of twenty-three Indian banks. Therefore, panel data analysis (PDA) was used to investigate the links that this paper's hypotheses suggested. PDA is justified by its ability to incorporate time series and cross-sectional data, which adds value to the framework and increases the validity of the results (Baltagi, 2008; Hsiao, 2007). PDA notably provides less vulnerability to endogeneity issues (Kanoujiya et al., 2022; Wooldridge, 2012) resulting in less biased data compared to traditional time series or cross-sectional methods. Additionally, the quantile panel data regression (QPDR) model (Graham, Jinyong, Alexandre, & James, 2015) was utilised for regression analysis due to the dependent variables' non-normal distribution (Kanoujiya et al., 2023; Koenker & Hallock, 2001). The understanding that non-normality may result in differences in the effects' strength amongst various quantiles prompted this decision (Asmare & Begashaw, 2018; Hettmansperger & Joseph, 2011; Kanoujiya et al., 2023). Therefore, it is considered that the QPDR model can be used to identify complex interactions in these kinds of situations (Asmare & Begashaw, 2018; Hettmansperger & Joseph, 2011). Additionally, the QPDR model has

benefits for reducing endogeneity issues and guarantees results in consistency (Kanoujiya et al., 2022; Wooldridge, 2012). This study uses four models. Equation 1 represents the base model (B1, B2, B3, and B4). Equation 2 represents the interaction model (symbolized as I1, I2, I3, and I4). The model (base and interaction) specifications are given below.

$$Z - score(\tau) = \theta_1 IV_{it} + \theta_2\, ln\_asset_{it} + \theta_3\, TL\_TA_{it} + \theta_4 CAR_{it} + \theta_5 LI_{it} \quad (1)$$

$$Z - score(\tau) = \theta_1 d\_IV_{it} + \theta_2\, d\_nim_{it} + \theta_3\, d\_IV^{*}\, d\_nim_{it} + \theta_4\, ln\_asset_{it} + \theta_5\, TL\_TA_{it} + \theta_6 CAR_{it} + \theta_7 LI_{it} \quad (2)$$

The Z-score represents the bank's financial distress. It is a dependent variable (DV) of the study. ESG, e-score, s-score, and g-score represent the sustainability in Indian banks and the study's independent variable (symbolized as IV). Ln_asset, TL_TA, CAR, and LI are used as control variables (CV) of the study (Jaiwani & Gopalkrishnan, 2023). In Equation 2, nim represents banks' profitability used as moderators. The term d_IV*d_nim$_{it}$ represents the interacting term where nim interacts with the independent variable. The variable specifications are described in Table 1.

5. RESULTS

5.1. Statistical Description and Multicollinearity

Table 2 demonstrates the statistical description of the variables. The mean values of Z-score, ESG, e.score, and s.score are 4.701, 0.3035, 0.1003, and 0.1335, respectively, and all lie more towards a low level. This implies that Indian banks have low financial distress and that their involvement in ESG, environmental , and social activities is also shallow. The g.score average is 0.4090 which lies more toward the max value which signifies that the bank has focused on governance. The mean of NIM is 3.1019 which lies among the min and max values which signifies that bank profitability is moderate. The standard deviation of the z-score is 11.821 which represents a high level of variation in the bank's financial health. The esg, e.score, s.score, g.score, and NIM standard deviation is 0.1075, 0.0668, 0.0748, 0.1275, and 0.8905, respectively which signifies that Indian banks have low levels of variation in their ESG activities and profitability.

Table 2. Statistical description.

Variables	Obs.	Mean	SD	Min.	Max.
Z-score	322	4.701	11.821	-5.3665	96.512
Esg	322	0.3035	0.1075	0	0.71
e.score	322	0.1003	0.0668	0	0.35
s.score	322	0.1335	0.0748	0	0.83
g.score	322	0.4090	0 .1275	0	0.676
NIM	322	3.1019	0.8905	1.1669	6.5995
TL_TA	322	55.5244	18.555	0	73.034
Total asset	322	4725956	7887469	7207.27	5.95e+07
CAR	322	117.099	76.442	1	251
li.index	322	0.5861	0.5068	-5.509	1.875

Note: VIF, obs, max, min, SD denote the variance inflation factor, observation, maximum, minimum, and standard deviation.

The Variance Inflation Factor (VIF) of the independent variables used to assess multicollinearity problems is shown in Table 3. There is no multicollinearity issue because all the independent and control variables have a VIF lower than 5 (Shrestha, 2020; Wu, 2022). The QRPDM is used to overcome the endogeneity problem (Wooldridge, 2012).

Table 3. VIF.

Var	Esg	e.score	s.score	g.score	NIM	TL_TA	Total asset	CAR	li.index	Mean VIF
VIF	1.78	1.47	1.09	1.42	1.59	1.34	1.58	1.69	1.51	1.57

Note: VIF denotes the variance inflation factor, and the value should be less than 3.

5.2. Normality and Endogeneity

The Shapiro-Wilk W test results are shown in Table 4. This test is used to verify the normality of the data and to see if the application of the QRPDM to the dependent variables (z-score) is satisfied. The data and figures are not distributed normally as indicated by the p-value of W which is 0.00 indicating significance. Utilising QRPDM is also appropriate as endogeneity problems are mitigated in this modelling approach strengthening the validity of the results.

Table 4. Shapiro-Wilk W test and endogeneity.

Variables	Obs.	W	V	Z	p-value	H0: Normal data	Result
Z-score	322	0.44328	26.298	11.397	0.00000	Reject H0	Not distributed normally
Endogeneity							
DV: Z-score							
DV: Z-score	**B1**		**B2**		**B3**		**B4**
Durbin Chi-2	3.092 (0.078)		0.000 (0.979)		0.408 (0.522)		3.699 (0.054)
Wu-Hausman test	3.043 (0.082)		0.000 (0.980)		0.397 (0.5289)		3.650 (0.0572)
DV: Z-score	I1		I2		I3		I4
Durbin chi-2	2.131 (0.144)		0.351 (0.553)		0.037 (0.845)		0.477 (0.489)
Wu-Hausman test	2.730 (0.151)		0.339 (0.560)		0.036 (0.848)		0.461 (0.497)

Note: The W test measures the normality of dependent variables. The test has a null of normal distribution. The p-value is denoted by ().

5.3. Analysis of Regression

Table 5 represents the results of the base models (B1, B2, B3, and B4) where the impact of ESG and individuals' scores on the Z-score are assessed. B1 represents the relationship between ESG and financial distress. In all quantiles 25%, 50% and 75%, the p-value of ESG is insignificant (>0.05) implying that ESG does not affect the financial distress of banks. B2 shows the relationship between e.score and Z-score. At the 25%, 50%, and 75% quantiles, the p-value of e.score is significant at 1% and has a negative coefficient. This implies that an increase in environmental activities by banks results in a decrease in banks' z-score (increase in financial distress and deteriorated financial health). B3 signifies the association between social score and z-score. In all quantiles, 25%, 50%, and 75%, the p-value of the social score is insignificant (>0.05) implying that the social score does not affect the financial distress of banks. B4 shows the relationship between the governance score and the z-score. Governance does not affect financial distress at 25% and 50%, as the p-value is insignificant. Whereas at 75%, the governance has a positive coefficient and is significant at p-value (at 10%). This implies that an increase in the governance level increases the Z-score (increases financial health and decreases distress for banks).

Table 5. Quantile panel data model (Base model).

DV: Z-score		B1	B2	B3	B4
		Coef.	Coef.	Coef.	Coef.
Q25%	esg	3.843 (4.957)	-	-	-
	e.score	-	-31.395*** (8.709)	-	-
	s.score	-	-	1.918 (6.722)	-
	g.score	-	-	-	1.999 (4.225)
	TL_TA	-0.021 (0.028)	-0.022 (0.032)	-0.0245 (0.029)	-0.022 (0.030)
	ln_asset	-0.942**	-0.571	-0.906***	-1.085***

DV: Z-score		B1	B2	B3	B4
		Coef.	Coef.	Coef.	Coef.
		(0.307)	(0.357)	(0.315)	(0.314)
	CAR	0.014**	0.014*	0.018***	0.016**
		(0.007)	(0.007)	(0.007)	(0.007)
	li.index	-8.526***	-9.571***	-8.876***	-8.933***
		(0.976)	(1.105)	(1.009)	(0.999)
	Cons	17.209***	17.439**	17.560***	19.945***
		(4.585)	(5.185)	(4.800)	(4.964)
Q50%	esg	1.462		-	-
		(4.611)			
	e.score	-	-35.686***	-	-
			(4.931)		
	s.score	-	-	6.117	-
				(5.909)	
	g.score	-	-	-	-0.530
					(3.761)
	TL_TA	-0.004	-0.018	-0.008	-0.000
		(0.026)	(0.018)	(0.026)	(0.026)
	ln_asset	-1.107***	-0.478***	-1.151***	-1.089***
		(0.286)	(0.202)	(0.276)	(0.279)
	CAR	-0.001	0.005	0.000	-0.001
		(0.006)	(0.004)	(0.006)	(0.006)
	li.index	-10.830***	-8.732***	-10.985***	-11.341***
		(0.908)	(0.626)	(0.887)	(0.889)
	Cons	26.198***	19.645***	26.506***	26.602***
		(4.266)	(2.936)	(4.219)	(4.419)
Q75%	esg	-3.322	-	-	-
		(2.158)			
	e.score	-	-12.942***	-	-
			(3.619)		
	s.score	-	-	0.719	-
				(3.331)	
	g.score	-	-	-	2.570*
					(1.521)
	TL_TA	0.001	0.006	-0.005	-0.000
		(0.012)	(0.013)	(0.014)	(0.010)
	ln_asset	-0.552***	-0.540***	-0.629***	-0.556***
		(0.133)	(0.148)	(0.156)	(0.113)
	CAR	-0.007**	-0.005*	-0.010***	-0.011***
		(0.003)	(0.003)	(0.003)	(0.002)
	li.index	-2.938***	-4.045***	-3.291***	-3.011***
		(0.425)	(0.459)	(0.500)	(0.360)
	Cons	18.487***	18.427***	19.562***	17.281***
		(1.996)	(2.154)	(2.379)	(1.788)

Note: The p-value is significant at 1***, **5% and *10%, individually.

Table 6 represents the interaction model (I1, I2, I3, and I4) using profitability as a moderator. I1 shows the impact of nim on the relationship of ESG and z-score. At every quantile (25%, 50% and 75%), nim does not affect the relationship of ESG and financial distress. I2 represents the impact of NIM on the relationship of environmental score and z-score. At the 25% and 75% quantiles, it is found that the nim does not affect the e.score and z-score. At a moderate level (50% quantile), the nim positively affects the association of e.score and z-score as the i_d_e.score*d_nim has a positive coefficient and significant p-value at 5%. It implies that an increase in the profitability of banks leads to an increase in the environmental activities of the banks, increasing the z-score (implying a decrease in financial distress and improved financial health). I3 represents the impact of NIM on the relationship of social score and z-score. At the 25% and 50% quantiles, the nim does not affect the s.score and z-score. Whereas at a high level (75% quantile), the nim has a positive effect on the association of social score and z-score as the i_d_s.score*d_nim has a positive coefficient and significant p-value at 1%. It implies that an increase in

the profitability of banks leads to an increase in the social activities of the banks and results in an increase in z-score (implying a decrease in financial distress and improved financial health). I4 demonstrates the impact of nim on the relationship between governance score and z-score. The result finds that nim does not affect the relation of g.score and z-score as the p-value of the i_d_s.score*d_nim is insignificant at each quantile level.

Table 6. Quantile panel data model (Interaction model).

DV: Z-score		I1	I2	I3	I4
		Coef.	Coef.	Coef.	Coef.
Q25%	d_esg	3.907 (5.662)	-	-	-
	d_nim	-0.380 (0.694)	-0.384 (0.877)	-0.254 (0.718)	-0.255 (0.713)
	i_d_esg*d_nim	-0.453 (4.83)	-	-	-
	d_e.score	-	-27.904*** (10.003)	-	-
	i_d_e.score*d_nim	-	13.718 (10.832)	-	-
	d_s.score	-	-	1.234 (7.400)	-
	i_d_s.score*d_nim	-	-	0.735 (8.023)	-
	d_g.score	-	-	-	1.099 (4.519)
	i_d_g.score*d_nim	-	-	-	-1.521 (5.187)
	TL_TA	-0.022 (0.030)	-0.032 (0.037)	-0.020 (0.031)	-0.026 (0.032)
	ln_asset	-1.091*** (0.325)	-0.606 (0.415)	-1.019*** (0.339)	-1.140*** (0.338)
	CAR	0.018** (0.008)	0.018* (0.010)	(0.018)** (0.008)	0.019** (0.008)
	li.index	-8.538*** (1.024)	-8.740*** (1.267)	-8.927*** (1.075)	-8.194*** (1.070)
	Cons	20.083*** (4.944)	14.136** (6.240)	19.210*** (5.120)	20.719*** (5.047)
Q50%	d_esg	2.176 (4.609)	-		
	d_nim	-0.141 (0.565)	0.115 (0.406)	-0.304 (0.566)	-0.331 (0.568)
	d_nim i_d_esg*d_nim	-1.101 (3.934)	-	-	-
	d_e.score	-	-34.431*** (4.631)	-	-
	i_d_e.score*d_nim	-	10.959** (5.015)	-	-
	d_s.score	-	-	4.993 (5.832)	-
	i_d_s.score*d_nim	-	-	3.766 (6.323)	-
	d_g.score	-	-	-	0.162 (3.602)
	i_d_g.score*d_nim	-	-	-	-3.750 (4.134)
	TL_TA	-0.004 (0.025)	-0.020 (0.017)	0.001 (0.025)	-0.002 (0.025)
	ln_asset	-1.055*** (0.264)	-0.397** (0.192)	-1.018*** (0.267)	-1.095*** (0.269)
	CAR	0.000 (0.006)	0.005 (0.004)	0.001 (0.006)	-0.001 (0.006)

DV: Z-score		I1	I2	I3	I4
		Coef.	Coef.	Coef.	Coef.
	li.index	-10.514***	-8.424***	-10.576***	-9.791***
		(0.834)	0.586	(0.847)	(0.853)
	Cons	25.668***	14.944***	24.635***	25.934***
		(4.024)	(2.889)	(4.035)	(4.022)
	d_esg	-2.271	-	-	-
		(2.106)			
Q75%	d_nim	-0.055	-0.070	-0.042	-0.029
		(0.258)	(0.340)	(0.276)	(0.246)
	i_d_esg*d_nim	-1.160	-	-	-
		(1.797)			
	d_e.score	-	-13.804***	-	-
			(3.878)		
	i_d_e.score*d_nim	-	4.650	-	-
			(4.199)		
	d_s.score	-		5.822**	-
				(2.846)	
	i_d_s.score*d_nim	-	-	8.675***	-
				(3.085)	
	d_g.score	-	-	-	2.867**
					(1.559)
	i_d_g.score*d_nim	-	-	-	-0.836
					(1.789)
	TL_TA	0.000	0.004	-0.003	-0.005
		(0.011)	(0.014)	(0.012)	(0.011)
	ln_asset	-0.497***	-0.580***	-0.619***	-0.622***
		(0.121)	(0.161)	(0.130)	(0.116)
	CAR	-0.006**	-0.003	-0.619***	-0.011***
		(0.003)	(0.004)	(0.130)	(0.002)
	li.index	-2.977***	-4.013***	-3.615***	-3.433***
		(0.381)	(0.491)	(0.413)	(0.369)
	Cons	16.840***	17.515***	19.347***	19.771***
		(1.839)	(2.419)	(1.969)	(1.741)

Note: The p-value is significant at 1***, **5% and *10%, separately.

5.4. Robustness

Multiple models were investigated in this study to ensure the robustness of our findings. The study examined the sustainability effect on financial distress in banks. Additionally, the moderating effect of NIM on the relationship of sustainability and financial distress was assessed. This study employed quantile regression methods to explore the influence of sustainability on financial distress (Kanoujiya et al., 2022). Consequently, confidently assert that results are robust obtained coefficients from quantile regression methods further validated the significance of the findings. Tables 5 and 6 base and interaction models gave almost similar results which ensures consistent and reliable results and validates the existence of robust results.

6. DISCUSSION

6.1. Hypothesis Testing

Hypothesis H_1 does not have supportive evidence so it gets rejected as ESG does not affect FD. The second hypothesis (H_2) failed to get rejected as there is the effect of e.score and g.score on FD, respectively. Here, the e.score is negatively significant in all quantiles, so as the e.score increases, this leads to an increase in FD. Here, the finding of this study supports the overinvestment theory as investing heavily in raising its environmental standards and complying with stricter regulations leads to deterioration of the financial health, creating the FD within the bank. Moreover, in the case of the g.score, it is positively significant at a high level, so as the g.score increases, it leads to a decrease in FD. Here, this study finding supports the societal legitimacy theory as investing in g.score can encourage banks to be more strict toward transparency and disclosure, improve openness and morale, reduce

information asymmetry between the bank and stakeholders, lessen management's capacity to manipulate profits, and increase trust in the eyes of shareholders' which helps in improving the financial stability of the banks.

Now, in the case of hypothesis H_3, there is no supporting evidence, so it is rejected as there is no effect of NIM on the relationship between ESG and FD. However, in the scenario of hypothesis H_4, it failed to get rejected as NIM impacts the relationship of e.score, s.score, and FD. Here, NIM impacts the relationship between e.score and FD at a positive, moderately significant level, representing that high profitability will reduce the negative impact of a high e.score on FD. Here, the study's findings support the stakeholder theory as increased profitability can help a bank better meet its stakeholders' environmental expectations, improving its overall reputation and lowering the risk of financial distress. Lastly, when NIM positively impacts the relationship of s.score and FD at a high level, it signifies that an increase in the profitability of banks leads to an increase in the social activities of the banks and a decrease in FD. This study's findings support the resource-based theory as a bank's increased profitability can be seen as a resource that allows it to make social investments that improve its intangible assets, such as customer loyalty and brand reputation, and lessen the chance of FD.

6.2. Comparison with Existing Studies

The findings of this study are in line with Grimaldi et al. (2020) and Hong and Andersen (2011) which suggest that increased profitability can help a bank meet the environmental expectations of its stakeholders better, improving its reputation as a whole and lowering the risk of financial distress which supports the stakeholder theory. Donaldson and Preston (1995) and Mutuc et al. (2019) favor the theory of stakeholder perspective, which also supports the study's findings. Moreover, Fadilah et al. (2022) and Prior et al. (2008) also support this study that investing in g.score can encourage transparency and disclosure, improve openness and morale, lessen management's capacity to manipulate profits and help improve financial stability. This supports the legitimacy theory. In this context, when investing more in e.score, it leads to an increase in FD as a result of overinvestment. There are many papers like Duque-Grisales and Aguilera-Caracuel (2021) and Sueyoshi and Goto (2009) supporting it but there is paper like Sueyoshi and Goto (2009) that is not in support of these findings.

6.3. Contribution

The significant contribution of this study is to offer insights into how banks might improve their financial stability by examining the relationship between ESG elements and financial distress indicators. This study provides fascinating insights to banks. There is no impact of ESG on FD but there is an impact of individual ESG scores on FD. It shows that investing more in the environment leads to FD and good governance leads to a decrease in FD. However, when deepening the analysis under the interaction model where NIM is taken as a moderator, the findings represent there is no impact of NIM on the relationship of ESG and FD, but there is an impact of NIM on the relationship of individual ESG scores and FD. It shows that increased profitability can help a bank better meet its stakeholders' environmental expectations, improving its overall reputation and lowering the risk of financial distress, and banks' profitability will lead to an increase in the social activities of the banks and a decrease in FD. Therefore, by adding these novel and interesting findings to the literature, the current findings add to the body of information already in existence.

6.4. Implication

The study's findings have significant implications for the regulatory bodies in charge of the banking industry. The finding that environmental investments can increase financial difficulty means that policy directions should motivate banks towards environmentally sound projects without impacting their financial stability. The study shows the need for bank managers to balance their ESG investments to lessen financial suffering strategically. Managers should prioritize improving governance systems, and profitability should be the primary goal of any ESG

strategy for banks to comply with ESG standards without endangering their financial stability. The information about how banks' ESG policies should be assessed helps investors understand the type of environmental investments a bank makes and investing in banks with a high governance structure. This study is helpful for customers because it shows that banks with sound governance procedures are less likely to suffer through financial difficulties, making their deposits and transactions safer.

This study enables the investor to understand the nuances of profitability dynamics, sustainability activities, and financial health in the banking sector. Investors can understand from this research that an increase in governance practices would be positively correlated with improved financial stability and lower distress levels. However, the results also show that although environmental activities are necessary in the long- term, they might increase short-term financial stress if not aligned with the strategic objectives of the bank's financial framework. Inversely, therefore, investors would have to make a sharp analysis of the profitability and engagement of banks in relation to ESG initiatives before investment decisions. A profitable bank with balanced ESG practices indicates a better long-term investment prospect in terms of lower financial risk and stronger returns.

The findings of the study make a critical point for bankers. Profitability must be aligned with sustainability strategies to improve financial health. Banks can directly see an increase in their z-scores and consequently decrease financial distress with better governance practices. Furthermore, the results indicate that while environmental initiatives are not trivial, these need to be done in tandem with strong profitability in order to avoid financial strain. Social initiatives should be seen by bankers as offering a dual opportunity to enhance their public image as well as their financial stability. Banks can improve stakeholder trust and make the firm resilient enough to withstand economic shocks by applying profitability-driven sustainability models.

This study provides the Reserve Bank of India with key insights for policy formulation in the direction of the stabilization of the banking sector. Notably, the RBI can encourage banks to strengthen governance frameworks as a vehicle through which to improve financial health and reduce distress. The conclusions based on the dual impact of environmental activities call for regulatory support in the form of tax incentives or subsidies that would ensure that these activities are not at the cost of short-term financial stability. RBI may promote profitability-driven social activities by encouraging banks to obtain balanced ESG practices. Through such policies, RBI can contribute to a sustainable and financially resilient banking system.

7. CONCLUSION

In this study, we investigate whether ESG engagement and individual ESG scores in banks affect FD. This study is further deepened to find ESG and individual ESG scores in interaction with NIM on banks. After exploring deeply, the results come with exciting insights. This study provides fascinating insights to banks; there is no impact of ESG on FD, but there is an impact of individual ESG scores on FD. It shows that investing more in the environment leads to FD, and good governance leads to a decrease in FD. However, when deepening the analysis under the interaction model where NIM is taken as a moderator, the findings represent that there is no impact of NIM on the relationship between ESG and FD. However, NIM has an impact on the relationship between individual ESG scores and FD. It shows that increased profitability can help a bank better meet its stakeholders' environmental expectations, improving its overall reputation and lowering the risk of FD. The banks' profitability will lead to an increase in the social activities of the banks and a decrease in FD.

The study concludes that governance and profitability are critical drivers of financial health in the banking sector. An increase in governance improves the z-score, increases stability, and reduces financial distress. Profitability positively affects social activities by banks, further boosting financial health. However, while environmental activities are crucial for sustainability, they may lead to greater financial distress in the short term if not supported by substantial profitability. These findings thus shed light on the balanced integration of sustainability, where governance and profitability become stabilizers that allow for better integration of

environmental and social initiatives without losing any financial stability, hence ensuring long-term resilience and growth. This study provides valuable information on integrating ESG into risk assessment and monitoring systems for bank supervisors, regulators, and risk managers to improve the stability and resilience of the banking industry by encouraging the more proactive identification and mitigation of ESG-related risks. The moderating function of NIM is especially intriguing because it highlights the intricate relationship between banks' sustainability, risk, and profitability policies. Examining how NIM affects the connection between ESG elements and financial distress may help banks better understand the trade-offs and implications for their business models as they shift to more sustainable operations. Furthermore, the research's conclusions may have broader ramifications for the financial services sector, encompassing asset management, investment banking, insurance, and more than just banking. The insights obtained from this study could be modified and implemented to create more comprehensive, industry-wide approaches to managing ESG-related risks and opportunities as these sectors also struggle with integrating ESG into their risk management and business plans.

However, there are two sides of the coin. Hence, the limitation of this study is that it only looked at a small number of banks or the Indian banking industry, so its conclusions might not be as generalizable. Since external factors, including market dynamics, regulatory changes and macroeconomic conditions may also impact banks' financial distress. It may be challenging to determine a clear causal relationship between the variables.

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