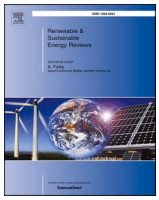
Renewable and Sustainable Energy Reviews 178 (2023) 113249

Contents lists available at ScienceDirect

Renewable and Sustainable Energy Reviews

journal homepage: www.elsevier.com/locate/rser



The impact of sustainable banking practices on bank stability

Kinan Salim [a,b,*], Mustafa Disli [c], Adam Ng [d], Ginanjar Dewandaru [e], Malik Abdulrahman Nkoba [f]

[a] School of Graduate and Professional Studies, INCEIF University, Jalan Tun Ismail, Kuala Lumpur, 50480, Malaysia
[b] Oxford Centre for Islamic Studies, Oxford, OX3 0EE, United Kingdom
[c] College of Islamic Studies, Hamad Bin Khalifa University, Qatar Foundation, Education City, Doha, Qatar
[d] World Wide Fund for Nature, Petaling Jaya, 46150, Selangor, Malaysia
[e] Indonesia National Committee of Islamic Economics and Finance, Jakarta, Indonesia
[f] Dalberg Advisors, Indian Ocean Building, Masaki, Dar Es Salaam, Tanzania

ARTICLE INFO

Keywords:
Sustainable finance
Bank stability
Environmental performance
Social performance
Financial product safety

ABSTRACT

This study seeks to examine whether corporate environmental performance (CEP) and corporate social performance (CSP) affect stability of the banking industry. The topic is of much interest to researchers and policy makers considering the growing demand to integrate environmental and social practices into banking business model. Based on a panel dataset of 473 banks in 74 countries, this research finds that CEP is negatively related to bank stability as measured by non-performing loans (NPL). However, the impact is insignificant for small and large banks, as well as for banks in countries with low environmental scores. Furthermore, CSP does not appear to have a significant relationship with bank stability, but financial product safety, which is an aspect of CSP, does. The results are robust to a variety of econometric specifications and have significant policy implications for investors, bankers and regulators.

1. Introduction

Over the past few decades, concerns about sustainability have increased in popularity due to increased awareness among stakeholders on the adverse social and environmental impacts of corporate actions. Organizations across a wide range of industries are embracing a longer-term perspective and adopting sustainable business practices to address these concerns. Considered as a sector that is vital to a country's economic development [1,2], the banking sector plays an instrumental role in sustainable development [3]. Socially responsible investment, corporate social responsibility (CSR), environmental, social and governance (ESG) and value-based intermediation are some jargon that are generating considerable interest and discussions lately, as the focus of finance and investments moves from absolute wealth maximization to the notion of sustainable and ethical finance. However, the question of whether embracing sustainable social and environmental practices can translate into positive economic outcomes is still a matter of debate. In this regard, the potential positive effect of responsible corporate behaviour on financial performance merits closer scrutiny [4]. Proponents of corporate sustainability build on the stakeholder theory, which states that companies should create value not only for shareholders, but also for other stakeholders [5]. Since the community and the environment are part of the stakeholders affected by corporate actions, this implies that being socially and environmentally responsible is increasingly becoming vital for the survival of a company. While this may be true, the shareholder theory asserts that the primary duty of the corporation is to pursue shareholder value maximization [6]. This theory reasons that CSR practices are associated with the misappropriation of shareholders' wealth since they impose an unjustified tax on shareholders and the costs outweigh the benefits.

Despite the growing literature, empirical evidence on the effect of adopting sustainable practices to corporate financial performance is mixed. Several studies have supported the notion that there is a positive link between sustainable practices and company performance [7–10]. These studies suggest that good social and environmental practices help companies attain a competitive advantage, which ultimately results in better financial performance. Conversely, other studies have found a negative relationship between sustainable practices and financial performance [11–16]. The main argument posed by these studies is that sustainable initiatives often increase operational costs, which in turn

Abbreviations: CEP, corporate environmental performance; CSP, corporate social performance; CSR, corporate social responsibility; ESG, environmental, social & governance; GMM, Generalized Methods of Moments; NPL, non-performing loans; ROA, returns on assets; ROE, return on equity.

* Corresponding author. School of Graduate and Professional Studies, INCEIF University, Jalan Tun Ismail, Kuala Lumpur, 50480, Malaysia.
E-mail address: kinan@inceif.org (K. Salim).

https://doi.org/10.1016/j.rser.2023.113249
Received 7 August 2022; Received in revised form 12 January 2023; Accepted 6 March 2023
Available online 21 March 2023
1364-0321/

negatively affect a company's competitive position.

As far as the banking sector is concerned, some studies show a positive relationship between CSR and financial performance [3,17,18]. Other studies, however, suggest that banks adopting social and environmental practices have lower financial performance as compared to their counterparts without these practices [19]. While the focus of the existing literature has been on assessing the relationship between sustainability and financial performance using profitability measures such as returns on assets (ROA) and return on equity (ROE), little is known about the effect of adopting sustainable practices on bank stability. Strong banks are vital for the stability of the financial sector, as well as for preventing instability from spreading to other parts of the economy [20]. Anecdotal evidence points to a positive association between sustainability and bank stability [21,22], whereas one study found no conclusive relationship between sustainability regulations and bank stability in Bangladesh, China and Nigeria [23]. Accordingly, this study provides the first empirical evidence on the relationship between corporate social performance (henceforth CSP), corporate environmental performance (henceforth CEP) and bank stability using a comprehensive cross-country bank-level data.

The relationship between product safety and CSP has become increasingly evident in many industries. For example, studies involving food and manufacturing industries suggest that ensuring product safety is an integral part of companies' sustainability practices [24,25]. Consequently, an increase in product safety is associated with an improvement in sustainability performance. However, little or no evidence from the banking industry exists on the relationship between financial product safety and CSP and whether product safety could be a channel through which banks' CSP affects financial performance. The same way that consumers can be tricked into buying products that involve environmental degradation, consumers who use credit cards, home mortgages, car loans and other financial products can be misled into buying products they cannot afford, which may eventually place them in financial distress. This, in turn, could have negative spill-over effects on their productivity [26], debt [27], and health [28]. This study attempts to fill this gap by examining whether financial product safety is a channel through which CSP can translate into more stable banks.

The main objective of this study is to investigate the relationship between CSP, CEP and bank stability. More specifically, this research aims to (i) assess whether CSP and CEP have a significant impact on bank stability, and (ii) examine whether the impact of CSP and CEP on bank stability varies among banks of different sizes and countries with different social and environmental scores, and (iii) investigate whether financial product safety is a channel through which CSP can affect bank stability. This research finds that CEP is negatively related to bank stability as measured by non-performing loans (NPL). The results, however, do not indicate a significant relationship between CSP and bank stability. According to the analysis in this study, CEP has an insignificant impact on bank stability in countries with poor environmental scores, and a significant negative impact in countries with good environmental scores. Conversely, CSP has no impact on bank stability regardless of a country's social score. When considering variations in bank size, the results reveal that there exists a negative relationship between CEP and bank stability for mid-sized banks, but not for very small and very large banks. Lastly, this research finds that financial product safety, as an aspect of CSP, is positively related to bank stability.

The rest of the paper is organized as follows: Section 2 reviews the existing literature, Section 3 discusses the methodology used to address the research objectives, Section 4 presents the empirical findings, and Section 5 highlights the contribution of the study, makes recommendations, identifies limitations of the study and suggests potential areas for future research.

2. Theory and literature review on sustainability, corporate and banks performance

2.1. Background

The question of what the main objective of private corporations should be has been a subject of debate for many decades. Some have described it as an extremely varied, open-ended, and inclusive topic that has remained an abstract concept for many years in the corporate vocabulary [29]. As a result, two opposing schools of thought have emerged based on different philosophies and presenting several arguments, namely, the shareholder theory and the stakeholder theory. While the stakeholder theory contends that companies should create value for all stakeholders, not just shareholders, the shareholder view argues that the key objective of a corporation is to seek to maximize shareholder wealth.

Initially proposed by Milton Friedman, the shareholder theory states that the sole responsibility of a firm is to increase profit or shareholders' wealth. This theory is built upon the idea that managers are appointed as agents of shareholders, and all actions they take should the interests of the shareholders. According to the theory, the adoption of CSR results in the misappropriation of shareholder wealth since it imposes an unjustifiable tax on shareholders, and its costs exceed any potential benefits. Hence, in the context of the present study, the adoption of good social and environmental practices involves costs which reduce the benefits that accrue to shareholders. Such resources could otherwise be diverted to credit monitoring and loan collection, which would result in a decline in non-performing loans [30] and thus benefit bank stability. Accordingly, the shareholder theory predicts that banks with lower CSP and CEP should be more stable. However, CSP and CEP can have a positive impact on a bank's financial performance as many customers and investors are increasingly taking into account a bank's CSP and CEP record when making purchasing and investment decisions. By implementing CSP and CEP initiatives, a bank can improve its reputation and build trust with customers, which can lead to increased customer loyalty and satisfaction. This, in turn, can result in higher revenues that cover losses related to non-performing loans. Indeed, the shareholder theory has been subjected to several criticisms following the collapse of companies and major banks such as Northern Rock in the United Kingdom and Lehman Brothers in the United States which were associated with poor corporate governance. A path change was necessary, as corporate governance structures were under scrutiny for all these failures and stakeholders had lost their trust in the system [31].

The stakeholder theory asserts that a company has responsibilities to a wider range of stakeholders such as customers, suppliers, employees, community and the surrounding environment. Since the community and the environment are affected by corporate actions, being socially and environmentally aware is necessary for the survival of the company. In the context of banks, it is within a bank's corporate objectives to adopt sustainable practices since its operations impact the community and the environment. Empirical evidence suggests that observing the needs of stakeholders, such as customers, generates positive shareholder returns [32]. More generally, one should expect that companies with higher CSP and CEP should have improved financial performance. Similarly, banks with a high CSP and CEP are expected to be more stable. This view is supported by the assertion that sustainable banks will be protected from losses relating to loans to clients who are adversely affected by lawsuits arising from corporate social or environmental misconduct.

In balancing shareholder and stakeholder theories, enlightened shareholder value argues that companies should maximize shareholder wealth with a long-term outlook that seeks sustainable growth and profits. Developed by Jensen [33], the theory does not merely combine the existing two theories but recognizes the fact that companies cannot maximize their value without taking good care of stakeholders [31]. Jensen's theory blends the Friedman's objective of profit maximization within the rules of the game with an aspect of morality drawn from

Freeman's stakeholder's theory. Nevertheless, the theory has been criticized for being shareholder-centric and lacking clarity on how all a company's stakeholders' interests can be balanced [31].

2.2. Sustainability and corporate financial performance

The relationship between both CSP and financial performance and CEP and financial performance has been widely discussed in the literature. However, the existing empirical evidence presents mixed results [34]. While some studies find a positive link [7–10,34–37], others suggest that CSP and CEP have in fact a detrimental effect on financial performance [11–16,34,38]. In a meta-analysis that covers 52 studies over 35 years, Albertini [35] find, on balance, a positive relationship between CEP and financial performance using all different measures of CEP and financial performance. Based on a study of 229 firms listed on Pakistan's stock exchange, Ali et al. [39] show that CSR improves financial performance because of its positive image among stakeholders. Alkaraan et al. [40] conclude that non-financial companies in FTSE with good ESG performance have better financial results in addition to being better at disclosing information. Likewise, using a sample of 230 European companies, Moneva and Ortas [36] show that businesses that perform better on environmental matters exhibit better financial results. As for the nexus between CSP and financial performance, in a meta-analysis consisting of 251 studies, Margolis et al. [37] reveal a positive link between CSP and financial performance. Their study indicates that observer perceptions and self-reported social performance provide a stronger link between CSPand financial performance compared to third-party audits and mutual fund screens. Choi et al. [41] find that there is a strong positive relationship between CSP and financial performance for larger or high-tech SMEs. Likewise, Okafor et al. [42] show that tech companies in Standard and Poor's 500 that spend more on CSR have higher revenues and profits. Conversely, using Bloomberg's ESG disclosure scores covering the Standard and Poor's 500 firms in the period 2007 to 2011. Nollet et al. [43] report a negative link between social sustainability and financial performance. Nevertheless, based on non-linear regression analysis, their findings suggest an U-shaped relationship indicating a positive social-performance effect in the long run. El Khoury et al. [44] also show a nonlinear relationship between ESG and financial performance, with ESG investments remaining beneficial until a certain inflection point. Of particular relevance to CSP is the aspect of product safety. As part of socially sustainable practices, companies in various industries have been improving their product safety to protect product users' interests. For example, in the food industry, food safety compliance is often prioritized to achieve sustainable value creation [25]. Product safety is also a key social concern in the manufacturing industry. As mentioned by Boileau [24], sustainable equipment manufacturers incorporate protective features in their products to ensure that their products are safe for use. Nonetheless, some studies present opposite findings on the CSP, CEP, and financial performance nexus. Using a sample of 537 firms quoted on the London Stock Exchange, Brammer and Millington [15] report that firms with unusually high or low CSP experience higher financial performance. In addition, based on security analyst earnings forecasts covering a sample of 523 US firms, Cordeiro and Sarkis [38] demonstrate that environmental activism negatively influences financial performance.

2.3. Sustainability in the banking industry

Despite promising evidence of the CSP and financial performance, and CEP and financial performance relations in different industries, studies from the banking industry are still limited, not conclusive and present mixed results. In some studies, sustainable banks exhibit better financial performance [3,17,18], whereas other studies report neutral or even negative effects on performance [19,62]. Using a sample of 385 US based banks, Simpson and Kohers [17] find a positive relationship between CSP and financial performance. Nizam et al. [3] documents a similar finding using a sample of 713 institutions from 75 countries. In a cross-country study, Belasri et al. [63] find that CSR has a positive impact on bank's efficiency, but only in developed countries where investor protection is high. Buallay et al. [64] find that ESG improves bank performance in developed countries. Maqbool and Zameer [65] show that CSR gives a competitive advantage to Indian banks which benefits their financial performance. Conversely, Soana [19], albeit with a small sample of 21 international banks, finds a negative link between social sustainability and financial performance. Further, Chih et al. [62] report no significant relationship between CSR and financial performance based on a cross-country sample of 520 financial institutions. Fijałkowska et al. [66] show that CSP does not influence bank financial performance in Central and Eastern Europe.

Banks operate in an industry that is subject to strict regulations and other monitoring mechanism such as robust internal controls and mandatory audits. With reference to the 2008 global financial crisis, various studies have attempted to explore the relationship between other non-regulatory factors and bank stability. Such studies hypothesize that, apart from the formal regulatory mechanism, aspects like social capital, financial inclusion and sustainability, have a role to play on the stability of the banking industry. Using a sample of more than 5500 banks, Jin et al. [67] find that banks in high social capital regions experienced fewer failures and less financial trouble during the global financial crisis than banks in low social capital regions. Likewise, with an international sample of 2635 banks in 86 countries over the period 2004 to 2012, Mostak and Mallick [68] document that higher level of financial inclusion improves bank stability.

Banks have been shown to play a key role in sustainable development [3], but little is known about how sustainable practices affect their soundness. Anecdotal evidence suggests that sustainable practices lead to bank stability [21,22], while others do not find this association [23]. In early papers, Jevons [21] claimed that sunspots causing drought and poor harvests adversely affect international trade, resulting in significant bank losses and financial crises. As a result of unsustainable farming methods in the firm belt states, the dust bowls, which affected the United States at the turn of the 20th century, were followed by economic downturns which led to significant losses on bank loans and economic instability [22]. These studies imply that banks and more generally countries that prudently observe their community and environment and embrace more sustainable practices have more stable financial systems. While this may be true, using a sample of banks in Bangladesh, evidence from Weber and Oni [23] suggests that no significant relationship exists between sustainability performance and banks' non-performing loans. However, to the best of our knowledge, there is no comprehensive cross-country study that examines the relationship between sustainability performance and bank stability. Therefore, this study substantially contributes to the literature by gathering a bank dataset that covers more than 70 countries.

In addition, there has been growing research attempting to see the relationship between product safety and CSP. For example, studies from the food industry and manufacturing industry suggest that ensuring product safety is an integral part of sustainability practices [24,25]. Although these studies imply that sustainability performance improves with product safety, little or no evidence exist from the banking industry on the financial product safety and CSP nexus and whether financial product safety can be a channel through which CSP affects the financial performance. With limited knowledge and exposure to banking products, bank customers with access to credit cards, home mortgages, and other financial products may be tempted to purchase products which customers cannot afford, resulting in unexpected financial difficulties. As a result, this can negatively affect customers' productivity [26], debt [27], and health [28]. Considering this gap, this research investigates whether financial product safety is a channel through which CSP can translate into more stable banks.

3. Data and methodology

3.1. Data and sample

This research uses an unbalanced panel dataset of 473 commercial banks, which mostly serve both corporation clients and individual clients in 74 countries from 2007 to 2016. While the data for bank specific variables is obtained from FitchConnect, the data on environmental and social variables is fetched from the MSCI ESG research database. As one of the most comprehensive ESG databases, the MSCI ESG database has been extensively used in recent literature [3,18,45a,b,46–50]. In contrast to Bloomberg and Thomson Reuters which do not consider materiality of ESG issues in different sectors, the MSCI ESG database categorizes ESG issues based on their materiality in different sectors. Using a comprehensive approach, the database sources data from governments, NGOs, company disclosures, and more than 1600 media sources that are monitored daily [51]. This makes the MSCI ESG database the standard for quantifying corporate social action [52]. It is important to highlight that ESG ratings are measured differently across rating agencies, and can therefore be an inconsistent measure of environmental and social performance. Additionally, data on macroeconomic variables and ESG country scores were obtained from the World Bank and Bloomberg, respectively. Variable descriptions and sources are listed in Table 1.

3.2. Data description

The study collects bank-specific and macroeconomic data from FitchConnect and the World Bank, respectively. In what follows, this research describes the variables that were used to conduct this study.

The stability of the banking sector is largely determined by the non-performing loans (NPLs) [53]. These are bank loans that are subject to late repayment or are unlikely to be repaid by the borrower. A bank's stability decreases as the amount of non-performing loans increases. In accordance with Atilla [54], this research uses non-performing loans as the main indicator of bank stability. The ratio of impaired loans to gross loans is used to measure non-performing loans.

To ensure comprehensiveness, this research uses the MSCI environmental pillar score as a proxy for CEP. This represents the weighted average of all material key issues that fall under the environment pillar. The finance of environmental impact is the key issue in the environmental pillar of ESG for banks. Banks are evaluated on the environmental risks of their lending and underwriting activities and their ability to capitalize on opportunities related to green finance. The CEP provides a measure of index constituents' management of environmental risks and opportunities, as well as their exposure to them. Specifically, the exposure score is based on the bank's business segments and the environmental intensity of its loan portfolio, while the management score is based on how the bank responds to environmental risks, for example, by implementing environmental credit policies, environmental risk management systems, and environmental financing opportunities. The CSP variable is calculated using the MSCI ESG database's social pillar score, which is a weighted average of all material key issues falling under the social pillar. For banks, this includes four material social key issues: human capital development, financial product safety, privacy and data security, and access to finance. Similar to CEP, CSP score is based on the exposure score and the management score of each of these key issues. The CEP and CSP variables are incorporated at bank level. Moreover, other bank-specific control variables, such as loan loss reserve to gross loan, total assets, return on assets, equity to total assets, net interest margin, asset growth, loans to total assets, non-interest income and efficiency ratio, have been taken into consideration in the econometric analysis. These variables have been widely used in the existing literature [3,18,55–57]. The descriptive statistics of the variables are shown in Table 2, while the Pearson's correlation matrix is shown in Table 3. According to the matrix, there is no evidence of multicollinearity in the dataset.[1]

The model incorporates GDP growth and inflation to account for the macroeconomic environment in which banks operate. Previous studies revealed that the financial performance of the banking industry is sensitive to inflation and GDP growth [58]. For example, Dietrich and Wanzenried [59] report a positive link between GDP growth and financial performance. During financial crises, however, slow GDP growth can negatively affect banks' credit quality, resulting in decreased financial performance. A close association has also been found between bank financial performance and inflation in existing studies [60].

Table 1
Variables, sources and descriptions.

Variable	Description	Source
BS: Bank-specific variables		
NPL	Non-performing loans computed as impaired loans divided by gross loans	FitchConnect
ASSET	Natural logarithm of the volume of total assets	
ROA	Net income divided by average total assets	
ETA	Equity divided by total assets	
NIM	Net interest income divided by total earning assets	
LTA	Total loans divided by total assets	
ASSETG	First difference of total assets divided by previous total assets	
NNI	Total non-interest income divided by the sum of interest dividend income and total non-interest income	
EFF	The sum of personnel expenses and other operational expenses divided by the sum of interest dividend income and total non-interest income	
GDPG	Real GDP growth	World Bank
INFL	Inflation according to the consumer price index	
Social and environmental sustainability performance factors		
CEP	Weighted average of all material key issues that fall under the MSCI ESG environment pillar	MSCI ESG
CSP	Weighted average of all material key issues that fall under the MSCI ESG social pillar	
Country's social and environmental sustainability performance factors		
EC	Country environment score	Bloomberg
SC	Country social score	

3.3. Methodology and model specification

In studies on bank risk, it has been found that NPLs have a time persistence, therefore, lags of the dependent variable (NPL) are often used on the right side of the equation in order to capture this persistence. In the presence of the lagged dependent variable, the traditional panel estimators (such as ordinary least squares, fixed effects, and random effects) are biased. The issue of endogeneity may arise in dynamic panels because of the correlation between the individual specific effect and the lagged dependent variable. This research adopts a dynamic panel specification using Generalized Methods of Moments (GMM) estimators. Specifically, this research uses System GMM. First difference GMM estimator uses the lagged level variables as instruments to deal with endogeneity. The System GMM estimator takes into account both the level variable and the first difference, hence it overcomes the shortcomings of difference GMM estimator. In addition, GMM does not require distributional assumptions on the error terms. It also accounts for heteroscedasticity which is a common problem in the panel studies. The Arellano-Bond auto-correlation test is used to confirm the absence of second order autocorrelation. In addition, this research uses the Hansen test to verify the relevance of the instruments. In all cases, this

[1] A variance inflation factor (VIF) analysis was also conducted to examine the presence of multicollinearity, and the results showed that none of the independent variables were highly correlated (mean = 1.71; minimum = 1.25; maximum = 2.63).

Table 2
Descriptive statistics.

Variables	Number of observations	Mean	Standard Deviation	Minimum	Maximum
RNPL (ratio × 100)	1664	3.3504	4.7998	0	59.59
NPL (log-odds transformation of RNPL)	1660	−3.9602	1.1792	−9.2102	0.3884
CEP (bank environmental score, takes value from 0 to 10)	2131	3.6700	2.3297	0	10
CSP (bank social score, takes value from 0 to 10)	2131	4.8699	1.3580	0.9	9.78
ASSET (Logarithm of bank total assets)	2133	10.4446	1.8962	5.0882	15.0030
ETA (ratio × 100)	2133	17.4408	23.4015	−85.37	100
NIM (ratio × 100)	1954	7.5274	186.5648	−115.27	8247.09
LTA (ratio)	1945	0.5685	0.1824	0.0000	0.9814
NNI (ratio)	1937	0.2267	0.1811	−2.3715	0.9986
EFF (ratio)	1844	0.4031	0.2901	0.0021	9.01526
ASSETG (growth rate of total assets)	1609	0.1074197	1.278247	−0.9642	38.2285
GDPG (growth rate of GDP)	1588	2.792716	2.229293	−9.7729	25.5572
INFL (ratio × 100)	1581	2.733872	7.956975	−1.5384	254.9485

Note: RNPL represents the original data of non-performing loans, NPL represents log-odds transformation of RNPL, CEP represents bank level environmental score, CSP represents bank level social score, ASSET represents the log of bank's total assets, ETA represents equity to total assets ratio, NIM represents ratio of net interest income divided by total earning assets, LTA represents loans to total assets, NNI represents non-interest income to total income, EFF is a measure of efficiency proxied by admin expenses over total income, ASSETG represents assets growth, GDPG represents GDP growth and INFL represents inflation rate.

Table 3
Pearson's correlation matrix.

Variables	NPL	CEP	CSP	ASSET	ETA	NIM	LTA	NNI	EFF	ASSETG	GDPG	INFL
NPL	1											
CEP	0.1665	1										
CSP	0.2718	0.3909	1									
ASSET	0.0112	0.1636	0.2601	1								
ETA	−0.0091	−0.1438	−0.2146	−0.4865	1							
NIM	0.1407	0.0739	0.0267	−0.5318	0.4576	1						
LTA	−0.092	−0.2737	−0.3436	−0.304	0.0576	0.1162	1					
NNI	0.0001	0.0864	−0.0062	−0.0014	0.2105	−0.0684	−0.3307	1				
EFF	−0.0788	−0.1545	−0.3266	−0.2993	0.1704	−0.0115	0.0444	0.4239	1			
ASSETG	−0.0811	−0.0116	−0.0116	0.0408	−0.0018	−0.0185	−0.0384	0.0228	−0.0213	1		
GDPG	0.0206	−0.0723	−0.0049	−0.191	0.1001	0.2406	0.1652	−0.1479	−0.2189	0.0035	1	
INFL	0.1045	0.1002	0.1658	−0.1401	0.1401	0.5901	−0.0429	−0.1293	−0.3169	−0.0066	0.0607	1

Note: NPL represents non-performing loans, CEP represents bank level environmental score, CSP represents bank level social score, ASSET represents the log of bank's total assets, ETA represents equity to total assets ratio, NIM represents ratio of net interest income divided by total earning assets, LTA represents net loans to total assets, NNI represents non-interest income to total income, EFF is a measure of efficiency proxied by admin expenses over total income, ASSETG represents assets growth, GDPG represents GDP growth and INFL represents inflation rate.

research reports the two-step robust standard errors of Windmeijer [61] for collapsing the instruments so that the number of instruments is kept below the number of cross-sectional units.

The benchmark estimation model is described as follows:

$$LNPL_{i,j,t} = \propto_1 LNPL_{i,j,t-1} + \propto_2 CEP_{i,j,t-1} + \propto_3 CSP_{i,j,t-1} + \propto_4 BS_{i,j,t-1} + \propto_5 MS_{jt} + \varepsilon_{i,j,t} \quad (1)$$

The dependent variable is the log-odds transformation of NPL (LNPL) (ratio of impaired loans to gross loans), i.e. LNPL = ln (NPL/(100-NPL)). Lower NPL implies that a bank collects most loans and advances on time. Thus, the lower the NPL, the more a bank is deemed to be stable. CEP is the bank's environmental performance, CSP is the bank's social performance, BS represents bank-specific control variables, and MS represents macroeconomic variables. This research has used the subscripts i, j, and t in the equations to represent variables at the bank, country, and time levels, respectively. Equation (2) enables us to account for a country's social and environmental scores:

$$LNPL_{i,j,t} = \gamma_1 LNPL_{i,j,t-1} + \gamma_2 CEP_{i,j,t-1} + \gamma_3 CSP_{i,j,t-1} + \gamma_4 BS_{i,j,t-1} + \gamma_5 MS_{j,t} + \gamma_6 EC_{j,t} + \gamma_7 SC_{j,t} + \varepsilon_{i,j,t} \quad (2)$$

with EC representing the country's environmental performance, and SC representing its social performance. Furthermore, to assess whether the effect of CEP and CSP on bank stability is different for banks operating in countries with high and low environmental and social scores, this research estimates the following regression equation:

$$LNPL_{i,j,t} = \delta_1 LNPL_{i,j,t-1} + \delta_2 CEP_{i,j,t-1} + \delta_3 CSP_{i,j,t-1} + \delta_4 BS_{i,j,t-1} + \delta_5 MS_{j,t} + \delta_6 EC_{j,t} + \delta_7 SC_{j,t} + \beta_8 CEP_{i,j,t} * EC_{j,t} + \beta_9 CSP_{i,j,t} * SC_{j,t} + \varepsilon_{i,j,t} \quad (3)$$

4. Empirical findings

This research highlights the key findings under the following headings: (i) CSP-Bank stability and CEP-Bank stability; (ii) Interaction with bank size and country's social and environmental scores; (iii) Relationship between financial product safety (CSP) and bank stability.

4.1. CSP-bank stability and CEP-bank stability

Table 4 summarizes the results of the GMM linear estimation conducted to verify the relationship between bank CSP and bank stability, as well as between bank CEP and bank stability. According to Models 1 and 2, the empirical results do not take into account the country's social and environmental scores, but Models 3, 4, and 5 do account for these factors. Models 1 and 3 control for three bank specific variables namely, total assets (ASSETS), equity total asset ratio (ETA), and net interest margin (NIM). Furthermore, Model 2 and Model 4 add on macroeconomic variables, i.e., GDP growth (GDPG) and inflation (INFL). Model 5 controls for all bank specific variables and macro-economic variables as well. Results from Table 4 indicate that there is a

Table 4
CSP-bank stability and CEP-Bank stability.

	Model 1	Model 2	Model 3	Model 4	Model 5
l.NPL	0.640***	0.747***	0.764***	0.756***	0.641***
	(4.33)	(5.25)	(7.20)	(6.47)	(9.92)
CEP	0.0555***	0.0391**	0.0326*	0.0361*	0.0653***
	(3.21)	(2.03)	(1.74)	(1.93)	(3.17)
CSP	−0.00360	−0.0193	−0.0181	−0.0137	0.0205
	(-0.14)	(-0.67)	(-0.66)	(-0.48)	(0.64)
ASSETS	0.377***	0.483***	0.414***	0.409***	0.105
	(3.61)	(4.06)	(3.69)	(3.53)	(0.64)
ETA	0.0142	0.0311	0.0219	0.0304	−0.0383
	(0.34)	(1.28)	(0.96)	(1.35)	(-0.96)
NIM	−0.114**	−0.0958	−0.0835	−0.0925	−0.0746
	(-2.53)	(-1.57)	(-1.51)	(-1.60)	(-1.52)
GDPG		−0.0243		−0.0207	
		(-1.42)		(-1.21)	
INFL		0.00204		0.00222	
		(0.10)		(0.13)	
LTA					1.011
					(0.92)
NNI					−0.545
					(-1.50)
EFF					0.0389
					(0.07)
ASSETG					0.169
					(0.56)
EC			−0.00962	−0.0127	
			(-1.28)	(-1.59)	
SC			−0.0222*	−0.0125	
			(-1.65)	(-0.83)	
Constant	−5.321***	−5.927***	−3.646**	−4.024**	−2.342
	(-3.67)	(-4.60)	(-2.04)	(-2.19)	(-1.06)
Country fixed effect	No	No	No	No	Yes
No. Of observations	1142	909	922	909	1112
No. Of groups	321	297	301	297	318
Instruments	15	17	17	19	215
AB test AR(1) [p-value]	0.0118	0.0175	0.00867	0.0115	0.0005
AB test AR(2) [p-value]	0.899	0.815	0.758	0.782	0.874
Hansen tests [p-value]	0.0984	0.0838	0.0969	0.0618	0.160

Note: NPL, the dependent variable, represents the log-odds transformation of non-performing loans, l.NPL represents the first lag of the dependent variable, NPL. CEP represents bank level environmental score, CSP represents bank level social score, ASSET represents the log of bank's total assets, ETA represents equity to total assets ratio, NIM represents ratio of net interest income divided by total earning assets, GDPG represents GDP growth and INFL represents inflation rate. LTA represents loans to total assets, NNI represents non-interest income to total income, EFF is a measure of efficiency proxied by admin expenses over total income, ASSETG represents assets growth, EC represents country level environmental score and SC represents country level social score. *T* statistics in parentheses; $*p < 0.1$, $**p < 0.05$, $***p < 0.01$.

significant positive relationship between CEP and non-performing loans (proxy for bank stability) in most Models. For example, in Model 1, a 1% increase in CEP score will increase non-performing loans by 0.05% point. For the CEP-bank stability relationship, these results are in line with studies that suggest banks that embrace social and environmental sustainability have lower financial performance as compared to their counterparts [19,43]. These results should not be taken as an excuse for poor environmental performance of the banks as this study uses NPL as a proxy of bank stability. A poor environmental and social performance may have a negative impact on bank stability that might not be captured by NPL ratio. For example, impact depositors may withdraw their money and close their accounts if the bank is involved in an environmental scandal. This risk is not captured by NPL. These studies denote that banks that adopt sustainable environmental practices are less stable than those that do not. This could be explained by the fact that banks that implement good environmental practices incur costs, which reduce shareholder benefits. Instead, such resources could be allocated to credit monitoring and loan collection [30], which would enhance bank stability.

Also, in all 5 models, results reveal existence of no significant relationship in the CSP and bank stability nexus. As for the CSP and bank stability relationship, results indicate no significant relationship between the two. This implies that adoption of sustainable practices by banks have no effect to their stability and support the results reached by Weber and Oni [23].

4.2. Interactions with bank size

A better interpretation of Table 5 results can be found in the average marginal effect graphs, which are indicated in Figs. 1–3. Model 1 takes into account the interaction between the CEP size and the country's social and environmental scores, while Model 2 does not account for country scores. Model 3 takes into account the interaction between CSP and size, as well as the country's social and environmental scores, while the Model 4 does not control for country scores. As shown in Fig. 1, the results from Model 1 indicate that CEP has no impact on bank stability regardless of the size of the bank. However, in Model 2 (shown in Fig. 2), where country's social and environmental scores are excluded as control variables, empirical evidence suggests that there exists a negative relationship between CEP and bank stability for mid-sized banks, whereas the relationship is insignificant for small and large banks. In accordance with Weber and Oni [23], the results in Model 3 as shown in Fig. 3 indicate that CSP has no impact on bank stability regardless of bank size.

4.3. Interactions with country's social & environmental scores

Table 6 presents the results of estimations where this research interacts CEP and CSP with the countries' environmental (EC) and social (SC) scores. As with the findings that relate to interaction with bank size, average marginal effect graphs, referred to as Figs. 4–7, are used to explain the findings. The first model incorporates the interaction

Table 5
Interactions with bank size.

	Model 1	Model 2	Model 3	Model 4
l.NPL	0.754***	0.637***	0.785***	0.644***
	(7.71)	(4.32)	(7.62)	(4.22)
CEP	0.171	0.0834	0.0362*	0.0529***
	(1.00)	(0.64)	(1.80)	(2.99)
CSP	−0.0129	−0.00294	0.0654	−0.128
	(-0.47)	(-0.11)	(0.35)	(-0.76)
EC	−0.00938		−0.00884	
	(-1.27)		(-1.22)	
SC	−0.0248*		−0.0211	
	(-1.84)		(-1.59)	
CEP × ASSETS	−0.0131	−0.00267		
	(-0.82)	(-0.23)		
ASSETS	0.455***	0.388***	0.444***	0.317***
	(3.65)	(3.22)	(3.38)	(2.82)
ETA	0.0222	0.0114	0.0251	0.0124
	(0.97)	(0.27)	(1.06)	(0.27)
NIM	−0.0859	−0.111**	−0.0933*	−0.115**
	(-1.59)	(-2.48)	(-1.66)	(-2.51)
CSP × ASSETS			−0.00749	0.0118
			(-0.44)	(0.79)
Constant	−4.022**	−5.431***	−4.002**	−4.646***
	(-2.21)	(-3.46)	(-2.11)	(-3.16)
No. Of observations	922	1142	922	1142
No. Of groups	301	321	301	321
No. Of instruments	18	16	18	16
AB test AR(1) [p-value]	0.00668	0.0111	0.00817	0.0129
AB test AR(2) [p-value]	0.743	0.897	0.730	0.910
Hansen tests [p-value]	0.0666	0.0720	0.103	0.0559

t statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Note: NPL, the dependent variable, represents the log-odds transformation of non-performing loans, l.NPL represents the first lag of the dependent variable, NPL. CEP represents bank level environmental score, CSP represents bank level social score, EC represents country level environmental score and SC represents country level social score. ASSET represents the log of bank's total assets. CEP × ASSETS is the interaction term of CEP and ASSETS while CSP × ASSETS is the interaction term of CSP and ASSETS. ETA represents equity to total assets ratio, NIM represents ratio of net interest income divided by total earning assets.

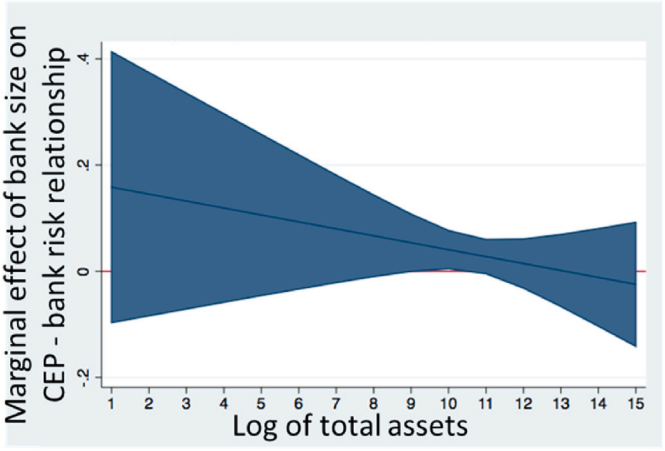


Fig. 1. CEP - bank size interaction (Table 5 -Model 1).

between CEP and the country's environmental score, while the second model incorporates the interaction between CSP and the country's social score. Model 3 includes both interactions. Based on Model 1, results from Fig. 4 show how CEP has an insignificant effect on bank stability in countries with poor environmental conditions and a negative effect in environmental-performing countries. This is because for the latter, CEP is positively linked to NPL. Conversely, depicting Model 2, Fig. 5 shows that CSP has an insignificant impact on bank stability regardless of a country's social score. Model 3 exhibits similar results, as shown in

Fig. 2. CEP - bank size interaction (Table 5 -Model 2).

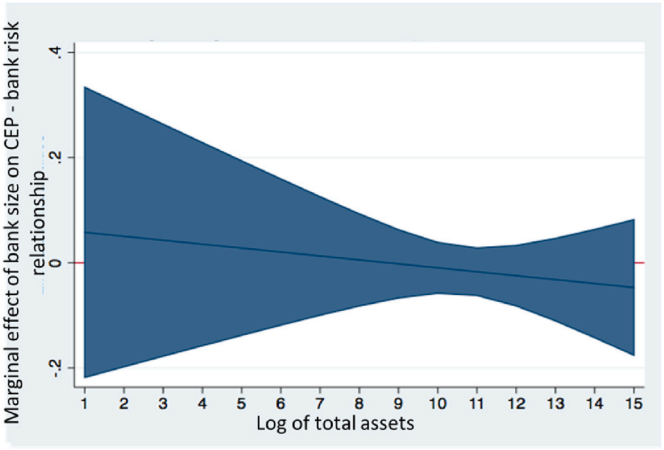


Fig. 3. CSP – bank size interaction (Table 5 -Model 3).

Figs. 6 and 7. The results for the CEP-bank stability relation are consistent with those of Weber and Oni [23] for countries with poor environmental scores, and with those of Soana [19] and Nollet et al. [43] for countries with better environmental scores. The CSP-bank stability results support those reached by Weber and Oni [23], who found no significant association between CSPand bank stability. One possible explanation for these results could be that operating in countries that already have higher social and environmental scores might be overdoing their sustainable practices due to the pressure from their stakeholders to the extent that it negatively affects their credit portfolio.

4.4. Financial product safety (CSP)-Bank stability relation

This research then examines whether financial product safety is a channel through which CSP can translate into more stable banks. The MSCI ESG research database covers four key social aspects for banks: human capital development, financial product safety, privacy & data security, and access to finance. Among the most important material issues facing the banking industry is financial product safety. This research has isolated scores from financial product safety out of the overall CSP score and retained the CEP score to assess the impact of financial product safety on bank stability. Table 7 presents results of estimation with financial product safety instead of the CSP. Model 1 does not include any control variables, Model 2 controls for three bank specific variables, which are total assets, equity to total assets ratio, and net interest margin, and Model 3 controls for macro-economic variables, i.

Table 6
Interactions with Country's social and environmental scores.

	Model 1	Model 2	Model 3
l.NPL	0.755***	0.767***	0.758***
	(6.91)	(7.26)	(6.97)
CEP	−0.123*	0.0322*	−0.123**
	(-1.94)	(1.71)	(-1.96)
CSP	−0.0204	0.00713	0.0103
	(-0.75)	(0.04)	(0.06)
EC	−0.0211**	−0.00960	−0.0210**
	(-2.36)	(-1.29)	(-2.36)
SC	−0.0243*	−0.0200	−0.0216
	(-1.83)	(-0.99)	(-1.08)
CEP × EC	0.00377**		0.00376**
	(2.48)		(2.50)
CSP × SC		−0.000495	−0.000608
		(-0.14)	(-0.18)
ASSETS	0.429***	0.417***	0.433***
	(3.85)	(3.66)	(3.83)
ETA	0.0235	0.0211	0.0228
	(1.04)	(0.91)	(0.99)
NIM	−0.0833	−0.0824	−0.0823
	(-1.49)	(-1.47)	(-1.46)
	−3.250*	−3.782*	−3.426*
Constant	(-1.84)	(-1.90)	(-1.73)
No. Of observations	922	922	922
No. Of groups	301	301	301
No. Of instruments	18	18	19
AB test AR(1) [p-value]	0.0101	0.00864	0.0101
AB test AR(2) [p-value]	0.776	0.758	0.776
Hansen tests [p-value]	0.124	0.0976	0.126

t statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Note: NPL, the dependent variable, represents the log-odds transformation of non-performing loans, l.NPL represents the first lag of the dependent variable, NPL. CEP represents bank level environmental score, CSP represents bank level social score, EC represents country level environmental score and SC represents country level social score. ASSET represents the log of bank's total assets. CEP × EC and CSP × SC are interaction terms for bank level and country level environmental and social scores respectively. ETA represents equity to total assets ratio, NIM represents ratio of net interest income divided by total earning assets.

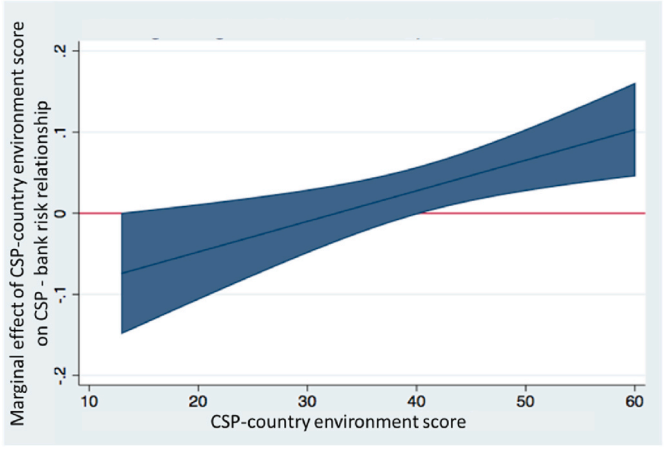


Fig. 4. CEP-country environment score interaction (Table 6 -Model 1).

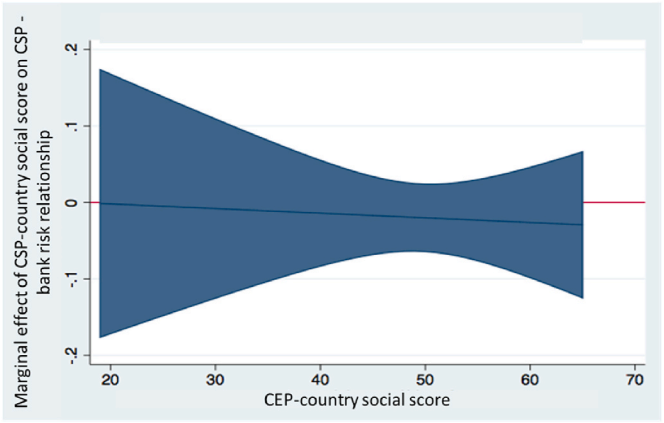


Fig. 5. CSP-country social score interaction (Table 6 -Model 2).

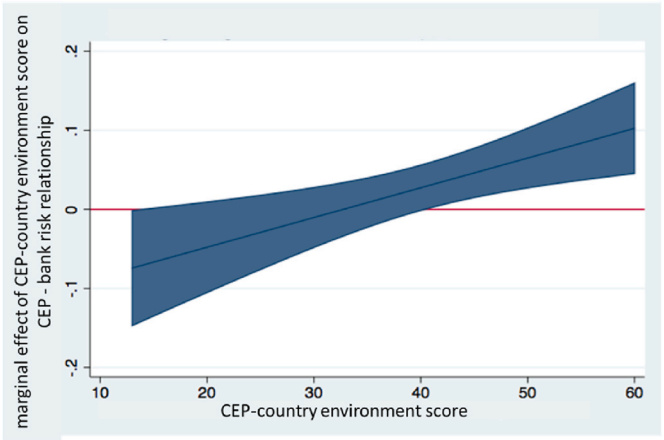


Fig. 6. CEP-country environment score interaction (Table 6 -Model 3).

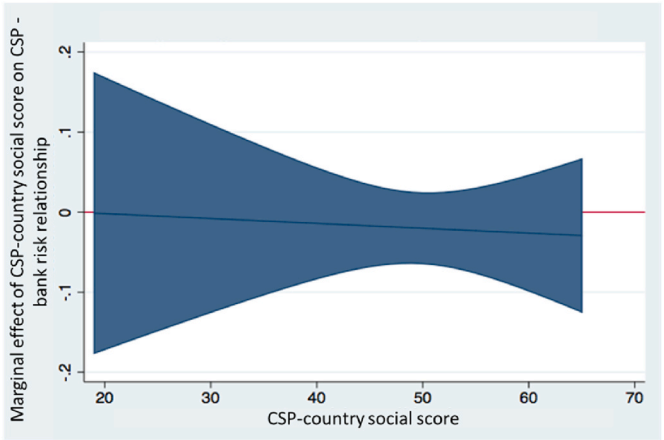


Fig. 7. CSP-country social score interaction (Table 6 -Model 3).

e., inflation and GDP growth. Model 4 controls for all bank-specific variables, while Model 5 incorporates all macroeconomic and bank-specific variables. Findings from Table 7 indicate that there is a significant negative relationship between the financial product safety aspect of CSP and non-performing loans (proxy for bank stability). For example, in Model 4, an increase of 1% in the financial product safety score will decrease non-performing loans by 0.0335%. This finding suggests banks might be able to improve their stability by enhancing the safety of their financial products, by being more transparent with their clients, and by abstaining from selling products that their clients would be worse off for having purchased. The relationship between banks' environmental performance and NPL, becomes unambiguously negative when this research uses financial product safety instead of the composite social performance score.

The findings of Table 8 illustrate the relationships between financial product safety (a component of CSP) and a country's social and environmental scores. The average marginal effect graphs of Models 1 to 6 can be better interpreted by referring to Figs. 8–11. Model 1 only

Table 7
Financial product safety (CSP)-Bank stability relation.

	Model 1	Model 2	Model 3	Model 4	Model 5
l.NPL	−0.127	−0.181	−0.259	−0.303	−0.510*
	(-0.53)	(-0.67)	(-0.92)	(-1.16)	(-1.94)
CEP	0.0618***	0.0593**	0.0669***	0.0707**	0.0848***
	(2.76)	(2.51)	(2.72)	(2.48)	(2.81)
Financial Product Safety	−0.0275**	−0.0306***	−0.0268**	−0.0335**	−0.0266*
	(-2.49)	(-2.92)	(-2.50)	(-2.53)	(-1.93)
ASSETS		−0.109	−0.147	−0.0584	−0.196
		(-0.52)	(-0.66)	(-0.17)	(-0.52)
ETA		0.00290	0.0291	−0.00176	0.0174
		(0.12)	(1.20)	(-0.07)	(0.64)
NIM		−0.196***	−0.268***	−0.188***	−0.286***
		(-2.83)	(-3.72)	(-2.79)	(-3.60)
GDPG			−0.000275		−0.00388
			(-0.02)		(-0.23)
INFL			0.0413***		0.0425**
			(2.65)		(2.06)
LTA				0.180	−0.187
				(0.11)	(-0.12)
NNI				−0.0898	−0.121
				(-0.20)	(-0.25)
EFF				−0.360	−0.264
				(-0.50)	(-0.37)
ASSETG				0.166	0.0306
				(0.43)	(0.08)
EC	−0.185***	−0.234***	−0.231***	−0.245***	−0.256***
	(-3.67)	(-3.41)	(-2.84)	(-3.23)	(-2.74)
SC	0.00339	0.0145	0.0282*	0.0152	0.0296
	(0.33)	(1.15)	(1.73)	(1.01)	(1.38)
Constant	2.951*	5.993	5.150	5.502	6.035
	(1.70)	(1.62)	(1.26)	(1.14)	(0.99)
No. Of observations	763	738	725	729	716
No. Of groups	311	297	293	294	290
No. Of instruments	14	17	19	21	23

t statistics in parentheses, $*p < 0.1$, $**p < 0.05$, $***p < 0.01$.
Note: NPL, the dependent variable, represents the log-odds transformation of non-performing loans, l.NPL represents the first lag of the dependent variable, NPL. CEP represents bank level environmental score, financial product safety is on bank level, ASSET represents the log of bank's total assets, ETA represents equity to total assets ratio, NIM represents ratio of net interest income divided by total earning assets, GDPG represents GDP growth and INFL represents inflation rate. LTA represents loans to total assets, NNI represents non-interest income to total income, EFF is a measure of efficiency proxied by admin expenses over total income, ASSETG represents assets growth, EC represents country level environmental score and SC represents country level social score.

considers interactions between CEP and country environmental score, while Model 2 only considers interactions between financial product safety and country social score. Model 3 includes both interactions. In contrast to Models 1 to 3, the last three models take into account bank-specific variables such as total assets, equity to total assets ratios, and net interest margins. As shown in Fig. 8, results from Model 2, show that financial product safety has no impact on bank stability in countries with poor and good social scores. Furthermore, for countries with intermediate social scores, there is a negative relationship between financial product safety and nonperforming loans, which implies higher the financial product safety leads to stability. Model 3, Model 5, and Model 6 exhibit similar findings, as shown in Fig. 9, Fig. 10, and Fig. 11, respectively. A possible explanation for this observation is that for countries with low social scores, sustainability practices may not have much value. Further, banks that enhance financial product safety as an element of CSP might be overdoing their sustainable practices for countries with very good social scores, so that the benefits are not realized. However, for countries with medium social scores, banks that enhance their financial product safety are more likely to reduce their NPL.

5. Conclusions

One of the most significant trends in the financial market has been the adoption of sustainable social and environmental practices by banks and other financial institutions. The purpose of this study is to investigate the impact of such adoption on the stability of banks. More specifically, this research examines the effects of CSP and CEP on bank stability. There is little information about how adopting sustainable practices affects bank stability, despite the fact that most existing studies has tested the relationship between sustainability and bank performance using profitability measures such as return on assets (ROA) and return on equity (ROE). In this way, this study contributes to the understanding of the relationship between sustainability performance and economic indicators. Additionally, due to increasing evidence of the relationship between product safety and CSP [24,25], this study provides new evidence from the banking industry regarding whether a bank's CSP can affect the stability of the bank through the product safety channel. The main findings can be categorized into the following main points. Firstly, as per [19,43], this research reports that CEP is positively correlated with NPL, implying that a higher CEP results in lower stability. This observation may be explained by the fact that resources used to improve CEP could have been used to monitor credit and follow up on loan collection, thereby reducing non-performing loans [30] and improving bank stability. The results, however, support Weber and Oni's [23] findings that there is no significant correlation between CSP and bank stability. Secondly, considering the variation in bank size, the results suggest that there exists a negative link between CEP and bank stability for mid-sized banks, but the relationship is insignificant for small and large banks. As for the CSP-bank stability relationship, the results reveal that CSP has no impact on bank stability regardless of bank size. Results from models with interaction with country's sustainability scores reveal that CEP has an insignificant impact on bank stability in countries with poor environmental scores and a significant negative impact on bank stability in countries with good environmental scores. This research argues that banks that operate in countries with already better social and

Table 8
Financial product safety interaction with country environmental and social scores.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
l.NPL	−0.104	−0.103	−0.0790	−0.141	−0.164	−0.126
	(-0.44)	(-0.41)	(-0.32)	(-0.52)	(-0.61)	(-0.47)
CEP	−0.162	0.0585**	−0.158	−0.121	0.0553**	−0.118
	(-1.61)	(2.50)	(-1.60)	(-1.21)	(2.29)	(-1.19)
Financial Product Safety	−0.0289***	−0.0705	−0.0761	−0.0319***	−0.0846	−0.0898
	(-2.63)	(-1.01)	(-1.13)	(-3.06)	(-1.26)	(-1.36)
EC	−0.194***	−0.187***	−0.197***	−0.235***	−0.243***	−0.245***
	(-3.84)	(-3.70)	(-3.87)	(-3.37)	(-3.55)	(-3.53)
SC	0.000656	−0.00209	−0.00559	0.0106	0.00780	0.00350
	(0.06)	(-0.15)	(-0.39)	(0.80)	(0.52)	(0.22)
CEP × EC	0.00531**		0.00514**	0.00429*		0.00413*
	(2.14)		(2.08)	(1.74)		(1.68)
Financial Product Safety × SC		0.000903	0.000995		0.00113	0.00121
		(0.64)	(0.73)		(0.83)	(0.91)
ASSETS				−0.0541	−0.125	−0.0756
				(-0.25)	(-0.62)	(-0.37)
ETA				0.00468	0.00210	0.00357
				(0.19)	(0.09)	(0.15)
NIM				−0.190***	−0.196***	−0.191***
				(-2.66)	(-2.93)	(-2.77)
Constant	3.611**	3.428*	4.122**	5.840	6.943*	6.898*
	(2.04)	(1.77)	(2.13)	(1.57)	(1.84)	(1.81)
No. Of observations	763	763	763	738	738	738
No. Of groups	311	311	311	297	297	297
No. Of instruments	15	15	16	18	18	19

t statistics in parentheses, $*p < 0.1$, $**p < 0.05$, $***p < 0.01$.
Note: NPL, the dependent variable, represents the log-odds transformation of non-performing loans, l.NPL represents the first lag of the dependent variable, NPL. CEP represents bank level environmental score, financial product safety is on bank level, EC represents country level environmental score and SC represents country level social score. ASSET represents the log of bank's total assets. CEP × EC is interaction term for bank level and country level environmental scores. Financial Product Safety × SC is interaction term for bank level financial product safety and country level social scores. ETA represents equity to total assets ratio, NIM represents ratio of net interest income divided by total earning assets.

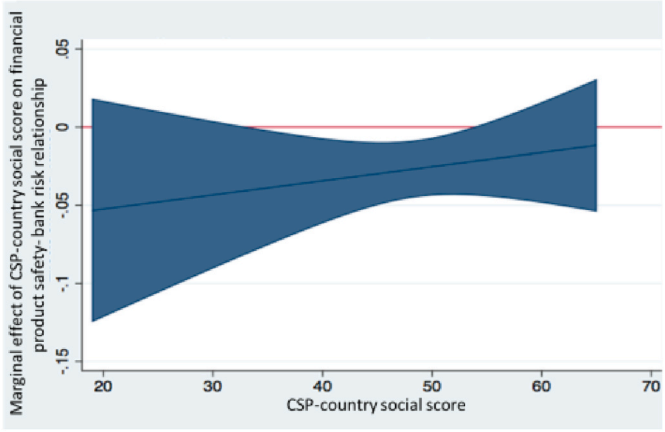


Fig. 8. Financial product safety - country social score interaction (Table 8 -Model 2).

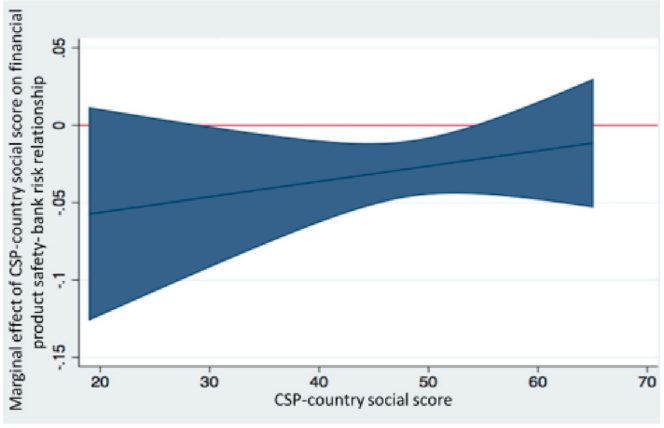


Fig. 9. Financial product safety - country social score interaction (Table 8 -Model 3).

environmental scores might be overdoing their sustainable practices due to the pressure from their stakeholders to the extent that it negatively affects their credit portfolio. Also, CSP has an insignificant impact on bank stability regardless of a country's social score. Thirdly, this research reports that financial product safety as an aspect of CSP is positively related to banks stability. This finding suggests that banks can be more stable if they improve the safety of their financial products, enhance transparency to their clients and refrain from selling products for which clients will be worse off having acquired them.

Findings from this study have significant implications to market investors, bankers and regulators. Market investors and analysts will have a better understanding of how bank stability can be affected by social and environmental sustainability practices. This can be incorporated in the valuation of bank financial performance. Furthermore, investors who are interested in the banking industry are incentivized to invest in banks that are transparent in their products as this translates to better stability. As for bankers, caution should be taken in embracing environmental sustainability as the empirical evidence suggests that NPLs increase with CEP. Furthermore, banks are encouraged to improve their CSP since enhancement of CSP does not adversely affect bank stability. Finally, for regulators, an incentive structure could be explored to encourage banks to embrace social sustainability practices, specifically for financial product safety, as this will improve the overall stability of the banking sector. This could be done by imposing taxes on socially harmful products or services; specifying a percentage of social impact compulsory in financing development projects; and providing tax deductions for socially friendly initiatives [3]. If these incentives are provided, and the financial sector is allowed to operate in a favourable

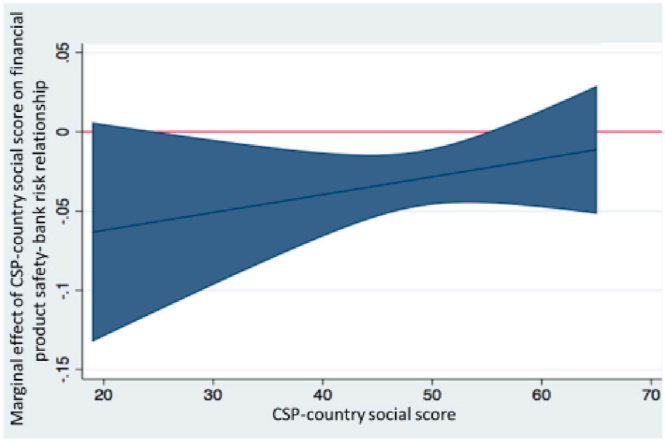


Fig. 10. Financial product safety - country social score interaction (Table 8 -Model 5).

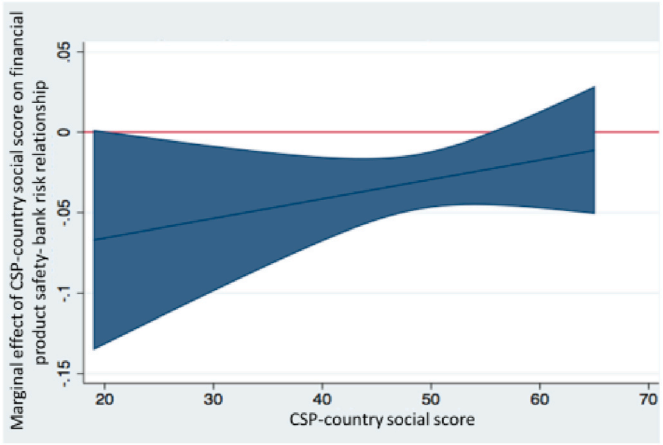


Fig. 11. Financial product safety - country social score interaction (Table 8 -Model 6).

economic and political environment with a level playing field, it can play a significant role in the economy [69].

This study has potential limitations. ESG ratings are measured differently across rating agencies, and can therefore be an inconsistent measure of environmental and social performance. That leads to a divergence in ratings from the independent agencies that evaluate and assign ESG ratings to firms. Other sustainability ratings can be used in future research to check whether the differences in the rating methodologies affect the relationship between sustainability and bank stability. Additionally, this study uses NPL as a proxy of bank stability. However, a poor environmental and social performance may have a negative impact on bank stability that might not be captured by NPL ratio. For example, impact depositors may withdraw their money and close their accounts if the bank is engaged in an environmental scandal. This risk is not captured by NPL. Future research may use another proxy such as z score or capital buffer to capture other aspects of bank risks. Despite providing insights on the sustainability-bank stability nexus, this study does not provide the channel through which CEP has an impact on NPL. Another interesting venue for future research is to find out whether the results apply to different types of bank customers i.e., corporate versus retail. Further, this study could be extended by using a granger-causality test to study the link between social and environmental sustainability performance and determinants of bank performance, and where data is available, include the governance aspect of sustainability performance.

Credit author statement

Kinan Salim: Formal analysis, Methodology, Writing. Mustafa Disli: Reviewing and Editing. Malik Abdulrahman Nkoba: Writing - Original Draft. Adam Ng: Conceptualization. Ginanjar Dewandaru: Conceptualization.

Ethical Statement

Upload an Ethical Statement or alternatively state in the Cover Letter.

Read details in this GFA.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

Acknowledgements

We would like to express our sincere gratitude to Nurlina Binti Shaharuddin who generously gave her time to proofread this paper.

References

[1] Beck T, Levine R, Loayza N. Finance and the sources of growth. J Financ Econ 2000;58(1–2):261–300.
[2] King RG, Levine R. Finance and growth: schumpeter might be right. Q J Econ 1993; 108(3):717–37.
[3] Nizam E, Ng A, Dewandaru G, Nagayev R, Nkoba MA. The impact of social and environmental sustainability on financial performance: a global analysis of the banking sector. J Multinatl Financ Manag 2019;49:35–53.
[4] Brooks C, Oikonomou I. The effects of environmental, social and governance disclosures and performance on firm value: a review of the literature in accounting and finance. Br Account Rev 2018;50(1):1–5.
[5] Freeman RE. Strategic management: a stakeholder approach. Pitman Boston; 1984.
[6] Friedman M. The social responsibility of business is to increase its profits. New York Times Magazine; 1970. p. 122–6.
[7] Spicer BH. Investors, corporate social performance and information disclosure: an empirical study. Account Rev 1978:94–111.
[8] Zhu Q, Sarkis J, Lai KH. Green supply chain management innovation diffusion and its relationship to organizational improvement: an ecological modernization perspective. J Eng Technol Manag 2012;29(1):168–85.
[9] Shrivastava P. The role of corporations in achieving ecological sustainability. Acad Manag Rev 1995;20(4):936–60.
[10] Al Mamun M, Sohog K, Akhter A. A dynamic panel analysis of the financial determinants of CSR in bangladeshi banking industry. Asian Econ Financ Rev 2013;3(5):560–78.
[11] Walley N, Whitehead B. It's not easy being green. Reader in Business and the Environment 1994;36(81):4.
[12] McWilliams A, Siegel D. Event studies in management research: theoretical and empirical issues. Acad Manag J 1997;40(3):626–57.
[13] Hillman AJ, Keim GD. Shareholder value, stakeholder management, and social issues: what's the bottom line? Strat Manag J 2001 Feb;22(2):125–39.
[14] Jensen MC. Value maximization, stakeholder theory, and the corporate objective function. Bus Ethics Q 2002 Apr 1:235–56.
[15] Brammer S, Millington A. Does it pay to be different? An analysis of the relationship between corporate social and financial performance. Strat Manag J 2008;29(12):1325–43.
[16] Tang Z, Hull CE, Rothenberg S. How corporate social responsibility engagement strategy moderates the CSR–financial performance relationship. J Manag Stud 2012;49(7):1274–303.
[17] Simpson WG, Kohers T. The link between corporate social and financial performance: evidence from the banking industry. J Bus Ethics 2002 Jan;35(2): 97–109.
[18] Cornett MM, Erhemjamts O, Tehranian H. Corporate social responsibility and its impact on financial performance: investigation of U.S. Commercial banks, vols. 1–53; 2014. Retrieved from, https://www2.bc.edu/~tehranih/CSR-Performance. Relationship for Banks Jan 2014.pdf.
[19] Soana MG. The relationship between corporate social performance and corporate financial performance in the banking sector. J Bus Ethics 2011 Nov;104(1):133–48.

[20] Klapper Leora, Ariss Rima, Berger N, Allen. Bank. Competition and financial stability. J Financ Serv Res 2009;35:99–118.
[21] Jevons W Stanley. Investigations in currency and finance. London: MacMillan and Co.; 1884.
[22] Hornbeck R. The enduring impact of the American Dust Bowl: short-and long-run adjustments to environmental catastrophe. Am Econ Rev 2012;102(4):1477–507.
[23] Weber Olaf, Oni Olawuwo. The impact of financial sector sustainability regulations on banks. 2016. https://doi.org/10.13140/Rg.2.1.1874.4409.
[24] Boileau PE. Sustainability and prevention in occupational health and safety. Ind Health 2016;54(4):293–5.
[25] Epuran G, Brătucu G, Bărbulescu O, Neacşu NA, Madar A. Food safety and sustainability–an exploratory approach at the level of the Romanian wine production companies. Amfiteatru Economic 2018;20(47):151–67.
[26] Kim J, Garman ET. Financial Stress and absenteeism: an empirically. derived model. Journal of Financial Counseling and Planning 2003;14(1):31.
[27] Bagwell DC. Work and personal financial outcomes of credit counseling clients. Virginia Polytechnic Institute and State University; 2000.
[28] Drentea P. Age, debt and anxiety. JHSB (J Health Soc Behav) 2000:437–50.
[29] Clark RC. Corporate law. Boston: Little Brown and Company; 1986.
[30] Asfaw AS, Bogale HN, Teame TT. Factors affecting non-performing loans: case study on development bank of Ethiopia central region. International journal of scientific and research publications 2016;6(5):656–70.
[31] Andreadakis S. Enlightened shareholder value: is it the new modus operandi for modern companies?. In: InCorporate governance. Berlin, Heidelberg: Springer; 2012. p. 415–32.
[32] Ogden S, Watson R. Corporate performance and stakeholder management: balancing shareholder and customer interests in the UK privatized water industry. Acad Manag J 1999;42(5):526–38.
[33] Jensen MC. Value maximization, stakeholder theory, and the corporate objective function. Bank Am J Appl Corp Finance 2010;22(1):32–42.
[34] Earnhart D. The effect of corporate environmental performance on corporate financial performance. Annual Review of Resource Economics 2018;10:425–44.
[35] Albertini E. Does environmental management improve financial performance? A meta-analytical review. Organ Environ 2013;26(4):431–57.
[36] Moneva JM, Ortas E. Corporate environmental and financial performance: a multivariate approach. Industrial Management & Data System 2010;110:193–210.
[37] Margolis JD, Elfenbein H, Walsh J. Does it pay to be good... and does it matter? A meta-analysis and redirection of research on corporate social and financial performance. Working paper. Harvard University; 2019.
[38] Cordeiro JJ, Sarkis J. Environmental proactivism and firm performance: evidence from security analyst earnings forecasts. Bus Strat Environ 1997;6(2):104–14.
[39] Ali HY, Danish RQ, Asrar-ul-Haq M. How corporate social responsibility boosts firm financial performance: the mediating role of corporate image and customer satisfaction. Corp Soc Responsib Environ Manag 2020;27(1):166–77.
[40] Alkaraan F, Albitar K, Hussainey K, Venkatesh VG. Corporate transformation toward Industry 4.0 and financial performance: the influence of environmental, social, and governance (ESG). Technol Forecast Soc Change 2022;175:121423.
[41] Choi JH, Kim S, Yang DH. Small and medium enterprises and the relation between social performance and financial performance: empirical evidence from Korea. Sustainability 2018;10(6):1816.
[42] Okafor A, Adeleye BN, Adusei M. Corporate social responsibility and financial performance: evidence from US tech firms. J Clean Prod 2021:126078. 292.
[43] Nollet J, Filis G, Mitrokostas E. Corporate social responsibility and financial performance: a non-linear and disaggregated approach. Econ Modell 2016;52:400–7.
[44] El Khoury R, Nasrallah N, Alareeni B. ESG and financial performance of banks in the MENAT region: concavity–convexity patterns. Journal of Sustainable Finance & Investment 2021:1–25.
[45] [a] Erkens DH, Hung M, Matos P. Corporate governance in the 2007–2008 financial crisis: evidence from financial institutions worldwide. J Corp Finance 2012;18(2):389–411.[b]Fatemi, A.M. and Fooladi, I.J. Sustainable finance: A new paradigm. Global Finance J. 2013 Jul 24(2) :101-113.
[46] Liang H, Renneboog L. On the foundations of corporate social responsibility. J Finance 2016;72:853–910.
[47] Nagy Z., Cogan D., Sinnreich D. Optimizing environmental, social and governance factors in portfolio construction: analysis of three esg-tilted strategies. Social and Governance Factors in Portfolio Construction: Analysis of Three ESG-Tilted Strategies 2013. Available at SSRN: https://ssrn.com/abstract=2221524 or https://doi.org/10.2139/ssrn.2221524.
[48] Nagy Z, Kassam A, Lee L-E. Can ESG add alpha? Morgan stanley capital international ESG research incorporated, vol. 23; 2015. p. 1. Retrieved from, http://www.imas.org.sg/uploads/media/2015/12/10/1028_Research_Insight_Can_ESG_Add_Alpha.pdf.
[49] Rahdari AH, Rostamy AA. Designing a general set of sustainability indicators at the corporate level. J Clean Prod 2015;108:757–71.
[50] Khan M, Serafeim G, Yoon A. Corporate sustainability: first evidence on materiality. Working Paper; 2015. p. 1–36. https://doi.org/10.2139/ssrn.2575912.
[51] MSCI., MSCI. ESG ratings methodology. https://www.msci.com/documents/10199/123a2b2b-1395-4aa2-a121-ea14de6d708a. [Accessed 18 November 2018]. Accessed at.
[52] Mattingly JE, Berman SL. Measurement of corporate social action: discovering taxonomy in the Kinder Lydenburg Domini ratings data. Bus Soc 2006 Mar;45(1):20–46.
[53] Kumar RR, Stauvermann PJ, Patel A, Prasad SS. Determinants of non-performing loans in banking sector in small developing island states: a study of Fiji. Account Res J 2018;(2):192–213.
[54] Çifter A. Bank concentration and non-performing loans in Central and Eastern European countries. J Bus Econ Manag 2015 Jan 2;16(1):117–37.
[55] Sanya S, Wolfe S. Can banks in emerging economies benefit from revenue diversification? J Financ Serv Res 2011;40(1):79–101.
[56] Stiroh KJ, Rumble A. The dark side of diversification: the case of US financial holding companies. J Bank Finance 2006;30(8):2131–61.
[57] Zamore S. Should microfinance institutions diversify or focus? A global analysis. Res Int Bus Finance 2018;46:105–19.
[58] Mirzaei A, Moore T, Liu G. Does market structure matter on banks' profitability and stability? Emerging vs. advanced economies. J Bank Finance 2013;37(8):2920–37.
[59] Dietrich A, Wanzenried G. Determinants of bank profitability before and during the crisis: evidence from Switzerland. J Int Financ Mark Inst Money 2011;21(3):307–27.
[60] Demirgüç-Kunt A, Huizinga H. Financial structure and bank profitability, vols. 1–24. Development Research Group, The World Bank; 2000.
[61] Windmeijer F. A finite sample correction for the variance of linear efficient two-step GMM estimators. J Econom 2005;126(1):25–51.
[62] Chih HL, Chih HH, Chen TY. On the determinants of corporate social responsibility: international evidence on the financial industry. J Bus Ethics 2010 Apr;93(1):115–35.
[63] Belasri S, Gomes M, Pijourlet G. Corporate social responsibility and bank efficiency. J Multinatl Financ Manag 2020;54:100612.
[64] Buallay A, Fadel SM, Alajmi J, Saudagaran S. Sustainability reporting and bank performance after financial crisis: evidence from developed and developing countries. Compet Rev 2021;(4):747–70.
[65] Maqbool S, Zameer MN. Corporate social responsibility and financial performance: an empirical analysis of Indian banks. Future Business Journal 2018 Jun 1;4(1):84–93.
[66] Fijałkowska J, Zyznarska-Dworczak B, Garsztka P. Corporate social-environmental performance versus financial performance of banks in Central and Eastern European countries. Sustainability 2018;10(3):772.
[67] Jin JY, Kanagaretnam K, Lobo GJ, Mathieu R. Social capital and bank stability. J Financ Stabil 2017:99–114.
[68] Ahamed MM, Mallick SK. Is financial inclusion good for bank stability? International evidence. J Econ Behav Organ 2019 Jan 1;157:403–27.
[69] Ng A. Banking for sustainability: the policy, regulatory and financial case for action. 2016.