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Drivers of Global Banking Stability in Times of Crisis: The Role of Corporate Social Responsibility

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This study examines the effect of environmental and social (ES) activities on global banking stability in the shadow of the COVID-19 pandemic. Using a sample of 244 commercial banks across 52 countries from 2002 to 2020, we provide evidence that during the global health crisis, banks with higher levels of ES activities are more financially stable (i.e. lower credit and liquidity risk exposures). Drawing on social capital and stakeholder theories, we find that ES activities increase firm-level social capital and establish a stakeholder-centred culture within a bank, strengthening social trust and public confidence in the bank's risk oversight. Accordingly, ES activities constrain excessive and aggressive bank risk-taking during turbulent times when short-termism prevails. Our additional analysis reveals that investors value such beneficial effects of ES activities. The findings offer new insights into the increasingly significant roles of social capital creation and stakeholder-centred culture in maintaining banks' financial stability.

Introduction

Banks' aggressive and excessive risk-taking behaviours contribute to financial instability, as demonstrated during the 2007−2009 global financial crisis, the European debt crisis and the LIBOR[1] scandal in the United Kingdom (Ashton and Christophers, 2015; Ivashina and Scharfstein, 2010). Undoubtedly, banks' unethical behaviours erode social trust and undermine public confidence in the banking sector's ability to allocate economic resources efficiently and contribute to societal advancement (Claessens, 2017). In response to these crises, numerous global regulators and local governmental authorities have enacted more stringent policies to strengthen risk oversight in the banking industry. For example, the Dodd–Frank Wall Street Reform and Consumer Protection Act in the United States (Acharya *et al.*, 2011) and the Financial Policy Committee in the United Kingdom (Duncan and Nolan, 2020) were both established to identify, monitor and mitigate risks to financial stability. At the firm level, banks apply the Equator Principles[2] (Scholtens and Dam, 2007; Wright, 2012) and the United Nations Environmental Project Finance Initiative (Park, 2012) to enhance internal risk management and control. Moreover, an increasing number of banks have incorporated corporate social responsibility (CSR) and codes of ethics into their lending and financing decision-making processes by implementing the ISO 14000 Environmental Management System and disclosing information regarding CSR performance in accordance with the Global Reporting Initiative (GRI) sustainability reporting standards (Scholtens, 2009; Shen *et al.*, 2016; Wu and Shen, 2013).

[1]LIBOR means London Interbank Offered Rate.

[2]Since 2003, certain leading international banks have adopted the voluntary framework of the Equator Principles, which require banks to integrate social and environmental risks into projects' financing.

From the agency theory perspective (Fama and Jensen, 1983; Jensen and Meckling, 1976), CSR may represent bank managers' opportunistic efforts to divert public attention away from previous unethical behaviours (Jain and Zaman, 2020; Kotchen and Moon, 2012), to enhance their corporate or personal reputation at the expense of shareholders (Barnea and Rubin, 2010; Shen *et al.*, 2016; Wu and Shen, 2013). However, social capital and stakeholder theories suggest that bank executives may intensify CSR to build social capital and reciprocal trust with relevant stakeholders and thus maintain a competitive advantage (Azmi *et al.*, 2021; Chiaramonte *et al.*, 2021). Following the latter argument and prior empirical evidence (e.g. Chih, Chih and Chen, 2010; Jin *et al.*, 2017; Lins, Servaes and Tamayo, 2017), we propose that a stakeholder-centred internal decision-making process can constrain banks' proclivity for excessive risk-taking at the expense of stakeholders' interests, thereby preserving global banking stability in times of crisis.

Prior research has established a variety of institutional and organizational determinants of bank risk-taking behaviours, and recent studies emphasize that a bank's corporate culture (e.g. work atmosphere and environment, and internal management style) may be the root cause of excessive risk-taking and subsequent risk exposure (Delis, Hasan and Tsionas, 2015; Guiso, Sapienza and Zingales, 2015; Nguyen, Nguyen and Sila, 2019). In particular, Nguyen, Nguyen and Sila (2019) alluded to the critical role of a stakeholder-centred corporate culture in guiding bank executives towards risk-taking decisions that are relatively more prudent (e.g. less reckless mortgage lending). However, existing literature draws limited attention to the role of CSR in fostering a corporate culture that heightens social capital and trust between banks and their relevant stakeholders, which ultimately is expected to reduce risk exposure and increase bank stability.

CSR literature in financial sectors is still in its infancy, and systematic research into the effect of CSR on global banking financial stability remains limited (see Azmi *et al.*, 2021; Chiaramonte *et al.*, 2021). To address this gap, we extend the key drivers of global banking stability to the role of environmental and social (ES) activities in explaining banks' risk exposures to liquidity and credit risks – two key factors that contribute to the global banking sector's financial stability in the shadow of the COVID-19 pandemic.

This study is focused on banking ES performance because of the peculiarities of the banking sector with respect to CSR practices. Although banking firms appear to have lower direct ES impacts relative to their industrial counterparts,[3] banks facilitate industrial activities by lending to firms that may engage in socially irresponsible corporate behaviours such as pollution, manufacturing of hazardous products and human rights violations (Kotchen and Moon, 2012; Thompson and Cowton, 2004). Anecdotal evidence suggests that banks have been accused of facilitating unethical social behaviours such as corruption, bribery and money laundering, in addition to other dubious lending, investment and asset management practices (Altunbaş, Thornton and Uymaz, 2021; Arnold, 2018).

Additionally, a characteristic that distinguishes the banking sector from other sectors is the breadth of its stakeholders, which includes the central bank, customers (e.g. account owners, borrowers, depositors), regulators, shareholders and managers, all of whom have a direct stake in the bank's performance and risk (Branco and Rodrigues, 2008; Griffiths, 2007; Yamak and Süer, 2005). Since banks provide necessary goods and services, their business policies and strategies are inextricably linked to public interest (Miles, 1987). Globally, the banking sector is heavily regulated because of its prominent public profile. However, despite the stringent requirements and penalties for banking financial instability, the aggressive lending decisions approved by bank managers are blamed for precipitating the financial crisis and subsequent 2007−2009 global economic recession, and for having a profoundly negative impact on a wide range of stakeholders, the economy and society at large. Indeed, the banking sector fulfils a critical function in the stability of the overall economic and financial system (Boyd and De Nicolo, 2005; Laeven and Levine, 2009). In our

[3]Many CSR studies exclude banks and financial institutions because of their less direct or visible impact on the natural environment. However, Jeucken (2004) found that the banking sector has high, direct social and environmental impacts because it has a substantial number of employees and, among other actions, uses a large amount of office space and consumes abundant resources such as paper, energy and water.

study, *banking stability* refers to the banks' propensity and ability to avoid aggressive or excessive risk-taking and thereby prevent defaults and failures in their lending, funding and project financing decisions. If a bank makes overly risky decisions, it increases its risk exposure and consequent instability in both normal and emergency situations (Imbierowicz and Rauch, 2014; Kashyap and Zingales, 2010; Kinateder *et al*., 2021).

We focus on credit and liquidity risks that threaten global banking stability for three reasons. First, *credit risk* refers to the possibility that debtors will be unable to repay the interest and principal they owe to the bank (Kinateder *et al*., 2021). For example, during the global financial crisis, Lehman Brothers primarily collapsed because of its clients' inability to repay their mortgages, precipitating a subprime crisis. Accordingly, credit risk can potentially contribute to the emergence of systemic risk affecting the general population. Second, bank executives and fund providers (depositors) have always been concerned about liquidity risk (Johnson, 2003; Mohammad *et al*., 2020). Banking institutions typically hold a substantial amount of short-term debt to fuel long-term investments; however, depositors have the right to withdraw their funds at any time. If a large and sudden withdrawal of funds occurs, banks may be forced to meet the demand by selling other financial or non-financial assets, possibly at discounted rates, or borrowing funds from the money market, possibly at a higher cost. Consequently, an insolvency risk may arise, followed by a liquidity risk (Mohammad *et al*., 2020). During times of financial distress, the knock-on effect of a liquidity risk may cause banking instability, defaults and failures, ultimately leading to economic volatility and social unrest. Third, prior studies have established a strong association between bank failure and the co-existence of credit and liquidity risks. The co-existence of credit and liquidity risks can significantly increase the likelihood of bank defaults, most notably during a financial crisis (Imbierowicz and Rauch, 2014). Therefore, more research is needed to gain a nuanced understanding of how banks can avoid exposure to liquidity and credit risks.

Using an international sample of 244 commercial banks across 52 countries, we uncover a decisive impact of ES activities on bank financial stability, which was particularly notable when the global banking sector experienced a severe exogenous shock as a result of the COVID-19 pandemic. Drawing on social capital and stakeholder theories, our study proposes that ES activities can develop corporate-level social capital and establish a stakeholder-centred culture within a bank, strengthening social trust and public confidence in the bank's risk oversight. Moreover, the increased social capital and stakeholder-centred culture can constrain excessive and aggressive bank risk-taking, especially during turbulent times when short-termism prevails. Specifically, we hypothesize that a corporate culture that is environmentally and socially responsible encourages bank management teams to make decisions that are relatively more prudent, reliable and value-driven.

We offer robust empirical evidence supporting these theoretical arguments by initially showing that banks with higher levels of ES activities were more financially stable (i.e. lower credit and liquidity risks) during the COVID-19 crisis. We empirically assess the two underlying channels, namely, firm-level social capital and stakeholder-centred culture. We find that banks that engage in ES activities and consequently have lower risk exposures are mainly those with higher social capital and stakeholder-centred cultures. In this study, the catastrophic shock of the pandemic serves as a natural experiment to verify the practical and genuine benefits of ES activities on the risk exposures of the global banking system. In addition, our results show that investors value the beneficial effects of banking ES activities, which implies a significantly positive valuation by stock markets of banks with a stakeholder-centred culture and social capital created through ES activities.

Our study makes several theoretical and empirical contributions to the literature on CSR, management and banking stability. Initially, it extends CSR literature on financial sectors. Compared with the extensive CSR-related literature on non-financial sectors (e.g. El Ghoul *et al*., 2011; Jain and Zaman, 2020; Muthuri, Matten and Moon, 2009; Stellner, Klein and Zwergel, 2015; Tang and Tang, 2018), banking CSR remains under-explored, particularly its effect on banking credit and liquidity risk exposures and market valuations during turbulent times. The international stock markets have collapsed following the outbreak of the COVID-19 pandemic, which has posed a new challenge for CSR – to protect banks from excessive risk exposures and declining market values. Our findings shed further light on the argument

that intensifying CSR in normal times pays off during times of crisis.

Additionally, this study extends prior evidence of environmental, social and governance (ESG) studies in the banking sector (see Azmi *et al*., 2021; Chiaramonte *et al*., 2021). Specifically, Azmi *et al*. (2021) examined the effect of ESG ratings on bank cash flows, value, efficiency, cost of equity and cost of debt, focusing on the emerging economies context before the COVID-19 outbreak, whereas Chiaramonte *et al*. (2021) drew attention to the ESG–bank fragility nexus in European countries during the global financial crisis (2007−2009). We enrich the existing (and limited) knowledge on banking CSR by investigating a comprehensive set of key drivers for global banking risk exposures during the COVID-19 pandemic. We also offer new insights on the decisive role of social capital through bank engagement in CSR, which creates a corporate stakeholder-centred culture. Moreover, by focusing on the global banking sector, our study further enriches the new stream of research on industrial (non-financial) firms' CSR, risk and performance (e.g. Apaydin *et al*., 2021; Bondy and Starkey, 2014; Cheah *et al*., 2011; Demers *et al*., 2021; Ding *et al*., 2021), and bank stability especially during the COVID-19 period (e.g. Elnahass, Trinh and Li, 2021; Kinateder *et al*., 2021) and other COVID-relevant aspects (e.g. Albuquerque *et al*., 2020; Demers *et al*., 2021; Ding *et al*., 2021; Song, Yeon and Lee, 2021).

Literature review

CSR and firm risks

A central tenet of existing CSR research is that firms can strengthen social trust between relevant stakeholders and firm management by engaging in CSR. Firms that are highly committed to CSR intend to safeguard their established social relationships by allocating their resources to satisfy the interests of a broader range of stakeholder groups rather than focusing exclusively on shareholders' short-term returns. Superior CSR can effectively counterbalance managers' excessive risk-taking or risk-avoidance decisions, thereby averting serious systematic, idiosyncratic and potential stock market crash risks (Harjoto and Laksmana, 2018; Jo and Na, 2012; Kim, Li and Li, 2014).

Some studies examine CSR's ability to provide an insurance-like protection to firms during economic and financial catastrophes. For instance, Lins, Servaes and Tamayo (2017) demonstrated that CSR-assisted businesses not only survived but also achieved increased profitability and further growth during the Enron/WorldCom scandal and the resulting financial tsunami. Accordingly, prior CSR may contribute to corporate immunity from the impact of the COVID-19 pandemic (Ding *et al*., 2021). These findings suggest that CSR can increase employee and customer loyalty and strengthen the bond between a business and relevant stakeholders who are willing to support the firm's management during times of crisis. Albuquerque *et al*. (2020) showed that firms with high levels of ES activities had lower stock volatility and operating profit margins and thus greater resilience in the first quarter of 2020. This finding implies that ES activities and related information disclosure played a critical role in strengthening employee, customer and investor loyalty before COVID-19, which helped companies remain resilient during the pandemic.

Nonetheless, conflicting evidence exists regarding the beneficial effects of CSR on firm performance during the pandemic. For example, Bae *et al*. (2021) and Demers *et al*. (2021) found that positive relationships between CSR and firm value may not exist owing to the fundamental differences between different types of crises. The COVID-19-induced market crash was not caused by corporate irresponsibility, whereas the previous financial crisis was precipitated by business misconduct, particularly by financial institutions.

CSR and bank risk-taking

Prior studies have documented that bank risk-taking behaviour is significantly associated with institutional and regulatory factors at the local level (e.g. Laeven and Levine, 2009; Saunders, Strock and Travlos, 1990), in industry competition (e.g. Bannier, Feess and Packham, 2013; Jiménez, Lopez and Saurina, 2013) and in terms of governance characteristics (e.g. Delgado-García, De La Fuente-Sabaté and De Quevedo-Puente, 2010; Mollah and Liljeblom, 2016; Zhang, Wang and Jia, 2021). Recent studies indicated that CSR can also significantly predict bank performance. Kanagaretnam *et al*. (2019) suggested that societal trust is a critical cultural variable that has an economic impact on bank risk-taking. Bank executives in countries with high levels of societal trust are

predisposed to engage in pro-CSR behaviours and thus are less likely to take excessive risks for personal gain. This CSR–performance nexus is channelled through loan and deposit growth, management quality and firm efficiency (Mayberry, 2020). Azmi *et al*. (2021) further demonstrated that banks in emerging economies appear to benefit from ES investments, including enhanced cash flows and efficiency. In addition, they found that high levels of environmental stewardship, rather than social activities, have beneficial effects on bank values. Meanwhile, extensive CSR can help banks obtain cheaper financing through equity, rather than debt issuance. Pro-CSR banks, similar to their non-financial counterparts, benefit from the relatively lower costs of external funding and capital because they are less likely to take risks (El Ghoul *et al*., 2011; Servaes and Tamayo, 2013; Stellner, Klein and Zwergel, 2015) and are therefore more likely to build a stronger reputation, competitive advantages and market values than peers with a weaker commitment to CSR (Harjoto and Laksmana, 2018; Laeven and Levine, 2009).

Recent studies emphasized the beneficial effect of CSR on bank risk oversight and market valuation in specific regions. For example, Chiaramonte *et al*. (2021) and Di Tommaso and Thornton (2020) found that CSR in European banks can guide their management towards effectively serving the interests of all stakeholders. Therefore, ESG can mitigate the negative impact of shareholder-focused governance, which encourages banks to take reasonable risks. The studies' findings suggest that banks with high ESG ratings exhibit low risk-taking behaviours, even as their values decline. Additionally, Kanagaretnam *et al*. (2019) offered evidence that banks operating in high-trust countries appear to avoid taking excessive risks and confront less financial distress and failure during economic downturns. Moreover, Cornett, Erhemjamts and Tehranian (2016) showed that the 2007−2009 financial crisis increased US commercial banks' awareness of the value of CSR in mitigating public criticism of their irresponsible behaviours that contribute to the crisis.

Elnahass, Trinh and Li (2021) demonstrated that COVID-19 has had a detrimental impact on the financial stability of the global banking system. However, existing CSR research commonly excludes financial firms owing to their use of specialized accounting policies, regulations and governance systems, which differ from those of non-financial firms. Nevertheless, the crucial role of the banking industry in economies (e.g. in increasing market efficiency by allocating scarce resources to the most pressing needs) and the devastation caused by bank failures cannot be overlooked. Compared with numerous CSR studies on non-financial firms (e.g. Servaes and Tamayo, 2013; Stellner, Klein and Zwergel, 2015), banking CSR studies are scarce, particularly those investigating its effect on banks' risk-taking behaviours and market valuation during the current pandemic. The stock market crash following the global pandemic outbreak poses a new test for CSR's beneficial role in shielding banks from subpar financial performance, excessive stock price volatility and declining market values.

Theory and hypotheses

Theoretical framework

Our theoretical framework integrates key propositions from social capital and stakeholder theories to identify the underlying channels through which CSR can be associated with banks' risk-taking behaviours and their potential exposures to financial volatility. According to social capital theory, in addition to traditional capital (i.e. financial, human and intellectual capital), organizations need to engage in social relations with relevant stakeholders (e.g. policymakers, employees, customers and the general public) within or beyond their own network to secure and develop moral or social capital (Jha and Cox, 2015; Jin *et al*., 2017; Russo and Perrini, 2010). Social capital is defined as 'the goodwill available to individuals or groups, its source lies in the structure and content of the actor's social relations. Its effects emerge from the information, influence, and solidarity it makes available to the actor' (Adler and Kwon, 2002, p. 23). As a critical source of competitive advantage for an organization, social capital is the 'goodwill that is engendered by the fabric (e.g. mutual trust) of social relations and that can be mobilized to facilitate actions' (Adler and Kwon, 2002, p. 17). Overall, social capital is referred to as the subjective interpretation of shared understanding and feelings of trust and reciprocal support between actors within the social context (Nahapiet and Ghoshal, 1998).

Therefore, the intensity of social capital in a network is determined by the social relationships

within a diverse group of stakeholders who both influence and are influenced by each other's activities. High levels of social capital are inextricably linked to corporate culture centred on the principle of protecting stakeholders' interests. Accordingly, individuals and organizations with high levels of social capital and trust can easily integrate into local social networks and relationships (Jha and Cox, 2015; Jin *et al*., 2017; Russo and Perrini, 2010). Notably, social capital is built through genuine human relationships, enabling social norms, values and assumptions to be established and thereby facilitating cooperation and collective actions within social networks (Burt, 1997; Putnam, 1993). This proposition holds for the banking sector. To maintain a certain level of social capital, bank executives must continuously invest in social relations with an expanding range of relevant stakeholders. A sound social relationship with stakeholders and the mutual trust and support it generates are critical resources for banks' competitiveness and performance in emergency and urgent situations (Azmi *et al*., 2021; Chiaramonte *et al*., 2021). The causal relationship between firms' survival or development and stakeholders' support is consistent with the proposition of stakeholder theory (Parmar *et al*., 2010).

The management literature has devoted considerable attention to the concept of social capital (Edelman *et al*., 2004; Kwon and Adler, 2014; Prashantham, 2011). Social capital can be examined at both macro (i.e. country or community) and micro (i.e. firm or individual) levels (Glaeser, Laibson and Sacerdote, 2002; Leana and Van Buren, 1999). However, previous studies mostly focused on social capital at regional or community levels (Hoi, Wu and Zhang, 2018; Jha and Cox, 2015; Jin *et al*., 2017) and investigated whether variations in social capital intensity across different countries or regions can affect internal corporate processes. For example, Jha and Cox (2015) found that companies in high social capital areas are more likely to engage in CSR. Furthermore, banks in regions with high social capital exhibit less aggressive risk-taking behaviours; thus, they experienced fewer failures during the financial crisis (Jin *et al*., 2017). However, there is a dearth of research on how firm-level social capital and the resultant reciprocal trust and support between banks and stakeholders mitigate managerial propensity to take excessive risks in bank lending and financing processes, and thereby expose banks to less risk during times of crises. Our study addresses this gap.

CSR, social capital and bank risk exposure

Growing empirical evidence from a social psychology perspective suggests that sustained CSR commitments (Degli Antoni and Portale, 2011; Edmans, 2011; Muthuri, Matten and Moon, 2009) can assist firms to develop a strong reputation and connections with stakeholders, resulting in strengthened social capital within specific networks (Guiso, Sapienza and Zingales, 2008; Leana and Van Buren, 1999). Studies demonstrate the impact of social capital on economic development (Degli Antoni and Portale, 2011; La Porta *et al*., 1997) and firm performance during a financial crisis (Lins, Servaes and Tamayo, 2017). Following financial crises, firms appear to engage in CSR to re-establish trust with broader social actors (Servaes and Tamayo, 2017). In addition, bank managers have become increasingly concerned about bank failures that could be devastating to stakeholders, the economy and society. We hypothesize that ES activities can fundamentally establish a stakeholder-centred corporate culture within banks and ways in which bank managers assess the potential risks and impacts of lending and funding decisions, to benefit their stakeholders. By avoiding approval of aggressively risky decisions, banks maintain strong social relationships through previously established social capital and stakeholders' trust and confidence, thereby avoiding bank risk exposure even during the COVID-19-related market crash.

Following the proposed theoretical channels, we extend the literature by examining whether global banks with relatively high social capital and close relationships with stakeholders can also foster a stakeholder-centred corporate culture that further prevents managers from engaging in opportunistic risk-taking behaviours at the expense of stakeholders. Accordingly, banks with higher ES ratings should have greater social capital and stakeholder trust, and thus be less exposed to credit and liquidity risks during both normal and COVID-19 periods. Therefore, we propose the following hypotheses, stated in alternative forms:

H1: Banks with high ES activities exhibit lower credit risk.

H2: Banks with high ES activities exhibit lower liquidity risk.
H3: Banks with high ES activities exhibit higher market value.

Sample and method

Data and sample

We analyse data from a global sample of banks for the period 2002−2020. Initially, we obtained from Bureau van Dijk's Orbis Bank Focus a global banking sample of 1090 commercial banks that trade on 116 stock exchanges across the globe. We eliminated banks whose stocks are illiquid, because illiquidity may signify misleading information that distorts the expected firm performance and provides unreliable measures of banks' financial stability. Furthermore, because the United States has a disproportionately larger number of banks than the rest of the countries in the sample, we follow Beck, Demirgüç-Kunt and Merrouche (2013) and Hagendorff *et al*. (2021) to avoid issues related to the over-representation of US banks by including only the top 50 largest US banks (measured by total value of assets) in our sample.

We construct our sample by combining the latest ES ratings from the Thomson Reuters Refinitiv ESG database as the proxy for banking ES activities, with banking financial, accounting and market variables derived from DataStream using their International Securities Identification Numbers. Country-related information and data were obtained from the World Bank. Missing information and the Financial Freedom Index of economies were obtained from the Heritage Foundation. Subject to the availability of ES data for international banking, our sample ultimately included 244 banks from 52 countries, comprising 2481 bank-year observations in total. The COVID-19 pandemic period is defined as 2020 (Elnahass, Trinh and Li, 2021) and the global financial crisis as 2007−2009 (Srivastav *et al*., 2017). Appendix A shows a detailed list of countries and the corresponding number of banks in our final sample.

Measures of ES activities

The use of the Refinitiv ESG Rating database is increasingly popular in CSR research (see Albuquerque *et al*., 2020; Bae *et al*., 2021; Demers *et al*., 2021; Firoozi and Keddie, 2021; Lins, Servaes and Tamayo, 2017). Refinitiv ESG Stat offers a detailed assessment of 10 categories of firm performance with regard to ESG aspects, including resource use, emissions and innovation, workplace, human rights, community and product responsibility, management, shareholders and CSR strategies. Following Albuquerque *et al*. (2020), Bae *et al*. (2021) and other studies (e.g. Dyck *et al*., 2019; Ferrell, Liang and Renneboog, 2016), our main CSR proxy is based on banking 'E' (environmental) and 'S' (social) scores (i.e. ES_Refinitiv) from the Refinitiv ESG database. 'G' (governance) is omitted because governance aspects are generally regarded as irrelevant to firm CSR and remits[4] (see Lins, Servaes and Tamayo, 2017). 'E' represents the environmental performance evaluation based on resource use, emissions and innovation. 'S' stands for social commitments measured by four areas of concern: workplace, human rights, community and product responsibility. Each component of the 'E' and 'S' aspects involves several related sub-themes and their scores are calculated based on the relative performance of banks in combination with the level of materiality of ES activities in the banking sector.

Our sensitivity tests address alternative proxies for CSR in banking. In particular, we measure CSR by focusing on each component of bank environmental performance (Environment_Refinitiv) and social commitment (Social_Refinitiv). The third alternative CSR proxy represents the average score of all three aspects of the ESG rating (ESG_Refinitiv) instead of only the ES ratings. In accordance with Refinitiv ESG, the 'G' score is evaluated based on management, shareholders and CSR strategies. Following Demers *et al*. (2021) and Lins, Servaes and Tamayo (2017), our robustness check incorporates the aggregate of all E, S and G factors, which could be associated with the level of trustworthiness in banking.

Measures of banks' financial stability

We examine banks' financial stability using measures of credit and liquidity risk exposures. Specifically, we first employ two alternative proxies for credit risk that have been widely used in banking studies (e.g. Kutubi, Ahmed and Khan, 2018;

[4]We exclude 'G' because we control for firm-level governance variables in the models (e.g. Lins, Servaes and Tamayo, 2017; Tamayo *et al*., 2021).

Nguyen, Nguyen and Sila, 2019): (i) the ratio of non-performing loans to total loans (NPL/Loan) and (ii) the ratio of non-performing loans to total assets (NPL/Assets). In the banking sector literature, these ratios are considered as two of the most common and reliable measures because loans are the main feature of banking firms. A non-performing loan is a loan for which the borrower is in default and has not made any scheduled payments of principal or interest for some time, which implies credit risk. The higher the ratio (NPL/Loan or NPL/Assets), the higher the bank's credit risk.

We also follow Saunders and Cornett (2006) and Mohammad *et al*. (2020) by measuring liquidity risk exposure based on the financing gap approach. This gap is the difference between the average bank loans and average bank core deposits (i.e. 'demand deposits, money market deposit accounts, negotiable order of withdrawal accounts, money market deposit accounts, other saving accounts and retail certificates of deposits (CDs)'; Mohammad *et al*., 2020, p. 7). Following Mohammad *et al*. (2020), we scale the financing gap by the average total assets to develop a financing gap ratio (FGR):

$$\mathrm{FGR} = \frac{\mathrm{AL} - \mathrm{ACD}}{\mathrm{ATA}}$$

where AL represents the average loans, ACD represents the average core deposits and ATA represents the average total assets. A higher FGR implies a higher degree of liquidity risk exposure.

Empirical models

Our model for testing the nexus between ES activities and banking financial stability (i.e. bank-specific risks and market value) is constructed by estimating the ordinary least square (OLS) model with robust standard errors (Trinh *et al*., 2020):

$$\begin{aligned}\mathrm{Risk}_{i,t} = {} & \mathrm{a}_i + \varphi \mathrm{CSR}_{i,t-1} + n\mathrm{Covid}_{i,t} \\ & + \Psi \mathrm{CSR}_{i,t-1} * \mathrm{Covid}_{i,t} \\ & + \Omega \mathrm{Governance}_{i,t-1} + ¥\mathrm{Bank}_{i,t-1} \\ & + €\mathrm{Country}_{k,t} + \mathrm{Year\ \ fixed\ \ effect} \\ & + \mathrm{Firm\ \ fixed\ \ effect} + \varepsilon \end{aligned} \quad (1)$$

$$\begin{aligned}\mathrm{Value}_{i,t} = {} & \mathrm{a}_i + \varphi \mathrm{CSR}_{i,t-1} + n\mathrm{Covid}_{i,t} \\ & + \Psi \mathrm{CSR}_{i,t-1} * \mathrm{Covid}_{i,t} \\ & + \Omega \mathrm{Governance}_{i,t-1} + ¥\mathrm{Bank}_{i,t-1} \\ & + €\mathrm{Country}_{k,t} + \mathrm{Year\ \ fixed\ \ effect} \\ & + \mathrm{Firm\ \ fixed\ \ effect} + \varepsilon \end{aligned} \quad (2)$$

where $\mathrm{Risk}_{i,t}$ represents (NPL/Loan, NPL/Assets and FGR) and $\mathrm{Value}_{i,t}$ represents (MV/BV). $\mathrm{CSR}_{i,t-1}$ represents ($\mathrm{ES\_Refinitiv}_{t-1}$) in the main tests and ($\mathrm{Environment\_Refinitiv}_{t-1}$, $\mathrm{Social\_Refinitiv}_{t-1}$ and $\mathrm{ESG\_Refinitiv}_{t-1}$) in the alternative models. $\mathrm{Covid}_{i,t}$ is measured by the dummy proxy that takes the value 1 if the year is 2020 (i.e. represents the COVID-19 pandemic period) and 0 otherwise (e.g. Elnahass, Trinh and Li, 2021). $\mathrm{CSR}_{i,t-1}{*}\mathrm{Covid}_{i,t}$ is the interaction term between CSR measures at year t−1 and the COVID period. We include this interaction term to explore whether a link exists between banks' financial stability and CSR changes during turbulent times. $\mathrm{Governance}_{i,t-1}$, $\mathrm{Bank}_{i,t-1}$ and $\mathrm{Country}_{k,t}$ represent governance- (at year t−1), bank- (at year t−1) and country-level characteristics (at year t), respectively. In addition, i, t and k denote bank, year and country, respectively. Appendix B presents the detailed definitions for all the main variables.

We fully recognize the possibility of a causal relationship between ES activities and bank financial stability, which might lead to issues related to simultaneity and endogeneity (Diemont, Moore and Soppe, 2016). Therefore, we apply 1-year lagged values for ES activities and all firm-level attributes of banking. In addition, we use year and firm dummies to capture the discrepancies in bank financial stability over time and across firms, respectively. More importantly, we employ various endogeneity treatment approaches such as the two-step generalized method of moments (GMM), three-stage least squares (3SLS) and propensity score matching (PSM) methods as robustness checks. These techniques can diminish the bias arising from sample selection, simultaneity and endogeneity issues.

In addition, we acknowledge that bank financial stability can be affected by many factors other than ES activities. Therefore, we create a wide-ranging vector of control variables for governance-, bank- and country-level characteristics (e.g. Elnahass, Trinh and Li, 2021; Hagendorff *et al*., 2021). Regarding governance variables (at year t−1), we

Table 1. Descriptive statistics

Statistics	N	Mean	SD	Min	Max	Skewness	Kurtosis	p25	p50	p75
NPL/Loan	2481	3.053	3.263	0	12.420	1.563	4.771	0.770	1.950	4.100
NPL/Assets	2445	1.974	2.135	0	8.213	1.620	4.992	0.514	1.214	2.673
FGR	2450	0.004	0.169	−0.299	0.320	0.142	2.193	−0.124	−0.007	0.135
MV/BV	2481	1.434	0.850	0.370	3.610	0.996	3.370	0.780	1.240	1.880
ES_Refinitiv	2481	0.392	0.261	0.036	0.853	0.294	1.789	0.149	0.354	0.614
Environment_Refinitiv	2481	0.353	0.305	0	0.877	0.366	1.727	0.050	0.303	0.620
Social_Refinitiv	2481	0.431	0.243	0.047	0.861	0.157	1.965	0.234	0.420	0.620
ESG_Refinitiv	2481	0.420	0.220	0.089	0.804	0.216	1.834	0.227	0.395	0.604
Covid	2481	0.098	0.297	0	1	2.713	8.360	0	0	0
LnBSize	2406	2.462	0.342	0.693	3.584	−0.490	4.312	2.197	2.485	2.708
%Ind	2481	0.434	0.288	0	1	0.047	1.988	0.214	0.438	0.667
Chair-CEO duality	2412	0.189	0.392	0	1	1.585	3.512	0	0	0
CEO perf-linked Comp	2412	0.205	0.404	0	1	1.460	3.131	0	0	0
%female	2481	0.138	0.133	0	0.600	0.802	2.884	0	0.111	0.222
LT-Debt/TA	2121	0.093	0.096	0	0.337	1.230	3.563	0.019	0.059	0.136
ST-Debt/TA	2121	0.048	0.065	0	0.217	1.378	3.780	0	0.014	0.077
Non-interest income	2481	1.409	1.343	0	5.360	1.666	5.227	0.584	1.014	1.691
Deposits/TA	2481	0.613	0.198	0.113	0.864	−0.946	3.253	0.517	0.653	0.766
Ln(TA)	2481	7.919	0.641	6.758	9.105	0.135	2.281	7.501	7.863	8.388
Ln(Age)	2481	1.454	0.468	0.301	2.155	−0.611	3.137	1.204	1.447	1.833
Cash/TA	2121	0.061	0.055	0.005	0.204	1.305	3.808	0.020	0.042	0.085
PPE/TA	2121	0.013	0.009	0.002	0.036	1.010	3.481	0.007	0.011	0.018
EBIT/Sales	2118	0.483	0.233	0.049	0.839	−0.243	1.928	0.289	0.512	0.680
Stock volatility	2481	0.088	0.044	0.034	0.192	0.928	3.009	0.054	0.078	0.112
Development	2481	3.875	0.611	2.844	4.796	0.016	1.828	3.400	3.848	4.527
Fiscal capacity	2481	−6.519	6.822	−20.168	0	−0.685	2.101	−11.997	−4.422	0
Private credit	2287	80.313	53.749	14.488	182.785	0.709	2.102	38.807	58.292	124.408
Global_crisis	2481	0.110	0.313	0	1	2.492	7.212	0	0	0

This table reports the descriptive statistics of all dependent, independent and control variables (winsorized at the 5% level) employed in our study. See variable definitions in Appendix B.

include board size (LnBSize), board independence (%Ind), CEO duality (Chair-CEO duality), CEO compensation linked to firm performance (CEO perf-linked Comp) and board gender diversity (%female). At the bank level, we control for several variables (at year t−1), including LT-Debt/TA, ST-Debt/TA, Non-interest_Income, Deposits/TA, Ln(TA), Ln(Age), Cash/TA, PPE/TA, EBIT/TA and stock volatility. For the country-level variables, we control for a country's Development, Fiscal Capacity and Private_Credit. Lastly, our study controls for Global_Crisis. Detailed descriptions of all the variables are provided in Appendix B.

Descriptive statistics

Table 1 presents the descriptive statistics of our international banking sample. With respect to bank risks representing banks' financial stability, the means of NPL/Loan and NPL/Assets (credit risk) and FGR (liquidity risk) are 3.053, 1.974 and 0.004, respectively. The minimum and maximum values for these bank risks are 0 and 12.420, 0 and 8.213, and –0.299 and 0.320, respectively. The values for ES_Refinitiv range from 0.036 to 0.853 and average 0.392. Environmental_Refinitiv and Social_Refinitiv have mean values of 0.353 and 0.431, respectively. The minimum and maximum values for Environmental_Refinitiv are 0 and 0.877; and for Social_Refinitiv, 0.047 and 0.861. The mean of ESG_Refinitiv is 0.42, while its range is from 0.089 to 0.804.

Overall, the descriptive statistics suggest that our sample is highly heterogeneous with regard to ES activities, as gauged by various ES ratings and bank financial stability indicators during the COVID-19 pandemic. In addition, the correlation matrix results for all independent variables (Table 2) reveal no serious issues concerning multicollinearity among the variables used in the analysis. Given that ES_Refinitiv, Social_Refinitiv, Environment_Refinitiv and ESG_Refinitiv are alternative proxies for the main independent

Table 2. Correlation matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. ES_Refinitiv	1.00																							
2. Environment_Refinitiv	0.96*	1.00																						
3. Social_Refinitiv	0.94*	0.81*	1.00																					
4. ESG_Refinitiv	0.97*	0.93*	0.91*	1.00																				
5. Covid	0.04*	0.03	0.04*	0.03	1.00																			
6. LnBSize	0.16*	0.18*	0.11*	0.15*	−0.08*	1																		
7. %Ind	0.316*	0.27*	0.34*	0.33*	0.04*	−0.08*	1																	
8. Chair-CEO duality	−0.076*	−0.09*	−0.04*	−0.11*	−0.04*	0.07*	−0.04	1																
9. CEO perf-linked Comp	0.136*	0.12*	0.13*	0.14*	0.03	−0.06*	0.32*	−0.10*	1															
10. %female	−0.01	−0.01	−0.01	−0.01	0.00	−0.03	0.0463*	−0.06*	−0.30*	1														
11. LT-Debt/TA	0.28*	0.30*	0.23*	0.27*	−0.07*	0.08*	0.16*	−0.01	0.08*	0.01	1.00													
12. ST-Debt/TA	0.17*	0.20*	0.11*	0.17*	−0.04*	0.04	0.03	−0.01	0.01	0.03	0.11*	1.00												
13. Non-interest income	0.23*	0.25*	0.18*	0.22*	−0.01	0.18*	0.028	0.02	0.00	0.00	0.23*	0.11*	1.00											
14. Deposits/TA	−0.24*	−0.25*	−0.20*	−0.23*	0.03	−0.07*	−0.10*	−0.05*	−0.05*	−0.02	−0.52*	−0.45*	−0.18*	1.00										
15. Ln(TA)	0.54*	0.57*	0.45*	0.55*	−0.04*	0.37*	0.16*	−0.03	0.03	0.03	0.20*	0.12*	0.26*	−0.14*	1.00									
16. Ln(Age)	0.06*	0.04*	0.08*	0.05*	0.07*	−0.06*	0.0272	−0.09*	0.02	−0.00	−0.06*	−0.08*	−0.01	0.06*	−0.04*	1.00								
17. Cash/TA	−0.23*	−0.25*	−0.18*	−0.19*	0.04	−0.16*	−0.07*	−0.02	−0.02	−0.02	−0.27*	−0.12*	−0.12*	0.18*	−0.27*	0.07*	1.00							
18. PPE/TA	0.04	−0.01	0.09*	0.02	0.13*	−0.02	−0.11*	−0.03	−0.05*	−0.01	−0.13*	−0.15*	−0.07*	0.18*	−0.29*	0.14*	0.17*	1.00						
19. EBIT/Sales	−0.05*	−0.04*	−0.05*	−0.02	−0.05*	−0.02	0.05*	0.04*	0.02	−0.01	0.05*	0.17*	−0.07*	−0.07*	−0.01	−0.04*	0.12*	−0.15*	1.00					
20. Stock volatility	0.13*	0.11*	0.14*	0.10*	0.30*	0.00	−0.02	0.03	0.01	0.01	0.15*	0.14*	0.07*	−0.16*	−0.04*	0.01	−0.09*	0.06*	0.04*	1.00				
21. Development	−0.01	−0.04*	0.02	−0.04	0.20*	−0.17*	0.02	−0.01	−0.06*	0.01	−0.10*	−0.05*	−0.06*	0.11*	−0.10*	0.04*	0.08*	0.06*	−0.05*	0.02	1.00			
22. Fiscal capacity	0.08*	0.09*	0.06*	0.08*	−0.17*	0.16*	0.02	−0.03	0.01	−0.00	0.10*	0.06*	0.01	−0.12*	0.01	−0.05*	−0.04*	0.06*	0.00	0.01	−0.31*	1.00		
23. Private credit	−0.03	−0.04*	−0.01	−0.04*	−0.08*	−0.07*	−0.01	−0.00	−0.07*	0.01	−0.06*	−0.04	−0.08*	0.03	−0.09*	−0.04*	0.07*	0.04	−0.03	−0.04*	0.60*	0.08*	1.00	
24. Global_crisis	−0.04*	−0.03	−0.06*	−0.04*	−0.11*	0.06*	−0.09*	0.08*	0.03	0.02	0.05*	0.09*	0.05*	−0.04*	0.07*	−0.09*	−0.08*	−0.16*	0.04	0.23*	−0.09*	0.06*	−0.04*	1.00

This table reports the results for the *Pearson* correlation matrix among all pairs of independent variables employed in our study.
*Indicates a significance level of 5%. See variable definitions in Appendix B.

variable (CSR) built from E, S and G elements, they should be significantly correlated to each other. Moreover, these variables are tested separately (i.e. not within the same empirical models) and hence, multicollinearity is mitigated across all modules. This result is also validated by low variance inflation factor values (see Appendix C).

Main findings

Does CSR enhance banks' financial stability?

Table 3 shows the regression results of bank risk-taking indicators on ES activities ($ES\_Refinitiv_{t-1}$). Most of the independent variables (except for country- or stock-market-level characteristics) are lagged by 1 year to mitigate endogeneity concerns. Panel A reports the results for the full sample from 2002 to 2020, and Panel B presents those for the post-crisis period of 2010 to 2020. In each panel, we present our results for different risk measures including credit risk (NPL/Loan: Models 1 and 4; NPL/Assets: Models 2 and 5) and liquidity risk (FGR: Models 3 and 6). Interactions between ES rating ($ES\_Refinitiv_{t-1}$) and the COVID crisis (Covid) dummy ($ES\_Refinitiv_{t-1}$ * Covid), year and bank fixed effects are employed in all the models.

The results from Models 1 to 3 of Panel A show that the coefficients of the interaction terms between $ES\_Refinitiv_{t-1}$ and Covid ($ES\_Refinitiv_{t-1}$ * Covid) on NPL/Loan, NPL/Assets and FGR are −1.050, −0.915 and −0.038, respectively. Because Covid is a binary variable, the negative coefficients on the interaction terms imply that during the COVID-19 pandemic crisis, banks with higher ES ratings tended to exhibit lower credit and liquidity risk exposures (higher financial stability) consistently. The economic magnitude is also significant. For example, the coefficients of the interactions ($ES\_Refinitiv_{t-1}$ * Covid) on NPL/Loan and NPL/Assets range from −0.915 to −1.050, suggesting that during the health crisis, a one-standard-deviation increase in ES rating corresponds to 0.239–0.274% declines in credit risk [−0.915 * 0.261 = −0.239 and −1.050 * 0.261 = −0.274]. Similarly, the coefficient of the interaction ($ES\_Refinitiv_{t-1}$ * Covid) on FGR is −0.038, implying that a one-standard-deviation increase in ES rating during the pandemic corresponds to a 0.01% decline in liquidity risk exposure [−0.038 * 0.261 = −0.010].

Our findings indicate that a higher level of ES activities can develop firm-level social capital and establish a stakeholder-centred culture within a bank. Therefore, they are likely to constrain banks from excessive and aggressive risk-taking behaviours, especially during pandemics. By contrast, managerial decisions of less socially responsible banks tend to be driven by the maximization of shareholders' short-term returns, leading to more aggressive risk-taking during times of crisis. The results for the post-crisis sample (Models 4–6 in Panel C) present a similar finding. In particular, the associations between $ES\_Refinitiv_{t-1}$ * Covid and all bank risk measures are negative and significant, suggesting that bank-specific risks can be reduced for banks that are relatively more socially responsible during the pandemic. Our control variables show results that are consistent with previous studies (e.g. Elnahass, Trinh and Li, 2021) and our expectations.

Robust measures of CSR

Further, we estimate separate regressions for each ES rating component (Environment_Refinitiv; Social_Refinitiv) and the ESG rating (ESG_Refinitiv) to examine whether all ESG attributes influence bank risk indicators equally. Panels A and B of Table 4 show the results for credit (NPL/Loan and NPL/Assets) and liquidity (FGR) risks, which are generally consistent with our main findings (Table 3). We find that across all CSR measures, credit and liquidity risks are significantly reduced during the pandemic, as evidenced by the negative and significant coefficients of the interaction terms in most of the models (the results in Models 2 and 3 are insignificant). Therefore, our results are generally robust across all proxies for CSR.

Do investors value the beneficial effects of banks' CSR?

We continue to examine whether investors value the CSR-induced improvement in a bank's financial stability in times of COVID-19 crisis when short-termism prevails. To this end, we extend our analyses to incorporate the measures of CSR (i.e. $ES\_Refinitiv_{t-1}$, $Environment\_Refinitiv_{t-1}$, $Social\_Refinitiv_{t-1}$ and $ESG\_Refinitiv_{t-1}$) and their interactions with the COVID-19 dummy on the market values of banks (measured by market to book value: MV/BV) for the full sample period,

Table 3. Do ES activities reduce bank risk exposures?

	Panel A: Full sample (2002–2020)			Panel B: Post-crisis sample (2010–2020)		
	Credit risk exposure		Liquidity risk exposure	Credit risk exposure		Liquidity risk exposure
Variables	NPL/Loan (1)	NPL/Assets (2)	FGR (3)	NPL/Loan (4)	NPL/Assets (5)	FGR (6)
$ES\_Refinitiv_{t-1}$	2.261***	1.642***	0.031**	1.594***	1.218***	0.041**
	(0.000)	(0.000)	(0.026)	(0.006)	(0.001)	(0.010)
*$ES\_Refinitiv_{t-1}$ * Covid*	*–1.050**	*–0.915***	–0.038**	–0.601	–0.605	–0.042**
	(0.098)	*(0.023)*	(0.028)	(0.333)	(0.123)	(0.013)
$Covid_{t-1}$	–0.127	0.089	–0.063**	–0.683	–0.232	–0.016
	(0.891)	(0.880)	(0.013)	(0.103)	(0.382)	(0.174)
$LnBSize_{t-1}$	–0.657**	–0.377**	–0.022***	–0.414	–0.256	–0.028***
	(0.026)	(0.043)	(0.008)	(0.183)	(0.189)	(0.001)
$\%Ind_{t-1}$	–0.271	–0.101	–0.030***	–1.034*	–0.516	–0.006
	(0.522)	(0.706)	(0.010)	(0.052)	(0.123)	(0.662)
Chair-CEO $duality_{t-1}$	–0.438**	–0.286**	–0.009*	–0.452**	–0.282**	–0.004
	(0.018)	(0.014)	(0.085)	(0.017)	(0.017)	(0.402)
CEO perf-linked $Comp_{t-1}$	0.309*	0.174*	–0.002	0.250	0.141	0.000
	(0.058)	(0.089)	(0.636)	(0.127)	(0.169)	(0.979)
$\%female_{t-1}$	0.432	0.268	–0.001	0.237	0.151	–0.001
	(0.299)	(0.306)	(0.903)	(0.574)	(0.570)	(0.919)
$LT\text{-}Debt/TA_{t-1}$	3.646***	2.180***	0.055*	2.838**	1.818**	0.074**
	(0.001)	(0.002)	(0.072)	(0.014)	(0.014)	(0.022)
$ST\text{-}Debt/TA_{t-1}$	3.205**	1.916**	0.078**	2.154*	1.228	0.076**
	(0.010)	(0.015)	(0.023)	(0.100)	(0.136)	(0.036)
Non-interest $income_{t-1}$	–0.009	–0.017	–0.001	–0.020	–0.022	–0.000
	(0.867)	(0.623)	(0.725)	(0.719)	(0.517)	(0.907)
$Deposits/TA_{t-1}$	–1.150	–0.491	–0.478***	–2.092***	–1.087**	–0.449***
	(0.132)	(0.308)	(0.000)	(0.009)	(0.031)	(0.000)
$Ln(TA)_{t-1}$	–0.527	–0.268	0.093***	0.189	0.189	0.099***
	(0.274)	(0.378)	(0.000)	(0.716)	(0.563)	(0.000)
$Ln(Age)_{t-1}$	0.732	0.542	0.071***	0.471	0.450	0.072***
	(0.283)	(0.207)	(0.000)	(0.553)	(0.365)	(0.001)
$Cash/TA_{t-1}$	2.768*	2.065**	–0.035	1.291	1.039	–0.006
	(0.060)	(0.025)	(0.382)	(0.380)	(0.258)	(0.885)
PPE/TA_{t-1}	40.011***	26.093***	0.218	31.626***	20.015***	0.163
	(0.001)	(0.001)	(0.504)	(0.008)	(0.008)	(0.620)
$EBIT/Sales_{t-1}$	0.838**	0.455**	–0.015	0.178	–0.002	–0.030***
	(0.014)	(0.034)	(0.108)	(0.611)	(0.994)	(0.002)
Stock volatility	12.497***	7.874***	0.163***	7.658***	4.795***	0.174***
	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.001)
Development	1.392**	0.905***	–0.021	1.186**	0.747**	0.003
	(0.011)	(0.009)	(0.159)	(0.043)	(0.045)	(0.852)
Fiscal capacity	–0.013	–0.002	0.001*	–0.031**	–0.013	0.001**
	(0.284)	(0.785)	(0.076)	(0.014)	(0.114)	(0.014)
Private credit	0.003	0.002	–0.000***	0.001	0.001	–0.000***
	(0.318)	(0.366)	(0.002)	(0.610)	(0.684)	(0.001)
Global_crisis	0.069	0.221	–0.029	–0.423	–0.032	0.039***
	(0.922)	(0.618)	(0.136)	(0.296)	(0.899)	(0.001)
*Covid + $ES\_Refinitiv_{t-1}$ * Covid*	–1.176*	–0.826*	–0.101***	–1.284***	–0.837***	–0.058***
	(0.095)	(0.082)	(0.000)	(0.005)	(0.003)	(0.000)
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.992	–0.128	–0.285**	–0.962	–1.444	–0.496***
	(0.818)	(0.963)	(0.016)	(0.846)	(0.643)	(0.000)

Table 3. (Continued)

	Panel A: Full sample (2002–2020)			Panel B: Post-crisis sample (2010–2020)		
	Credit risk exposure		Liquidity risk exposure	Credit risk exposure		Liquidity risk exposure
Variables	NPL/Loan (1)	NPL/Assets (2)	FGR (3)	NPL/Loan (4)	NPL/Assets (5)	FGR (6)
Observations	1740	1724	1728	1581	1565	1569
Adjusted R-squared	0.705	0.728	0.913	0.740	0.763	0.913
Wald chi^2	0.000	0.000	0.000	0.000	0.000	0.000

This table reports OLS regression results for the effect of ES activities on bank credit risk and liquidity risk exposure. Panel A presents those for a panel analysis for the full sample period (2002–2020) and Panel B reports those for the post-financial crisis period (2010–2020). The dependent variables include credit risk exposure (NPL/Loan – Models 1 and 4 and NPL/Assets – Models 2 and 5) and liquidity risk exposure (FGR: Models 3, 6 and 9). The main independent variables include ES activities in year t–1 ($ES\_Refinitiv_{t-1}$) and its interactions with Covid ($ES\_Refinitiv_{t-1}$ * Covid). Firm-level characteristics are lagged by 1 year to reduce the endogeneity problem.
***, ** and * indicate 1%, 5% and 10% significance level, respectively. See variable definitions in Appendix B.

2002−2020. The results are reported in Table 5. We find that investors are likely to perceive and value banks' CSR positively, especially environmental activity (see positive and significant coefficients on the interaction terms in Model 2) during COVID-19. Therefore, we conclude that CSR, such as ES investment, is generally considered in stock market prices during turbulent times. Overall, this result implies that investors value the improved financial stability of banks through their engagements in CSR.

The underlying channels: social capital and stakeholder-centred culture

As previously mentioned, ES activities can lead to a higher *firm-level social capital* and promote a *stakeholder-centred culture*, and accordingly reduce risk-taking by banks. Therefore, social capital and stakeholder cultures are probable and important underlying channels of our predicted association. Notably, empirical identifications of firm-level social capital and stakeholder-centred culture are challenging (Lins, Servaes and Tamayo, 2017; Tamayo *et al*., 2021).[5] Studies do not currently provide an identifiable, consistent and accurate measure for both indicators. In addition, the available measurements are subjective, non-observable and multi-dimensional. To address this challenge, we extend our empirical assessments to these two possible underlying channels (i.e. social capital and stakeholder-centred culture) using alternative measures.

First, the bank's goodwill is used as a proxy for its firm-level social capital (e.g. Adler and Kwon, 2002; Anderson, Park and Jack, 2007; Pastoriza, Arino and Ricart, 2008). Goodwill is the value of a firm's brand name, solid customer base, good relations with customers and employees, as well as proprietary technology (Chauvin and Hirschey, 1994; Henning, Lewis and Shaw, 2000; Jennings *et al*., 1996). We use goodwill as a proxy for banks' social capital based on the underlying assumption that homogenous firms (i.e. firms in the same industry and of the same size) commonly operate in similar ways and have similar governance procedures in place (Gooderham, Minbaeva and Pedersen, 2011; Maak, 2007; Muthuri, Matten and Moon, 2009; Preston, 2004; Wheeler and Davies, 2004). Goodwill is scaled by total assets to measure a bank's social capital. Second, the stakeholder-centred culture reflects a bank's internal and external relations with its relevant stakeholders (de Chernatony and Harris, 2000; Farooq, Rupp and Farooq, 2017; Jiao *et al*., 2017; Jones, Felps and Bigley, 2007; Veser, 2004; Welch and Jackson, 2007). Therefore, we construct an index to reflect a bank's relationships with both internal and external stakeholders by applying the principal component analysis

[5]In the studies of Lins, Servaes and Tamayo (2017) and Tamayo *et al*. (2021), the authors use ES performance directly as a proxy for firm-level social capital and the ensuing public trust, and stakeholder cooperation, which in turn increases the overall firm value. However, studies pay less attention to a firm's socially irresponsible activities that might affect its social capital gained as a result of its responsible practices (Kang, Germann and Grewal, 2016).

Table 4. Robustness measures of CSR

	Panel A: Credit risk exposure						Panel B: Liquidity risk exposure		
	NPL/Loan			NPL/Assets			FGR		
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Environment_Refinitiv$_{t-1}$	1.569***			1.155***			0.020*		
	(0.000)			(0.000)			(0.071)		
*Environment_Refinitiv$_{t-1}$ * Covid*	–0.975*			–0.828**			–0.032**		
	(0.083)			(0.020)			(0.039)		
Social_Refinitiv$_{t-1}$		1.829***			1.328***			0.031**	
		(0.000)			(0.000)			(0.027)	
*Social_Refinitiv$_{t-1}$ * Covid*		–0.819			–0.765*			–0.036**	
		(0.213)			(0.069)			(0.046)	
ESG_Refinitiv$_{t-1}$			1.477**			1.147***			0.036**
			(0.016)			(0.003)			(0.032)
*ESG_Refinitiv_Refinitiv$_{t-1}$ * Covid*			–1.113			–1.030**			–0.047**
			(0.152)			(0.037)			(0.027)
Covid	–0.037	0.144	0.409	0.126	0.296	0.482	–0.064**	–0.060**	–0.057**
	(0.967)	(0.877)	(0.667)	(0.827)	(0.616)	(0.425)	(0.010)	(0.019)	(0.029)
LnBSize$_{t-1}$	–0.662**	–0.674**	–0.682**	–0.378**	–0.390**	–0.393**	–0.022***	–0.022***	–0.022***
	(0.025)	(0.023)	(0.022)	(0.042)	(0.037)	(0.036)	(0.008)	(0.007)	(0.008)
%Ind$_{t-1}$	–0.271	–0.276	–0.327	–0.100	–0.105	–0.143	–0.030***	–0.030***	–0.031***
	(0.522)	(0.515)	(0.442)	(0.708)	(0.696)	(0.594)	(0.010)	(0.010)	(0.007)
Chair-CEO duality$_{t-1}$	–0.419**	–0.450**	–0.410**	–0.273**	–0.295**	–0.266**	–0.008*	–0.009*	–0.008
	(0.023)	(0.015)	(0.027)	(0.019)	(0.012)	(0.023)	(0.095)	(0.076)	(0.106)
CEO perf-linked Comp$_{t-1}$	0.299*	0.304*	0.292*	0.167	0.171*	0.162	–0.002	–0.002	–0.002
	(0.066)	(0.062)	(0.074)	(0.103)	(0.095)	(0.115)	(0.615)	(0.640)	(0.609)
%female$_{t-1}$	0.430	0.458	0.452	0.265	0.288	0.278	–0.001	–0.001	–0.002
	(0.301)	(0.272)	(0.279)	(0.313)	(0.274)	(0.292)	(0.896)	(0.938)	(0.888)
LT-Debt/TA$_{t-1}$	3.668***	3.837***	3.839***	2.188***	2.326***	2.313***	0.055*	0.057*	0.056*
	(0.001)	(0.000)	(0.000)	(0.002)	(0.001)	(0.001)	(0.068)	(0.060)	(0.066)
ST-Debt/TA$_{t-1}$	3.057**	3.250***	3.072**	1.807**	1.954**	1.826**	0.076**	0.080**	0.077**
	(0.014)	(0.009)	(0.014)	(0.022)	(0.013)	(0.021)	(0.027)	(0.020)	(0.024)
Non-interest income$_{t-1}$	–0.007	–0.011	–0.009	–0.015	–0.018	–0.017	–0.001	–0.001	–0.001
	(0.901)	(0.837)	(0.871)	(0.657)	(0.594)	(0.624)	(0.736)	(0.709)	(0.720)
Deposits/TA$_{t-1}$	–1.155	–1.280*	–1.288*	–0.493	–0.586	–0.583	–0.479***	–0.480***	–0.479***
	(0.131)	(0.094)	(0.093)	(0.307)	(0.225)	(0.229)	(0.000)	(0.000)	(0.000)
Ln(TA)$_{t-1}$	–0.423	–0.375	–0.329	–0.197	–0.154	–0.136	0.095***	0.094***	0.093***
	(0.377)	(0.434)	(0.499)	(0.514)	(0.611)	(0.657)	(0.000)	(0.000)	(0.000)
Ln(Age)$_{t-1}$	0.723	0.822	0.788	0.534	0.606	0.582	0.072***	0.072***	0.071***
	(0.290)	(0.229)	(0.251)	(0.215)	(0.159)	(0.178)	(0.000)	(0.000)	(0.000)
Cash/TA$_{t-1}$	2.661*	2.729*	2.632*	1.987**	2.033**	1.970**	–0.037	–0.036	–0.036
	(0.070)	(0.064)	(0.074)	(0.032)	(0.028)	(0.034)	(0.363)	(0.377)	(0.375)
PPE/TA$_{t-1}$	41.506***	41.606***	44.025***	27.152***	27.237***	28.954***	0.243	0.224	0.253
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.456)	(0.492)	(0.436)
EBIT/Sales$_{t-1}$	0.840**	0.856**	0.834**	0.458**	0.468**	0.449**	–0.015	–0.015	–0.015
	(0.014)	(0.012)	(0.015)	(0.033)	(0.030)	(0.038)	(0.113)	(0.115)	(0.104)
Stock volatility	12.473***	12.556***	12.616***	7.830***	7.929***	7.954***	0.160***	0.164***	0.163***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)	(0.002)
Development	1.368**	1.426***	1.411**	0.889**	0.931***	0.923***	–0.021	–0.021	–0.021
	(0.012)	(0.009)	(0.010)	(0.011)	(0.008)	(0.008)	(0.161)	(0.169)	(0.171)
Fiscal capacity	–0.012	–0.012	–0.010	–0.001	–0.001	0.000	0.001*	0.001*	0.001*
	(0.342)	(0.334)	(0.412)	(0.891)	(0.875)	(0.999)	(0.062)	(0.076)	(0.067)
Private credit	0.003	0.003	0.003	0.002	0.001	0.002	–0.000***	–0.000***	–0.000***
	(0.336)	(0.366)	(0.356)	(0.392)	(0.427)	(0.403)	(0.001)	(0.001)	(0.002)
Global_crisis	0.113	0.322	0.357	0.249	0.404	0.415	–0.027	–0.026	–0.028
	(0.873)	(0.645)	(0.612)	(0.575)	(0.359)	(0.349)	(0.156)	(0.171)	(0.151)
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 4. (Continued)

	Panel A: Credit risk exposure						Panel B: Liquidity risk exposure		
	NPL/Loan			NPL/Assets			FGR		
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.645	–0.688	–0.729	–0.346	–1.375	–1.315	–0.293**	–0.302***	–0.288**
	(0.881)	(0.872)	(0.866)	(0.899)	(0.611)	(0.631)	(0.014)	(0.010)	(0.015)
Observations	1740	1740	1740	1724	1724	1724	1728	1728	1728
Adjusted R-squared	0.704	0.704	0.702	0.728	0.727	0.726	0.913	0.913	0.913
Wald chi^2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

This table reports OLS regression results for the effect of robustness measures of CSR on bank credit risk and liquidity risk exposure for the full sample period (2002–2020). The dependent variables include credit risk exposure (NPL/Loan – Models 1–3 and NPL/Assets – Models 4–6) and liquidity risk exposure (FGR: Models 7–9). The main independent variables include CSR measured by three different robustness measures of ES ratings in year t–1 including environment rating (Environment_Refinitiv$_{t-1}$), social rating (Social_Refinitiv$_{t-1}$) and ESG rating (ESG_Refinitiv$_{t-1}$). Firm-level characteristics are lagged by 1 year to reduce the endogeneity problem.

***, ** and * indicate 1%, 5% and 10% significance level, respectively. See variable definitions in Appendix B.

(PCA) approach. This index includes six major indicators covering both internal relations (i.e. employee engagement and voluntary community work, employee health and safety policy) and external relations (i.e. shareholder engagement policy, stakeholder engagement, customer health and safety policy, corporate responsibility awards).[6]

Table 6 (Models 1−4) presents the empirical results, which generally show significantly positive coefficients on the interaction terms between firm-level social capital and ES activities (ES_Refinitiv$_{t-1}$ * Social Capital$_{t-1}$). Likewise, positive associations are reported for the interaction term of stakeholder-centred culture index and ES activities (ES_Refinitiv$_{t-1}$ * Stakeholder-Centred Culture$_{t-1}$). These findings suggest that the lower credit and liquidity risk exposures resulting from engagement in ES activities are mainly seen in banks with a higher social capital and a stakeholder-centred culture. Therefore, these analyses confirm our expectations and theoretical assumptions regarding the two underlying channels dominating the association between ES ratings and banks' risk exposures.

Capturing country and regional fixed effects

We report the regression results after capturing country and regional fixed effects in Panels A and B of Table 7, respectively. Models 1 and 4, 2 and 5, and 3 and 6 present the results of NPL/Loan, NPL/Assets and FGR, respectively. We generally find that coefficient estimates on the interactions between ES_Refinitiv$_{t-1}$ and Covid (ES_Refinitiv$_{t-1}$ * Covid) are significant across all the models. These results suggest that during COVID-19, a bank's higher level of ES activities is related to its higher financial stability (i.e. lower credit and liquidity risks). Therefore, we confirm the robustness of our main findings regarding the predicted association between ES and bank risk-taking behaviour, regardless of country and regional fixed effects.

Endogeneity treatments

Instrument variable estimations: GMM and 3SLS

Studies emphasize that the influence of ES activities on firm performance and risk may be endogenous (e.g. Wu and Shen, 2013). When employing OLS, this issue could give rise to a missing third-variable problem because non-random engagement in ES activities influences firm outcome indicators such as the banks' financial stability measures used in our study. Therefore, we address, or at least minimize, endogeneity problems using two methods: GMM and 3SLS.

To conduct a GMM analysis, we use internal instrument variables (IVs), which are lagged values of potential endogenous variables (i.e. CSR performance and all firm-characteristic variables

[6]All the data are retrieved from the Refinitiv database.

Table 5. How investors value CSR of banks

Variables	MV/BV (1)	MV/BV (2)	MV/BV (3)	MV/BV (4)
ES_Refinitiv$_{t-1}$	0.740***			
	(0.000)			
ES_Refinitiv$_{t-1}$ * Covid	0.144			
	(0.379)			
Environment_Refinitiv$_{t-1}$		0.425**		
		(0.020)		
*Environment_Refinitiv$_{t-1}$ * Covid*		0.219*		
		(0.057)		
Social_Refinitiv$_{t-1}$			0.882***	
			(0.000)	
*Social_Refinitiv$_{t-1}$ * Covid*			0.035	
			(0.826)	
ESG_Refinitiv$_{t-1}$				1.094***
				(0.000)
*ESG_Refinitiv_Refinitiv$_{t-1}$ * Covid*				0.130
				(0.528)
Covid	–1.439***	–1.441***	–1.307***	–1.477***
	(0.000)	(0.000)	(0.000)	(0.000)
LnBSize$_{t-1}$	–0.223	–0.236	–0.217	–0.216
	(0.174)	(0.160)	(0.179)	(0.177)
%Ind$_{t-1}$	0.305**	0.374**	0.254	0.241
	(0.049)	(0.018)	(0.104)	(0.114)
Chair-CEO duality$_{t-1}$	0.117	0.128	0.101	0.134
	(0.245)	(0.215)	(0.301)	(0.171)
CEO perf-linked Comp$_{t-1}$	–0.049	–0.049	–0.043	–0.049
	(0.413)	(0.413)	(0.478)	(0.413)
%female$_{t-1}$	0.002	–0.000	0.000	0.016
	(0.988)	(0.997)	(0.998)	(0.912)
LT-Debt/TA$_{t-1}$	–0.378	–0.342	–0.333	–0.440
	(0.505)	(0.561)	(0.539)	(0.431)
ST-Debt/TA$_{t-1}$	–0.218	–0.228	–0.086	–0.294
	(0.706)	(0.699)	(0.880)	(0.607)
Non-interest income$_{t-1}$	–0.107***	–0.105***	–0.103***	–0.108***
	(0.000)	(0.000)	(0.000)	(0.000)
Deposits/TA$_{t-1}$	–0.198	–0.235	–0.186	–0.183
	(0.619)	(0.571)	(0.630)	(0.641)
Ln(TA)$_{t-1}$	–0.423***	–0.377***	–0.415***	–0.461***
	(0.000)	(0.000)	(0.000)	(0.000)
Ln(Age)$_{t-1}$	–0.153*	–0.146	–0.162*	–0.152*
	(0.080)	(0.106)	(0.060)	(0.076)
Cash/TA$_{t-1}$	1.140*	1.075*	1.120*	1.027*
	(0.063)	(0.084)	(0.064)	(0.089)
PPE/TA$_{t-1}$	3.698	5.317	2.724	2.941
	(0.481)	(0.316)	(0.592)	(0.574)
EBIT/Sales$_{t-1}$	0.344**	0.348**	0.336**	0.323**
	(0.040)	(0.042)	(0.045)	(0.049)
Stock volatility	–3.449***	–3.177***	–3.607***	–3.368***
	(0.000)	(0.000)	(0.000)	(0.000)
Development	0.223**	0.229**	0.210**	0.236**
	(0.018)	(0.015)	(0.028)	(0.012)
Fiscal capacity	–0.009	–0.009	–0.009	–0.009
	(0.119)	(0.147)	(0.122)	(0.111)
Private credit	0.000	0.000	0.000	0.000
	(0.990)	(0.996)	(0.941)	(0.977)

Table 5. (Continued)

Variables	MV/BV (1)	MV/BV (2)	MV/BV (3)	MV/BV (4)
Global_crisis	–0.301	–0.305	–0.229	–0.319*
	(0.120)	(0.119)	(0.217)	(0.091)
Year fixed effect	Yes	Yes	Yes	Yes
Firm clustered	Yes	Yes	Yes	Yes
Constant	5.444***	5.150***	5.293***	5.570***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	1740	1740	1740	1740
Adjusted R-squared	0.331	0.318	0.341	0.344
Wald chi^2	0.000	0.000	0.000	0.000

This table reports OLS regression results for the effect of CSR on bank market value for the full sample period (2002–2020). The dependent variable is market to book value (MV/BV). The main independent variables include four proxies for CSR in year t−1 (ES_Refinitiv$_{t-1}$; Environment_Refinitiv$_{t-1}$; Social_Refinitiv$_{t-1}$; ESG_Refinitiv$_{t-1}$) and its interactions with Covid. Firm-level characteristics are lagged by 1 year to reduce the endogeneity problem.
***, ** and * indicate 1%, 5% and 10% significance level, respectively. See variable definitions in Appendix B.

except country-level characteristics that are exogenous under the GMM approach). However, the 3SLS method requires at least one external IV that satisfies the two conditions of being correlated to the endogenous variable (i.e. CSR) and uncorrelated to the error term of dependent variables (i.e. bank credit and liquidity risk). Following the common instrumenting technique in previous studies (e.g. Laeven and Levine, 2009; Safiullah and Shamsuddin, 2019; Trinh *et al*., 2020), we employ the year average of the ES rating variable of other banks in the same country in our sample. By using this IV, we assume that a change in the risk of one bank is less likely to affect the ES rating of other banks, and accordingly we predict that the chosen IV could be correlated to the potential endogenous variable (ES rating) but not to the unobserved variables that influence the dependent variable (risk).

We report the GMM and 3SLS results in Table 8, Panels A and B, respectively. The results are generally consistent with our main findings, which remain unchanged since all the diagnostic tests support the validity of the IVs. The results show the presence of heteroscedasticity after running 3SLS; therefore, the GMM estimator is more efficient than the IV estimator (Baum, Schaffer and Stillman, 2003).

Propensity score matching analyses

We further consider that ES ratings may be non-randomly distributed across banking firms in our sample during the COVID-19 period. In addition, other variables may be associated with that rating and in turn influence banks' financial stability. These raise endogeneity issues that can be addressed by applying the PSM approach. This approach can also help resolve sample selection bias. We identify two groups: (i) treatment (i.e. high ES-rated banks during COVID-19) and (ii) control (i.e. low ES-rated banks during COVID-19). We then match these samples to ensure that each pair of matched bank-year observations is virtually undifferentiated from one another, other than participating in ES activities.

In accordance with Casu *et al*.'s (2013) procedures, we conduct our analysis in three steps. First, we estimate propensity scores by applying probit models to the dummy ES rating variable during the COVID-19 period (i.e. coded 1 if a bank has a high ES rating (larger or equal to the median) during the COVID-19 period, and 0 otherwise) and the control factors. This test can balance all the covariates between the control and treatment groups (Casu *et al*., 2013; Trinh, Elnahass and Salama, 2021). Because all the control variables (firm level) used in the main tests are included in the propensity score models, they should not be affected by the treatment. Therefore, we lag them by 1 year, which is consistent with Casu *et al*. (2013). Second, we use different nearest-neighbour matching techniques (i.e. one-to-one matching without replacement, one-to-one matching with replacement and nearest neighbour with n = 2 and 3) to match each bank with a high ES rating (treatment) with one that has a low ES rating. Third, we examine the effect of the ES rating dummy on bank risks for the matched sample.

Table 6. ES activities, social capital and stakeholder-centred culture

Variables	NPL/Assets (1)	FGR (2)	NPL/Assets (3)	FGR (4)
$ES\_Refinitiv_{t-1}$	0.917*	0.063**	1.313***	0.026*
	(0.064)	(0.039)	(0.000)	(0.054)
$ES\_Refinitiv_{t-1}$ * $Social\ Capital_{t-1}$	0.021***	0.003***		
	(0.000)	(0.000)		
$ES\_Refinitiv_{t-1}$ * $Stakeholder\text{-}Centred\ Culture_{t-1}$			0.109	0.010*
			(0.385)	(0.075)
$Social\ Capital_{t-1}$	–0.003	–0.001***		
	(0.346)	(0.000)		
$Stakeholder\text{-}Centred\ Culture_{t-1}$			–0.013	–0.005*
			(0.828)	(0.083)
Controls included	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
Firm fixed effect	Yes	Yes	Yes	Yes
Constant	1.363	0.469**	7.365**	0.121
	(0.515)	(0.014)	(0.015)	(0.322)
Observations	456	457	1759	1763
Adjusted R-squared	0.269	0.563	0.720	0.911
Wald chi^2 (p-value)	0.000	0.000	0.000	0.000

This table reports OLS regression results for the moderating effect of social capital (Models 1 and 2) and stakeholder-centred culture (Models 3 and 4) on the relationship between ES activities and bank credit/liquidity risk exposure for the full sample period (2002–2020). The dependent variables include credit risk exposure (NPL/Assets – Models 1 and 3) and liquidity risk exposure (FGR – Models 2 and 4). The main independent variables include ES activities in year t–1 ($ES\_Refinitiv_{t-1}$) and its interactions with social capital ($ES\_Refinitiv_{t-1}$ * $Social\ Capital_{t-1}$) and with stakeholder-centred culture ($ES\_Refinitiv_{t-1}$ * $Stakeholder\text{-}Centred\ Culture_{t-1}$). Social capital is proxied by bank's goodwill. Stakeholder-centred culture is a constructed index comprising six indicators covering both internal relations (i.e. employee engagement voluntary work, employee health and safety policy) and external relations (i.e. shareholder engagement policy, stakeholder engagement, customer health and safety policy, corporate responsibility awards) using the PCA approach. Firm-level characteristics are lagged by 1 year to reduce the endogeneity problem.
***, ** and * indicate 1%, 5% and 10% significance level, respectively. See variable definitions in Appendix B.

Appendix D demonstrates the high quality of matching.

Table 9 shows the PSM results. In Panel I, we present the results for credit risk (NPL/Assets), which show significantly negative differences in NPL/Assets between the treatment and control groups (Panel A of Panel I). This outcome implies that the credit risk of high ES-rated banks during the COVID-19 period is significantly and statistically lower than low ES-rated banks during the crisis. Our univariate finding is consistent across all matching approaches. Panel B of Panel I shows the average treatment effect on the treatment sample with the one-to-one nearest neighbour matching technique and bootstrapping of standard errors (replications of 100, 1000 and 10,000), and the results reveal that the observed differences (Δ) are −1.552 and significant. This result confirms the findings shown in Panel A. In the multivariate analysis for the matched samples (Panel C of Panel I), we find significant and negative associations between HighES-Covid and NPL/Assets across Models 1 to 4 using different matching techniques, suggesting a bank credit risk-reducing effect from a high ES rating. All these results are similar to those obtained and reported in Panel II (Panels A–C), which use liquidity risk (FGR) as the dependent variable.

Discussion and conclusions

CSR has gradually become a prominent practice in the global banking sector; however, academic research on the role of CSR in banks' risk-taking behaviours is limited. Existing studies on banking CSR show that ESG performance can reduce European banks' fragility (Chiaramonte *et al.*, 2021) and enhance US banks' financial performance (Cornett, Erhemjamts and Tehranian, 2016) during the 2007−2009 global financial crisis, as well as improve banks' market values and reduce

Table 7. Capturing country and region fixed effects

	Panel A: Country fixed effect			Panel B: Regional fixed effect		
	Credit risk exposure		Liquidity risk exposure	Credit risk exposure		Liquidity risk exposure
Variables	NPL/Loan (1)	NPL/Assets (2)	FGR (3)	NPL/Loan (4)	NPL/Assets (5)	FGR (6)
ES_Refinitiv$_{t-1}$	1.024**	0.800***	0.041***	2.411***	1.671***	0.031**
	(0.019)	(0.005)	(0.007)	(0.000)	(0.000)	(0.026)
ES_Refinitiv$_{t-1}$ * Covid	–3.163***	–2.204***	–0.021	–1.100*	–0.938**	–0.038**
	(0.000)	(0.000)	(0.416)	(0.083)	(0.020)	(0.028)
Covid	0.119	0.253	0.013	–1.114***	–0.533**	–0.063**
	(0.766)	(0.330)	(0.347)	(0.005)	(0.035)	(0.013)
Controls included	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effect	Yes	Yes	Yes	No	No	No
Regional fixed effect	No	No	No	Yes	Yes	Yes
Constant	–10.865***	–5.426***	0.044	–3.369	–2.119	–0.285**
	(0.000)	(0.000)	(0.479)	(0.352)	(0.353)	(0.016)
Observations	1740	1724	1728	1740	1724	1728
Adjusted R-squared	0.441	0.467	0.741	0.698	0.721	0.913

This table reports OLS regression results for the effect of ES activities on bank credit risk and liquidity risk exposure for the full sample period (2002–2020) while capturing country fixed effect (Panel A) and regional fixed effect (Panel B). The dependent variables include credit risk exposure (NPL/Loan – Models 1 and 4 and NPL/Assets – Models 2 and 5) and liquidity risk exposure (FGR – Models 3 and 6). The main independent variables include ES activities in year t–1 (ES_Refinitiv$_{t-1}$) and its interactions with Covid (ES_Refinitiv$_{t-1}$ * Covid). Firm-level characteristics are lagged by 1 year to reduce the endogeneity problem.
***, ** and * indicate 1%, 5% and 10% significance level, respectively. See variable definitions in Appendix B.

financing costs in emerging markets (Azmi *et al*., 2021). The studies generally justify the beneficial effects of CSR by employing the stakeholder and signalling theories. They show that ESG-related activities and information disclosure by banks lead to lower information asymmetry between banks and a wide range of stakeholders. The findings of our study enrich previous research by offering further insights into the beneficial role of CSR through a systematic analysis of risk-taking behaviours in the global banking sector in the context of the COVID-19 pandemic.

We provide robust evidence that banking CSR can play a vital role in enabling banks to remain financially stable (i.e. lower credit and liquidity risks) during times of crisis (i.e. the outbreak of the COVID-19 pandemic). We offer a new theoretical justification that ES activities may create a stakeholder-centred culture and enhance firm-level social capital, preventing bank managers from taking excessive risks related to lending and financing decisions. Our findings suggest that stakeholder-centred banks and those with high social capital exhibit lower credit and liquidity risk exposures. The pandemic serves as an exogenous shock that provides a suitable research context to verify the beneficial roles of ES activities in stabilizing the international banking sector during a global crisis. Our findings are supported by a battery of additional tests using alternative measures of ES activities and robustness checks that mitigate the influence of endogeneity issues. Additionally, our findings imply that investors consider the role played by CSR in maintaining banks' financial stability during the COVID-19 pandemic.

Our findings present important practical implications for bank executives and regulators in terms of managing the financial stability of the banking system, and for investors choosing capital investments in bank firms. Using credit and liquidity risk indicators, we show that despite the COVID-19-related economic issues that have a persistently detrimental impact across industries, high levels of ES activities shield banks from the crisis to some extent, regardless of their locations. Although policymakers and economists agree on the existing depression across economies caused by COVID-19, the detrimental effects of this global health

Table 8. Endogeneity treatment: GMM and 3SLS

	Panel A: GMM			Panel B: 3SLS		
	Credit risk exposure		Liquidity risk exposure	Credit risk exposure		Liquidity risk exposure
Variables	NPL/Loan (1)	NPL/Assets (2)	FGR (3)	NPL/Loan (4)	NPL/Assets (5)	FGR (6)
$ES\_Refinitiv_{t-1}$	–0.222	0.094	0.003	2.124***	1.558***	0.034***
	(0.777)	(0.877)	(0.940)	(0.000)	(0.000)	(0.009)
$ES\_Refinitiv_{t-1}$ * Covid	–1.416*	–1.047**	–0.046*	–0.885	–0.811**	–0.042***
	(0.086)	(0.024)	(0.088)	(0.131)	(0.029)	(0.010)
Covid	0.396	0.349	0.011	–0.765**	–0.284	–0.007
	(0.379)	(0.166)	(0.568)	(0.050)	(0.253)	(0.499)
$Risk_{t-1}$	0.872***	0.817***	0.589***			
	(0.000)	(0.000)	(0.000)			
Controls included	Yes	Yes	Yes	Yes	Yes	Yes
Constant	–8.709*	–7.208*	0.014	2.128	0.550	–0.351***
	(0.099)	(0.067)	(0.938)	(0.618)	(0.839)	(0.003)
Observations	1740	1722	1727	1740	1724	1728
Adjusted R-squared				0.705	0.728	0.913
Wald chi^2 (p-value)	0.000	0.000	0.000	0.000	0.000	0.000
AR(1)	0.000	0.000	0.056			
AR(2)	0.649	0.363	0.690			
Difference-in-Hansen J. for GMM style (p-value)	0.157	0.141	0.650			
Difference-in-Hansen J. for IV style (p-value)	0.913	0.437	0.143			
Number of instruments	55	55	127			
Number of groups	210	209	209			
Breusch–Pagan LM test (p-value)				0.013	0.015	0.041
Likelihood ratio LR test (p-value)				0.012	0.015	0.040
Wald test (p-value)				0.000	0.000	0.000
Hansen–Sargan overidentification test (p-value)				0.857	0.638	0.837

This table reports GMM (Panel A) and 3SLS (Panel B) robustness test results for the effect of ES activities on bank risks for the whole sample period (2002–2020). The dependent variables include credit risk exposure (NPL/Loan – Models 1 and 4 and NPL/Assets – Models 2 and 5) and liquidity risk exposure (FGR – Models 3 and 6). The main independent variables include ES activities in year t–1 ($ES\_Refinitiv_{t-1}$) and its interactions with Covid ($ES\_Refinitiv_{t-1}$ * Covid).
***, ** and * indicate 1%, 5% and 10% significance level, respectively. See variable definitions in Appendix B.

crisis on bank stability can be mitigated by heightened social capital derived from CSR. Therefore, for regulators who are considering recovery plans across different COVID-19 pandemic waves, social responsibility and accountability towards society by the banking industry should be incorporated into their political packages. Hence, our study calls for international regulatory interventions and responses to support the social responsibility role of the banking industry. The findings are also important to depositors and to bank managers seeking to identify the key drivers of bank financial stability and long-term resilience across regions and during similar urgent crises.

Future studies could extend our analyses to assess the distinct effect of CSR on the global banking sector after the pandemic, while considering other financial and non-financial indicators. For instance, prospect research can examine the changes in banks' financial stability and market valuations around a shift in ESG or CSR ratings (i.e. from low to high or from high to low) to provide irrefutable evidence of the value of CSR.

Table 9. Propensity score matching estimation: do high ES-rated banks exhibit lower risk exposure during COVID-19 pandemic?

PANEL I: Credit risk (NPL/Assets)

Panel A: Average treatment effect (ATE) with nearest-neighbour matching method

		Treated	Control	Δ	SE	T-stat
1:1 matching without replacement						
	Unmatched	2.104	2.167	–0.063	0.206	–0.31
	Matched	2.103	3.339	–1.236***	0.315	–3.93
1:1 matching with replacement						
	Unmatched	2.104	2.167	–0.063	0.206	–0.31
	Matched	2.103	3.356	–1.253***	0.494	–2.53
Nearest neighbour (n = 2)						
	Unmatched	2.104	2.167	–0.063	0.206	–0.31
	Matched	2.103	3.651	–1.547***	0.419	–3.69
Nearest neighbour (n = 3)						
	Unmatched	2.104	2.167	–0.063	0.206	–0.31
	Matched	2.103	3.756	–1.653***	0.369	–4.47

Panel B: Average treatment effect on the treated (ATT) with 1:1 nearest-neighbour matching and bootstrapping of standard errors

No. treated obs.	Replications	Observed (Δ)	Bias	SE	T-stat
124	100	–1.552***	–0.013	0.433	–3.587
124	1000	–1.552***	–0.013	0.501	–3.095
124	10,000	–1.552***	–0.016	0.498	–3.114

Panel C: Regression results on matched samples

Independent variables	(1) 1:1 matching without replacement	(2) 1:1 matching with replacement	(3) Nearest neighbour (n = 2)	(4) Nearest neighbour (n = 3)
HighES-Covid	–1.313***	–1.448***	–1.699***	–1.690***
	(0.000)	(0.000)	(0.000)	(0.000)
$LnBSize_{t-1}$	–0.274	–0.297	0.260	0.401
	(0.649)	(0.614)	(0.640)	(0.439)
$\%Ind_{t-1}$	–0.621	–0.709	–0.779	–1.212**
	(0.391)	(0.308)	(0.238)	(0.045)
Chair-CEO $duality_{t-1}$	–1.323***	–1.307***	–0.749*	–0.807**
	(0.005)	(0.006)	(0.094)	(0.045)
CEO perf-linked $Comp_{t-1}$	0.185	0.207	0.014	0.205
	(0.675)	(0.622)	(0.974)	(0.588)
$\%female_{t-1}$	0.659	0.730	1.315	1.506
	(0.623)	(0.572)	(0.299)	(0.190)
LT-$Debt/TA_{t-1}$	–0.911	2.372	0.515	–0.395
	(0.618)	(0.188)	(0.766)	(0.801)

Table 9. (Continued)

Panel C: Regression results on matched samples

Independent variables	(1) 1:1 matching without replacement	(2) 1:1 matching with replacement	(3) Nearest neighbour (n = 2)	(4) Nearest neighbour (n = 3)
ST-Debt/TA_{t-1}	–0.342	–2.520	–1.106	–2.556
	(0.910)	(0.410)	(0.698)	(0.321)
Non-interest $income_{t-1}$	–0.147	–0.112	0.001	–0.067
	(0.191)	(0.321)	(0.992)	(0.476)
Deposits/TA_{t-1}	–1.258	0.077	0.245	–0.633
	(0.352)	(0.952)	(0.841)	(0.564)
$Ln(TA)_{t-1}$	0.633*	0.829**	0.651**	0.593**
	(0.055)	(0.012)	(0.031)	(0.030)
$Ln(Age)_{t-1}$	0.218	–0.237	–0.013	–0.078
	(0.547)	(0.511)	(0.969)	(0.803)
Cash/TA_{t-1}	–7.965***	–9.286***	–9.207***	–10.258***
	(0.007)	(0.001)	(0.001)	(0.000)
PPE/TA_{t-1}	50.380***	59.851***	48.500***	45.787***
	(0.002)	(0.000)	(0.001)	(0.001)
EBIT/$Sales_{t-1}$	–0.408	–0.217	0.066	0.194
	(0.506)	(0.720)	(0.909)	(0.707)
Stock volatility	16.663***	16.404***	18.371***	18.157***
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	–2.446	–4.352	–4.762*	–3.497
	(0.411)	(0.124)	(0.080)	(0.163)
Adjusted R-squared	0.244	0.288	0.295	0.309
Observations	242	242	286	347

PANEL II: Liquidity risk exposure (FGR)

Panel A: Average treatment effects with nearest-neighbour matching method

		Treated	Control	Δ	S.E.	T-stat
1:1 matching without replacement						
	Unmatched	0.002	0.018	–0.016	0.017	–0.97
	Matched	0.002	0.039	–0.037**	0.024	–1.52
1:1 matching with replacement						
	Unmatched	0.002	0.018	–0.016	0.017	–0.97
	Matched	0.002	0.032	–0.030**	0.022	–1.93
Nearest neighbour (n = 2)						
	Unmatched	0.002	0.018	–0.016	0.017	–0.97
	Matched	0.002	0.030	–0.028**	0.021	–1.53
Nearest neighbour (n = 3)						
	Unmatched	0.002	0.018	–0.016	0.017	–0.97
	Matched	0.002	0.030	–0.028**	0.020	–1.83

Table 9. (Continued)

Panel B: Average treatment effect on the treated with 1:1 nearest neighbour matching and bootstrapping of standard errors					
No. treated obs.	Replications	Observed (Δ)	Bias	SE	T-stat
115	100	–0.027***	–0.002	0.027	–2.014
115	1000	–0.027***	–0.001	0.024	–2.104
115	10,000	–0.027***	–0.001	0.026	–2.054

Panel C: Regression results on matched samples				
Independent variables	(1) 1:1 matching without replacement	(2) 1:1 matching with replacement	(3) Nearest neighbour (n = 2)	(4) Nearest neighbour (n = 3)
HighES-Covid	–0.029**	–0.040***	–0.028**	–0.025**
	(0.047)	(0.008)	(0.042)	(0.042)
$LnBSize_{t-1}$	–0.033	–0.028	–0.023	–0.026
	(0.157)	(0.297)	(0.315)	(0.193)
$\%Ind_{t-1}$	0.043	0.030	0.050*	0.049*
	(0.213)	(0.360)	(0.090)	(0.068)
Chair-CEO $duality_{t-1}$	0.003	0.017	–0.000	0.004
	(0.898)	(0.527)	(0.986)	(0.841)
CEO perf-linked $Comp_{t-1}$	–0.018	–0.015	–0.011	–0.019
	(0.408)	(0.502)	(0.572)	(0.304)
$\%female_{t-1}$	–0.012	0.022	0.011	0.015
	(0.859)	(0.763)	(0.861)	(0.797)
LT-Debt/TA_{t-1}	0.058	0.173*	0.178**	0.166**
	(0.538)	(0.072)	(0.046)	(0.034)
ST-Debt/TA_{t-1}	–0.110	0.022	0.047	0.029
	(0.468)	(0.890)	(0.744)	(0.823)
Non-interest $income_{t-1}$	–0.016***	–0.008	–0.017***	–0.019***
	(0.001)	(0.106)	(0.000)	(0.000)

Table 9. (Continued)

Panel C: Regression results on matched samples				
Independent variables	(1) 1:1 matching without replacement	(2) 1:1 matching with replacement	(3) Nearest neighbour (n = 2)	(4) Nearest neighbour (n = 3)
$Deposits/TA_{t-1}$	–0.711***	–0.667***	–0.640***	–0.644***
	(0.000)	(0.000)	(0.000)	(0.000)
$Ln(TA)_{t-1}$	–0.004	–0.006	0.002	0.004
	(0.804)	(0.683)	(0.891)	(0.778)
$Ln(Age)_{t-1}$	0.016	0.033*	0.017	0.025
	(0.384)	(0.090)	(0.324)	(0.117)
$Cash/TA_{t-1}$	–0.587***	–0.657***	–0.563***	–0.589***
	(0.000)	(0.000)	(0.000)	(0.000)
PPE/TA_{t-1}	0.901	1.052	1.455**	1.218*
	(0.258)	(0.206)	(0.046)	(0.064)
$EBIT/Sales_{t-1}$	0.026	–0.026	–0.019	–0.015
	(0.476)	(0.444)	(0.576)	(0.166)
Stock volatility	–0.032	–0.035	–0.085	–0.044
	(0.852)	(0.842)	(0.592)	(0.753)
Constant	0.594***	0.535***	0.451***	0.438***
	(0.000)	(0.001)	(0.002)	(0.001)
Adjusted R-squared	0.496	0.499	0.495	0.504
Observations	228	228	270	328

We obtained consistent results for NPL/Loan models. Unreported results will be provided upon request.
Dependent variable: Credit risk (NPL/Assets) and liquidity risk exposure (FGR).
Independent variables: HighES-Covid, coded 1 if a bank has high score of ES rating (≥ mean ES_Refinitiv) over the COVID-19 period.

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Conflict of interest

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