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ESG performance and Bank stability: The role of national culture and formal institutions

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ABSTRACT

Why does ESG stabilize banks in some countries but not others? We argue that the inconsistent relationship between ESG performance and bank stability stems from a neglect of macro-level institutional contexts. While emerging research explores how national culture shapes ESG performance or how ESG performance affects liquidity and stability, no study integrates these perspectives to explain bank stability. We posit that national culture (as an informal institution) and formal institutions are critical, competing moderators that explain this heterogeneity. Using a global sample of 660 banks from 2002 to 2023, we find that ESG performance enhances bank stability, but predominantly in individualistic cultures. In contrast, high levels of uncertainty avoidance, power distance, and long-term orientation diminish this stabilizing effect. Strong formal institutions, however, positively moderate the ESG–stability relationship. Further analysis reveals that bank liquidity and funding costs act as key transmission channels. Our findings are robust to alternative model specifications and proxy measures. Sub-sample analyses indicate divergent patterns across the pre- and post-Paris Agreement periods and banks operating in developed vs developing economies. These results offer valuable implications for regulators and bank executives seeking to tailor ESG strategies to specific institutional and cultural environments.

1. Introduction

The global banking sector is undergoing a profound transformation, driven by the accelerating integration of Environmental, Social, and Governance (ESG) principles. As central intermediaries in the financial system, banks are increasingly expected to align their operations with sustainability objectives both to comply with regulatory requirements and to meet the evolving preferences of socially conscious investors and depositors (Aracil et al., 2021). This transition has been further catalyzed by systemic disruptions such as the 2007–2009 global financial crisis, the Fourth Industrial Revolution, and the COVID-19 pandemic, each of which has intensified scrutiny of banks' roles in promoting long-term economic resilience. However, despite the widespread adoption of ESG practices, a critical question remains unresolved: Does ESG performance consistently enhance bank stability, or is its effectiveness contingent upon deeper, context-specific factors?

Existing empirical evidence paints a conflicting picture. Proponents of ESG, drawing from stakeholder theory, argue that sustainable banking practices mitigate risks by improving reputation capital, reducing regulatory penalties, and attracting stable, long-

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term funding (Chiaramonte et al., 2022; Gehrig et al., 2024). Conversely, critics rooted in agency theory contend that ESG investments divert resources from core profitability, increase operational complexity, and may even introduce new risks particularly when ESG commitments are superficial or misaligned with financial objectives (Salim et al., 2023; Soana, 2011). This lack of consensus suggests that the relationship between ESG and bank stability is not universally positive or negative but likely contingent on external moderators that remain insufficiently explored.

An emerging body of literature has begun to explore these contingencies, yet in a fragmented manner. For instance, recent work suggests that national culture is a key normative force that can directly shape a bank's ESG orientation and performance (Claudio and Gallo, 2025). Simultaneously, other research demonstrates that a bank's environmental reputation is a material driver of its liquidity, particularly in regions exposed to climate transition risks (Choi et al., 2023). However, these streams of research remain disconnected. Crucially, there is a lack of a unified framework that examines how these formal and informal institutional forces simultaneously compete and interact to moderate the core relationship between aggregate ESG performance and overall bank stability. This constitutes a critical theoretical gap. Banks do not operate in an institutional vacuum; their ESG strategies are enacted within a dual framework of deeply ingrained cultural norms and country-specific legal and regulatory systems. The failure to account for this dual institutional configuration undermines both theory and practice.

We posit that the missing explanatory mechanism lies in institutional theory specifically, the formal and informal "rules of the game" that shape banking behavior across societies (North, 1990). Formal institutions, including regulatory quality, rule of law, and government effectiveness, provide the legal and economic infrastructure within which banks function. Informal institutions, most notably national culture, influence stakeholder expectations, managerial decision-making, and the societal valuation of sustainability (Kong et al., 2021; Shin et al., 2023). For example, in individualistic cultures where personal autonomy and transparency are emphasized, ESG disclosures may be perceived as more credible, thereby exerting a stronger stabilizing effect. Conversely, in high power-distance societies characterized by rigid hierarchies, ESG initiatives may be imposed in a top-down manner, reducing stakeholder engagement and weakening their effectiveness. Despite the obvious relevance of these factors, no study to date systematically examines how national culture and formal institutions shape the ESG-stability nexus a gap that undermines both theory and practice.

This paper addresses this gap by analyzing a comprehensive global sample of 660 banks across 58 countries from 2002 to 2023. Drawing on institutional theory and stakeholder perspectives, we investigate three central questions: (1) Does ESG performance enhance bank stability? (2) How do national cultural dimensions specifically individualism, uncertainty avoidance, power distance, and long-term orientation moderate this relationship? (3) How do formal institutional factors such as regulatory quality, rule of law, and government effectiveness shape the ESG-Stability nexus?

Our findings indicate that the relationship between ESG performance and bank stability is highly context dependent. While ESG performance is generally associated with greater stability, this effect is significantly increased in individualistic cultures and diminished in societies characterized by high uncertainty avoidance, power distance and long-term orientation. Formal institutional quality further enhances ESG's stabilizing role, underscoring the importance of regulatory and legal environments in fostering substantive, rather than symbolic, sustainability practices. Additionally, we identify liquidity creation and reduced funding costs as key transmission mechanisms: ESG enhances bank stability by strengthening depositor confidence and lowering capital costs, but only under favorable institutional conditions. These results are robust across alternative model specifications, including Lewbel's (2012) two-stage least squares and Kiviet's (2020) Kinky Least Squares estimators, which address endogeneity concerns common in cross-country banking studies.

This study makes three key contributions to literature. First, it recontextualizes the ESG–bank stability nexus by shifting the analytical lens from firm-level attributes to macro-level institutional forces. While existing studies predominantly assess the direct effects of ESG on financial performance (Chiaramonte et al., 2022; Curcio et al., 2024; Danisman and Tarazi, 2024), we show that national culture and formal institutions can significantly amplify, attenuate, or even reverse these effects offering a theoretical advancement that challenges assumptions of ESG's universal efficacy. Second, we unpack the transmission mechanisms linking ESG performance to bank stability by empirically identifying bank liquidity and funding costs as critical channels. Third, our sub-sample analyses segmented by pre- and post-Paris Agreement periods, as well as by developed and developing economies reveal important temporal and structural heterogeneities. In particular, the findings indicate a structural shift following the 2015 Paris Agreement, after which the moderating role of formal institutions became more pronounced, with significant implications for international climate finance policy.

From a practical perspective, our findings serve as a cautionary note for policymakers and bank executives. Promoting ESG adoption without accounting for national cultural norms or institutional capacity may yield unintended consequences particularly in environments where informal norms are misaligned with sustainability objectives. For instance, in high uncertainty-avoidance societies, regulatory mandates for ESG disclosure may be necessary to overcome resistance to change. In contrast, in individualistic cultures, market-based incentives and voluntary frameworks may prove more effective. By highlighting how institutional context conditions the effectiveness of ESG practices, our study offers a strategic blueprint for designing locally adaptive sustainable finance policies ensuring that ESG contributes to, rather than detracts from, long-term financial resilience.

The paper is organized as follows: Section 2 reviews relevant literature, theoretical frameworks, and formulates the hypotheses. Section 3 outlines the research methodology and data sources. Section 4 presents the results and offers a discussion. Finally, Section 5 concludes with key insights and policy recommendations.

2. Theoretical background and hypothesis development

The banking sector has traditionally lagged in adopting sustainability practices, as financial institutions were historically perceived

as having minimal direct environmental and social impact (Barako and Brown, 2008). However, the 2007–2008 Global Financial Crisis (GFC) exposed deep structural vulnerabilities, leading to widespread shareholder distrust due to fraudulent banking practices and their far-reaching social consequences (La Torre et al., 2021). In response, banks sought to rebuild their credibility by integrating sustainability into their corporate strategies, particularly in the areas of corporate social responsibility (CSR), anti-corruption, and employment practices (Aracil et al., 2021).

Post-crisis academic discourse on banks' sustainability performance has evolved into three key research streams. The first examines the scope and quality of sustainability reporting (Kaasa, 2015). The second investigates factors affecting sustainability performance (Gurol and Lagasio, 2023; Sethi et al., 2017). More recently, a third stream has emerged, focusing on how sustainability practices influence banks' financial outcomes, including liquidity, funding costs, and overall stability (Chiaramonte et al., 2022; Curcio et al., 2024; Danisman and Tarazi, 2024).

While ESG adoption in banking has gained increasing scholarly attention, research on its financial implications remains inconclusive (Chiaramonte et al., 2022). Barnett (2007) argue that studies on ESG-financial outcomes overlook key contextual contingencies that moderate ESG's impact on financial returns. Finance scholars often overlook the institutional environments in which banks operate, failing to account for how these contexts shape the ESG-financial outcome relationship. While a few studies from manufacturing sector explored cultural or institutional factors as moderators (Shin et al., 2023), this remains untapped in ESG bank stability nexus.

Grounded in institutional and stakeholder theories (discussed in the following section), we discover how institutional pressures, driven by national cultural configurations and formal institutions, affect ESG performance and bank stability association.

2.1. Theoretical background

Rooted in stakeholder theory, the risk-mitigation perspective posits that CSR investments serve as a form of reputational insurance, fostering moral capital and stakeholder goodwill (El Ghoul and Karoui, 2017). This perspective suggests that CSR investments reduce risks associated with negative external shocks, strengthening firms' reputations and lowering perceived risks among stakeholders, including customers, investors, and regulators (Shin et al., 2023). Peloza (2006) confirm that sustainability practices contribute to financial stability While stakeholder theory explains why firms engage in ESG, it does not fully account for how external forces shape ESG adoption and its financial consequences.

To address this, we integrate institutional theory, which provides a framework for understanding how regulatory and cultural pressures influence ESG-bank stability dynamics. Institutional theory asserts that organizational behavior is shaped by pressures from the institutional frameworks that define the economic and social environments in which firms operate (Dimaggio and Powell, 2004a). These institutions encompass both formal and informal structures, including norms, regulations, and cultural frameworks, which provide stability within each context (Ben-Amar and Chelli, 2018). Acting as the "rules of the game," these institutions impose constraints that shape economic and social interactions (North, 1990).

Institutional pressures play a critical role in shaping firms' sustainability strategies, particularly in regions with diverse regulatory and cultural settings (Shin et al., 2023). Firms operating within similar institutional environments tend to adopt similar ESG behaviors to manage external expectations and maintain legitimacy (Posadas et al., 2023). Greater conformity to institutional pressures strengthens a firm's social acceptance, reinforcing its financial stability and integration into the broader economic system (Dumitru et al., 2017).

Institutional theory identifies three key mechanisms coercive, normative, and mimetic isomorphism, that can drive sustainability practices. These pressures shape firms' ESG strategies and financial outcomes, either independently or in combination, depending on the regulatory and cultural environment (Scott, 2008).

Coercive isomorphism arises from regulatory and legal pressures that enforce ESG compliance. For instance, Directive 95/2014/EU mandates non-financial disclosures for large entities, compelling firms to integrate sustainability reporting into corporate governance frameworks (Posadas et al., 2023). However, regulatory enforcement does not always yield positive outcomes. In some cases, coercive mandates may conflict with informal cultural norms, leading to symbolic compliance or minimal ESG engagement (Bebbington et al., 2012). The extent to which banks fully internalize ESG mandates depends on the strength of regulatory enforcement and societal expectations.

Normative isomorphism is driven by social norms, professional standards, and cultural expectations that shape stakeholder perceptions of corporate behavior (Gallego-Álvarez and Ortas, 2017). National culture serves as a powerful normative force, influencing what stakeholders perceive as socially responsible behavior (Garcia-Sanchez et al., 2016). This is increasingly evidenced in the financial sector, where recent studies find that cultural values are a powerful normative force directly shaping banks' ESG strategies and performance (Claudio and Gallo, 2025). Our study extends this logic by examining how culture not only influences ESG adoption but also conditions its financial efficacy in enhancing stability. Hofstede (1984) defines national culture as "the collective programming of the mind that distinguishes the members of one group from another" (p. 9). Cultural values such as individualism, uncertainty avoidance, and power distance shape corporate sustainability engagement by determining the level of stakeholder pressure for ESG adoption (Nicolò et al., 2024). Existing studies suggest that normative pressure, driven by cultural systems, explains variations in sustainability engagement across countries, even in the absence of strict regulatory mandates (Pizzi et al., 2023).

Mimetic isomorphism occurs when firms imitate the sustainability strategies of industry leaders, particularly in uncertain regulatory environments where firms lack clear guidance on ESG compliance (Dimaggio and Powell, 2004b). In the absence of strict regulations, firms mirror the sustainability practices of competitors to maintain legitimacy and reduce uncertainty about best practices (Posadas et al., 2023). This imitation leads to standardized ESG reporting practices, increasing uniformity in disclosures but not

necessarily improving substantive ESG performance.

Critically, the effectiveness of these institutional pressures in driving substantial ESG adoption and consequently shaping bank stability is contingent on national cultural context and formal institutions. Coercive pressures (regulatory mandates) achieve meaningful ESG integration primarily in low-power distance societies, where stakeholders enforce accountability and robust formal institutional environment enables enforcement (Sari et al., 2021). Normative pressures (stakeholder expectations) on the other hands, thrive in individualistic societies that value transparency (McNab and Wilson, 2018), but are weakened in high uncertainty avoidance cultures resistant to change. Finally, Mimetic pressures (imitation) dominate where formal institutions are weak but yield superficial adoption in short-term oriented cultures prioritizing quick returns over strategic learning (Yang and Kang, 2020). Thus, culture and formal institutions act as filters that determine whether institutional pressures translate into genuine ESG commitments that enhance stability or remain ceremonial practices that undermine it.

Building on these insights, we adopt a normative and coercive institutional perspective to investigate how national cultural dimensions, and formal institutions affect ESG performance and stability of banks globally.

2.2. Hypothesis development

Building on theoretical foundations and prior literature, this section develops testable hypotheses on the relationship between ESG performance, bank stability, national culture, and formal institutions.

2.2.1. ESG and bank stability

The empirical literature on the relationship between ESG performance and bank stability is characterized by mixed and inconclusive findings (Bruno et al., 2024). As systematically synthesized in Table 1, the body of evidence can be categorized into three distinct streams, revealing no clear consensus.

The first stream of research reports a positive stabilizing effect of ESG. Grounded in stakeholder theory, these studies argue that sustainable practices mitigate risks by enhancing reputation capital, reducing regulatory penalties, and attracting stable, long-term funding (Chiaramonte et al., 2022, 2024; Gehrig et al., 2024). For instance, Chiaramonte et al. (2022) show that banks with higher ESG ratings exhibited lower fragility during crises. Similarly, Gehrig et al. (2024)find that long-term ESG strategies enhance overall risk profiles. Conversely, a second and equally substantial stream of literature documents has negative effects. Rooted in agency theory, these studies contend that ESG investments can divert resources from core profitability, increase operational complexity, and introduce new risks particularly when commitments are superficial or misaligned with financial objectives (Salim et al., 2023). For example, Di Tommaso and Thornton (2020) find that high ESG performance can reduce bank value by diverting scarce resources, while Jiang et al. (2025) report that the effect is negative for regional banks with fewer resources. Finally, a third stream points to context-dependent or non-linear relationships, suggesting that the impact of ESG is contingent on factors such as regulatory environments, bank size, and geographic region (Liu and Xie, 2024; Soana, 2011). For instance, Liu and Xie (2024) demonstrate that ESG's effect on liquidity risk varies significantly across different regulatory regimes.

A closer inspection of Table 1 indicates these contradictions follow systematic patterns. Studies relying on standardized ESG ratings especially from global providers common in developed markets tend to document stabilizing effects (Azmi et al., 2021; Buallay et al., 2021). In contrast, research based on narrower proxies such as CSR disclosures or green loan metrics often yields neutral or negative outcomes, particularly when institutional quality is weak (Hojer and Mataigne, 2024). Furthermore, stabilizing effects are observed more frequently among banks in developed economies, where regulation and governance are stronger, whereas emerging-market and smaller regional banks show mixed or adverse results, underscoring the moderating role of formal institutions and measurement

Table 1
ESG-Bank stability literature.

Study	Sample & context	Main finding on ESG-Stability Link	Proposed explanation	ESG measure	Stability measure
Chiaramonte et al. (2022)	European banks during financial crises	Positive: ESG reduces bank fragility	Stakeholder theory: ESG builds reputational capital and attracts stable funding	Refinitiv ESG scores	Z-score, default risk
Gehrig et al. (2024)	Global banks	Positive: ESG enhances resiliency	Risk mitigation: Long-term ESG strategies improve risk profiles	MSCI ESG Ratings	Systemic risk metrics
Salim et al. (2023)	Banks in emerging markets	Negative: ESG increases risk	Agency theory: ESG investments divert resources from core profitability, increasing costs	Custom ESG index	NPL, volatility
Soana (2011)	Italian banks	Neutral: No significant effect	Context-dependent: ESG benefits offset by costs in regulated environments	CSR reporting extent	ROA, ROE volatility
Jiang et al. (2025)	Chinese banks	Mixed: Positive for state banks, negative for regional banks	Regulatory arbitrage: State banks have better resources to implement ESG effectively	Green loan ratios	Credit risk (NPL)
Di Tommaso and Thornton (2020))	Global sample	Negative: High ESG reduces bank value	Overinvestment view: ESG diverts scarce resources from value-creating investments	Bloomberg ESG scores	Tobin's Q, Z-score
Liu and Xie (2024)	Commercial banks	Positive: ESG reduces liquidity risk	Improved trust: ESG lowers NPLs and enhances financial performance	Custom ESG index	Liquidity coverage ratio

approaches (Prasad and Mondal, 2025).

This fundamental lack of consensus in ESG, bank stability literature, suggests that the relationship is not universally positive or negative. Rather, the conflicting evidence underscores the presence of critical but unobserved contingent factors that determine whether the risk-mitigation or agency-cost perspective dominates in each context. We posit that the missing explanatory mechanism lies in the macro-level institutional context. The effect of ESG is likely conditional on the national environment in which a bank operates. Therefore, we propose a baseline hypothesis to test the average effect (H1), while arguing that its strength and direction are significantly shaped by the formal and informal institutions tested in subsequent hypotheses.

Hypothesis 1. **(H1):** *There is a positive relationship between ESG performance and bank stability.*

2.2.2. Role of national culture in ESG and bank stability

Culture, as an informal institution, shapes organizational behavior through shared values, beliefs, and customs, thereby legitimizing specific practices (Hofstede, 1980). Institutional theory posits that these cultural values influence organizational practices by aligning them with societal expectations, with legitimacy rooted in the broader institutional environment (Dimaggio and Powell, 2004b). Although Hofstede's cultural framework remains the most widely applied in cross-country finance and sustainability research due to its parsimony and extensive coverage (Kirkman et al., 2006), alternative taxonomies exist. The GLOBE project (House, 2004) and Schwartz's cultural values framework (Schwartz, 1999) offer more nuanced dimensions that have also been applied in CSR and governance research. However, their limited coverage across countries and weaker integration into banking and finance studies constrain their comparability in a global sample. For these reasons, we adopt Hofstede's dimensions in our main analysis. Defined as "the collective programming of the mind that distinguishes one group from another" (Hofstede, 1980), this model has shown strong correlations with various economic outcomes (Graafland and de Jong, 2022), and sustainability performance (Lu and Wang, 2021). Following Bae et al. (2012), we focus on four of Hofstede's six cultural dimensions *individualism, power distance, uncertainty avoidance*, and *long-term orientation*. In following sub-sections hypotheses considering the role of these cultural dimensions in ESG-bank stability nexus is provided.

Individualism, a core dimension of cultural variability, reflects "the degree to which people in a society are integrated into groups" (Hofstede, 1980). In individualist societies, individuals prioritize autonomy and self-esteem (Lu et al., 2021), while in collectivist cultures, group cohesion and an interdependent self-image are emphasized (Hofstede, 2011). This dimension is the most frequently studied cultural dimensions in the culture and finance literature (Lu et al., 2021).

We argue that individualism strengthens the relationship between ESG performance and bank stability through three key mechanisms. First, in individualistic societies, trust extends beyond close networks (Lu et al., 2021), fostering confidence in financial institutions (Fungáčová et al., 2019) and enhancing financial stability via increased financial inclusion (Han and Melecky, 2017). Trust also supports ESG performance by improving institutional quality (Zhu and Wang, 2024) reducing pollution (Chen et al., 2021), and strengthening governance (Dong et al., 2018). Second, individualism promotes lending based on economic fundamentals rather than social ties, curbing herd behavior and excessive risk-taking, which mitigates financial crises and enhances resilience (Berger et al., 2021). Finally, while stakeholders in individualistic societies often prioritize personal gain over collective welfare, they increasingly adopt ESG practices upon recognizing their financial benefits (Shin et al., 2023). Consequently, ESG adoption becomes a financial strategy rather than a purely societal goal, amplifying its positive impact on bank stability. Thus, by fostering trust, encouraging sound economic decision-making, and aligning ESG with financial incentives, individualism reinforces the ESG–bank stability nexus.

Hypothesis 2a. **(H2a):** *The positive effect of ESG performance on bank stability is stronger in highly individualistic countries.*

Uncertainty avoidance reflects a society's tolerance for ambiguity (Hofstede, 1980). High uncertainty avoidance cultures impose strict regulations and mandate sustainability to mitigate risk (García-Sánchez et al., 2013), while low uncertainty avoidance societies adopt sustainability more flexibly (Gallego-Álvarez and Ortas, 2017). This cultural trait also shapes financial behavior and bank stability (Srivisal et al., 2021). High uncertainty avoidance fosters short-term consumption (Wang et al., 2016) and risk-averse investments in low-yield assets, limiting bank lending, constraining profitability, and ultimately weakening financial resilience

We argue that high uncertainty avoidance weakens the ESG–bank stability relationship due to a specific form of risk aversion. In such societies, stringent regulations may indeed mandate ESG compliance, potentially leading to higher ESG scores (Claudio and Gallo, 2025). However, this compliance is often symbolic and motivated by a desire to avoid regulatory penalty rather than a genuine strategic commitment. This risk-averse, checkbox-ticking approach undermines the very stakeholder engagement and reputational benefits that make ESG effective in enhancing stability. Consequently, while ESG *scores* might be higher, the stabilizing effect of those scores is weakened as ESG is viewed as a cost of operation rather than a source of value creation (Godfrey et al., 2009). We hypothesize that high uncertainty avoidance weakens the ESG–bank stability links due to risk aversion, lower savings, and limited voluntary ESG adoption.

Hypothesis 2b. **(H2b)**: *The positive effect of ESG performance on bank stability is weaker in high uncertainty avoidance countries.*

Power distance reflects societal acceptance of inequality (Hofstede, 2010), shaping ESG and financial outcomes (Chen and Liu, 2022). In high power distance societies, firms prioritize self-interest, and weak CSR expectations lead to poorer ESG performance (Nicolò et al., 2024). Conversely, low power distance fosters intolerance for social and environmental injustices, driving stronger sustainability practices (Williams and Zinkin, 2008). We believe that power distance weakens the ESG–bank stability relationship on two grounds. First, high power distance societies exhibit low social trust (Bjørnskov, 2008), leading to higher transaction costs (Steenkamp and Geyskens, 2012) and reduced financial stability. Since trust is vital for banks (Aggarwal and Goodell, 2009), its

absence raises costs, discouraging ESG investments and increasing operational expenses. Second, trust influences risk-taking higher trust fosters greater risk-taking (Growiec and Growiec, 2014). In low power distance societies, trust-driven risk-taking boosts financial access for entrepreneurship and innovation (Mihet, 2013), enhancing bank profitability and enabling ESG investments. Considering the above discussion, we hypothesize that high power distance weakens the positive relationship between ESG performance and bank stability.

Hypothesis 2c. **(H2c)**: *The positive effect of ESG performance on bank stability is weaker in high power distance countries.*

Long-term orientation reflects a society's focus on future outcomes, emphasizing long-term over short-term gains (Hofstede, 2010). In long term-oriented societies, cultural traits such as patience and thrift drive sustainability investments, aligning corporate strategies with long-term stakeholder expectations (Vitolla et al., 2019). Conversely, in short-term-oriented societies, firms prioritize immediate financial returns, limiting ESG engagement and transparency, thereby weakening sustainability-linked financial stability (Orij, 2010). Long-term orientation reflects a society's prioritization of future rewards over immediate outcomes (Hofstede, 2010). In banking, LTO's role in the ESG-stability nexus is theoretically ambiguous. On one hand, high-long term oriented cultures foster strategic reinvestment (Zheng and Ashraf, 2014), directing resources toward ESG initiatives that mitigate long-term risks (e.g., climate-related financial exposures) and enhance stability through robust risk governance. The future-focused ethos of LTO societies encourages sacrificing short-term gains for sustained resilience, potentially strengthening banks' ESG performance and stability (Claudio and Gallo, 2025). Conversely, LTO may dilute the near-term profitability of ESG activities (Shin et al., 2023), weakening liquidity and funding cost benefits critical for bank stability. This tension is augmented in banks, where long-term orientation could promote patient capital allocation for sustainability (e.g., green loans) but may reduce emphasis on immediate ESG transparency, eroding stakeholder trust. Given these conflicting mechanisms and evidence, we propose rival hypotheses:

Hypothesis 2d. **(a):** *High long-term orientation strengthens the positive relationship between ESG performance and bank stability.*

Hypothesis 2d. **(b):** *High long-term orientation weakens the positive relationship between ESG performance and bank stability.*

2.2.3. Role of formal institutions

Formal institutions defined as the codified rules, laws, and enforcement mechanisms governing societal interactions (North, 1990), play a central role in shaping the ESG–bank stability relationship. Strong institutions protect creditor rights, reduce opportunism, and foster prudent risk-taking by enhancing governance and limiting corruption (Sodokin et al., 2023). From a transaction-cost and risk-governance perspective, robust institutional environments reduce information asymmetries, enforce contracts, and strengthen regulatory oversight, thereby mitigating systemic fragility in the banking sector (Nguyen and Dang, 2023).

Empirical evidence further suggests that formal institutions condition the effectiveness of sustainability practices. Oliveira et al. (2019) show that regulatory frameworks and stakeholder engagement channels influence banks' ESG and CSR strategies. Similarly, Úbeda et al. (2022) find that sustainable banking fosters financial development only in countries with strong institutional quality. Maama (2021) also highlights that governance quality, proxied by the Corruption Perceptions Index shapes banks' ESG adoption by influencing transparency, accountability, and political stability.

While some studies employ the ESG Regulation Index as a direct proxy for sustainability-specific institutional frameworks, its limited temporal and cross-country coverage restricts its suitability for global banking samples (Singhania and Saini, 2021; Singhania et al., 2023). Accordingly, we adopt broader institutional indicators such as the World Governance Indicators (WGI), which provide consistent and comparable measures across our study period. In weaker institutional environments, ESG may fail to generate stability benefits, as sustainability commitments risk remaining symbolic, misaligned, or poorly enforced. By contrast, in strong institutional settings, ESG practices are more likely to be genuine, value-creating, and risk-reducing.

Hypothesis 3. **(H3):** *The positive effect of ESG performance on bank stability is stronger in countries with strong formal institutions.*

2.2.4. ESG and bank stability: channels of liquidity and funding cost

Sustainable practices impact bank stability and performance through liquidity and funding costs. ESG activities enhance bank liquidity by strengthening depositor confidence, widening interest rate spreads, improving risk management, and attracting sustainable investors (Lee et al., 2024). However, the literature presents mixed theoretical and empirical evidence on the relationship between liquidity creation and bank stability. One view, grounded in the model of Diamond and Dybvig (1983), suggests that liquidity creation can strengthen fragility, as banks finance long-term illiquid assets with short-term liquid liabilities, rendering them vulnerable to sudden deposit withdrawals and potential bank runs. This "liquidity creation–fragility" hypothesis is supported by (Fungacova et al., 2021), who show that excessive liquidity creation increases the risk of bank failure. Berger and Bouwman (2017) similarly find that abnormally high liquidity creation often precedes major financial crises, such as the dot-com bubble and the global financial crisis, suggesting it can serve as a warning signal of future instability. Zhang et al. (2021) further demonstrate that excessive liquidity creation is associated with increased systemic risk in China, particularly when banks are highly interconnected within the financial system.

In contrast, other studies argue that liquidity creation can promote stability by reducing banks' exposure to funding risk and mitigating moral hazard. Wagner (2007) and Acharya and Naqvi (2012) show that during periods of macroeconomic uncertainty, banks with higher liquidity may become overconfident and increase their credit risk exposure. Khan et al. (2017) find that banks with lower funding liquidity risk tend to take more risk, while Zheng et al. (2019) report that liquidity creation reduces bank risk, particularly among smaller institutions. Similarly, Davydov et al. (2021) find an overall negative association between liquidity

creation and systemic risk but note a positive link between liquidity and a bank's systemic interconnectedness.

Taken together, these findings imply that the impact of ESG-induced liquidity on stability is context-dependent. While liquidity may support stability under prudent risk management and effective regulation, it may exacerbate risk in systems with weaker institutional oversight or excessive risk-taking behavior.

In addition to liquidity, ESG performance lowers financing costs by reducing risk perception, enhancing reputation, and attracting sustainable investors, thereby strengthening profitability and stability (Andrieș and Sprincean, 2023). Moreover, ESG-driven transparency reduces information asymmetry, increasing demand for bank bonds and stocks. Social responsibility mitigates litigation risk; lowers required returns for investors and encourages depositors to accept lower rates. Furthermore, strong ESG ratings reduce idiosyncratic risk, leading to lower funding costs and enhanced bank stability (Agnese and Giacomini, 2023).This reduction in funding cost obtained through ESG performance further enhances bank stability. Building on this, we posit that liquidity creation and funding costs are key mechanisms through which ESG performance influences bank stability. Accordingly, we hypothesize that,

Hypothesis 4a, b (H4a, H4b). : *ESG performance affects bank stability through changes in liquidity and funding costs.*

2.3. Conceptual framework

In this study, we integrate institutional and stakeholder theories to examine the role of institutions in the ESG-bank stability nexus. Institutional theory highlights how norms shape organizations, while stakeholder theory emphasizes addressing diverse sustainability expectations. The conceptual framework (Fig. 1) synthesizes these perspectives, revealing how formal and informal institutions influence ESG performance and bank stability. Furthermore, liquidity creation and funding cost are underlying mechanisms in ESG and bank stability relationship.

3. Methodology

3.1. Data sources and sample composition

We leveraged the Refinitiv ASSET4 database to obtain ESG scores, bank stability measures, and relevant control variables. Following Danisman and Tarazi (2024), we restricted our sample to banks with annual ESG data for at least three consecutive years between 2002 and 2023. To assess potential selection bias, we compared banks with and without ESG data. Descriptive statistics for size, profitability (ROE), equity and loan shares, and formal-institutions measures reveal no meaningful differences (see Table A3 in Appendix), indicating that missing ESG scores are unlikely to compromise external validity. Additionally, we incorporated cultural dimension scores from (Hofstede, 2001, 2010), formal institutional measures from the Worldwide Governance Indicators (WGI), and country-level control variables derived from the World Bank database. This rigorous exercise resulted in an unbalanced panel dataset comprising 14520 observations across 660 banks in 58 countries over the period 2002–2023.

3.2. Variables

Table 2 presents the summary statistics of the variables, while Tables A1 and A2 in the Appendix provide the sample distribution by country, and variable definitions and data sources respectively.

3.2.1. Dependent variable (Bank stability)

We measure bank stability using the Z-score, following Laeven and Levine (2009), a standard indicator in financial literature (Ahamed and Mallick, 2019; Fang et al., 2014). The Z-score is calculated as the sum of equity to total assets (ETA) and return on average assets (ROAA), divided by the standard deviation of ROAA. In Table 2, an average Z-score of 2.644 with a standard deviation of 2.347 suggests strong bank stability in our sample. To ensure robustness, we also incorporate non-performing loans (NPL) as an alternative stability measure.

3.2.2. Independent variable (ESG performance)

We source banks' ESG variables from the Refinitiv ASSET4 database, following Chiaramonte et al. (2022). This database has provided ESG performance scores since 2002, based on publicly reported data, including annual reports, CSR disclosures, stock exchange filings, and media coverage, compiled by trained analysts (Danisman and Tarazi, 2024). The scores are categorized into ten groups, contributing to three pillar scores (environmental, social, and governance) and a combined ESG score. We use the combined ESG score, ranging from 1 to 100. In Table 2, the average ESG score is 44.14, with a standard deviation of 20.48, indicating substantial variability. For robustness, we also compute an alternative ES score by averaging environmental and social performance scores, following Shin et al. (2023) and G score. Additionally, Table 2 shows that average environmental (47.785) and governance (52.052) scores exceed the social score (45.101). The higher standard deviation in environmental scores suggests greater variability in banks' environmental performance globally.

Fig. 2 shows the annual trends in ESG scores and Z-scores (2002–2023). ESG scores exhibit a steady rise, reflecting growing emphasis on sustainability, while Z-scores remain stable despite global disruptions like the 2007–2008 financial crisis and COVID-19. This stagnation suggests external shocks constrained financial stability improvements.

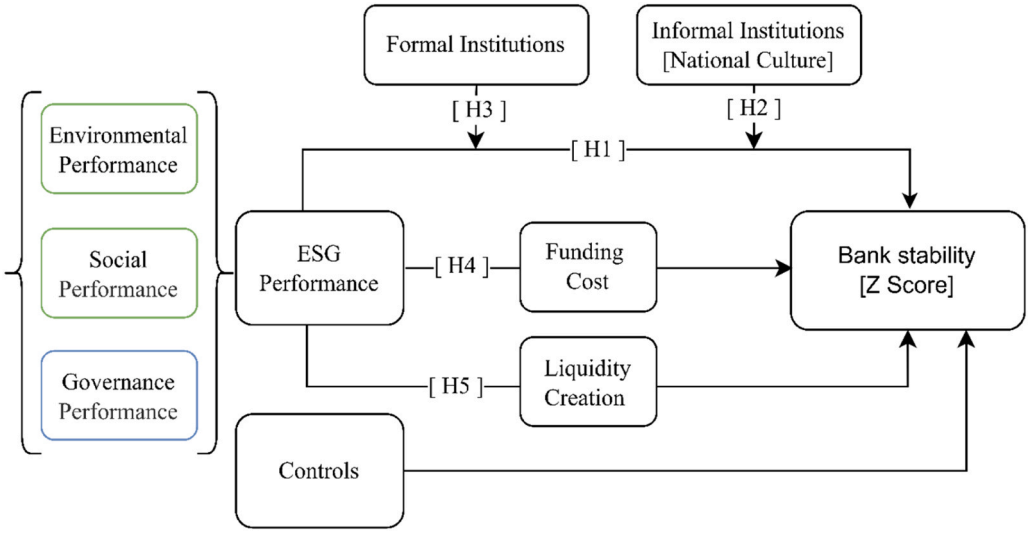

Fig. 1. Conceptual framework: The role of institutions in the ESG-bank stability nexus. Note: This figure presents the integrated theoretical model guiding the study. It posits that Environmental, Social, and Governance (ESG) Performance has a direct relationship with Bank Stability (H1), which is simultaneously moderated by two key macro-level institutional forces: (1) National Culture (informal institutions), represented by the dimensions of Individualism (H2a), Uncertainty Avoidance (H2b), Power Distance (H2c), and Long-Term Orientation (H2d); and (2) Formal Institutions (H3). Furthermore, the framework proposes that the influence of ESG on Bank Stability is transmitted through two key mediating channels: Bank Liquidity and Funding Costs (H4a, H4b). The model synthesizes perspectives from institutional and stakeholder theories.

Table 2
Summary statistics.

Variable	Observations	Mean	Std. Dev.	Min	Max
Z-score	14520	2.644	2.347	−4.448	27.757
Non-performing loan (NPL)	14520	2.986	5.286	0.032	46.446
ESG Performance (ESG)	14520	44.148	20.480	1.37	95.73
Environmental Performance (E)	14520	47.785	27.538	14.791	98.512
Social Performance (S)	14520	45.101	23.821	0.330	97.649
Governance Performance (G)	14520	52.052	22.324	0.036	99.260
Individualism (IDV)	14520	63.261	30.006	0.00	100
Uncertainty Avoidance (UAI)	14520	54.611	18.647	8.00	100
Power Distance (PDI)	14520	51.927	18.507	11.00	100
Long Term Orientation (LTO)	14520	40.845	27.755	8.00	100
Formal Institutions (FOR_INS)	14520	0.894	0.855	−1.491	2.472
Bank Size (SIZE)	14520	10.808	3.237	5.847	19.552
Cash to Assets (CA_AS)	14520	0.034	0.059	0.001	0.771
Equity to Assets (EQ_AS)	14520	0.097	0.046	0.025	0.358
Loan Share (LO_AS)	14520	−0.357	0.415	−13.54	6.478
Return on Equity (ROE)	14520	2.353	0.684	−4.688	6.464
HHI	14520	0.226	0.161	0.000	1.000
Inflation (INF)	14520	2.956	3.88	−4.863	72.309
Economic Growth (EC_GR)	14520	2.875	3.349	−11.167	26.17

Note: This table presents the summary statistics of the variables used in this study.

3.2.3. Moderating variables

We consider national culture and formal institutions as moderators. The following subsections briefly discuss these variables. Following recent culture and finance literature (Boubakri et al., 2017; Mourouzidou-Damtsa et al., 2019), we incorporate Hofstede (1980, 2001, 2010)[1] cultural dimensions individualism (IDV), uncertainty avoidance (UAI), power distance (PDI) and long-term orientation (LTO) in our study. These dimensions usually range from 0 to 100 (also can exceed 100), with higher values indicating cultures that have more power distance, are more individualistic, have higher uncertainty avoidance, and are more focused on long-term goals, thereby allowing individuals to be satisfied. For robustness, we use comparable GLOBE cultural dimensions (House,

[1] For further elaboration, readers may refer to the seminal works by Hofstede and his colleagues, including G. Hofstede's work from 1980, G. Hofstede et al.'s research from 2010, and G. Hofstede & Hofstede's publication from 1991. Additionally, readers can visit the website https://www.hofstede-insights.com for more information on Hofstede culture measures.

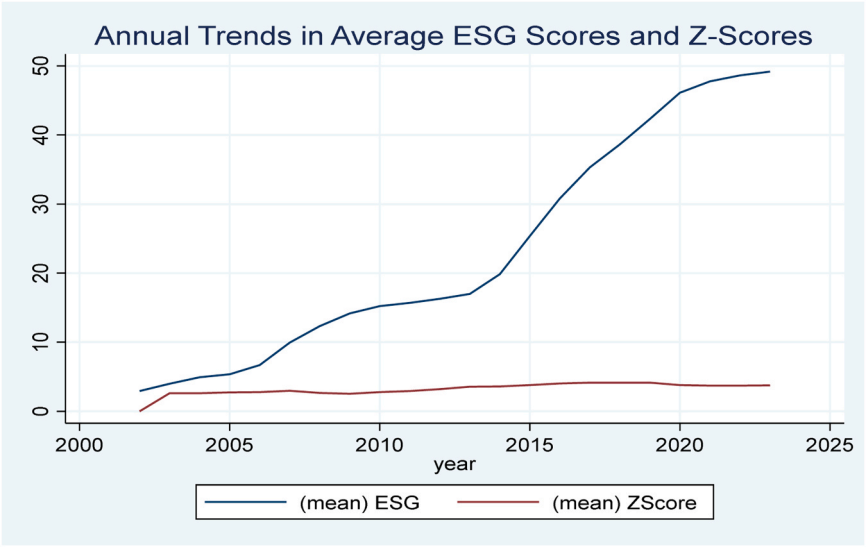

Fig. 2. Visual representation of ESG and bank stability through time. Note: This figure plots the annual average values of the aggregate ESG score (left axis) and the Z-score measure of bank stability (right axis) for the global sample of 660 banks from 2002 to 2023. The data reveal two distinct trends: a steady, upward trajectory in ESG performance, reflecting the banking sector's increasing adoption of sustainability practices over the past two decades. In contrast, the Z-score has remained relatively stagnant, failing to show a consistent upward trend despite the rise in ESG. This divergence suggests that the translation of improved ESG performance into enhanced financial stability is not automatic and may be impeded by external shocks such as the 2007–2008 Global Financial Crisis (GFC) and the COVID-19 pandemic visible as dips in the Z-score, underscoring the need to investigate the contingent factors that determine when ESG effectively stabilizes banks.

2004) namely societal in-group collectivism (inverse of individualism and we labeled it as G_IDV), uncertainty avoidance (G_UAI), power distance(G_PDI), and future orientation (G_LTO).

Formal institutions (FOR_INS) are commonly measured using established cross-country governance datasets such as the Political Risk Service – International Country Risk Guide (PRS-ICRG), the World Governance Indicators (WGI) published by the World Bank (Kaufmann et al., 2011), and the Quality of Government (QoG) index (Teorell et al., 2019). Consistent with prior studies (Bermpei et al., 2018; Houston et al., 2010), we operationalize FOR_INS using three WGI dimensions control of corruption, rule of law, and political stability which directly capture the quality of contract enforcement, governance, and risk mitigation. In the baseline specification, we construct an equally weighted index of these three dimensions, following standard practice in institutional-quality research (Demirguc-Kunt and Levine, 2008; Porta et al., 1998).

To ensure transparency and replicability, we also implement two robustness checks: (i) a three-year moving average of the indicators to smooth out short-term fluctuations, and (ii) a principal component analysis (PCA)–based index, as recommended by (Kaufmann et al., 2011) and applied in recent finance studies (Dong et al., 2021; Liang et al., 2013). These alternative specifications confirm that our results are not sensitive to index construction methods.

3.2.4. *Control variables*

We also employ several control variables commonly used in the bank stability literature. Bank-specific controls include the natural logarithm of total assets as a proxy for bank size (SIZE) (Bermpei et al., 2018). Additionally, the ratio of equity to total assets (EQ_AS) is included in capturing the degree of monitoring exercised by equity holders, while the loan-to-assets ratio (LO_AS) reflects the composition of the bank's asset structure (Barth et al., 2013). To account for cash to total assets (CA_AS) and return on equity (ROE), we follow (Demirgüç-Kunt and Huizinga, 2010). All bank-specific variables are sourced from the Refinitiv database.

We use both bank industry and macroeconomic variables as country-level controls. Consistent with Bermpei et al. (2018), the Herfindahl–Hirschman Index (HHI) is calculated using loan market data, where $\mathrm{HHI} = : \sum_{i=1}^{n} (MSi)^2$ where MS is the loan market share of the i bank and n is the number of banks in a market (i.e. country). This method emphasizes the market share of larger banks. For macroeconomic controls, following Agoraki et al. (2011) we include inflation rate (INF) as a proxy for monetary instability and GDP growth rate (EC_GR) to capture economic fluctuations. These data are sourced from the World Bank's WDI database. Table 3 presents the correlation coefficients and variance inflation factor (VIF) values for the independent variables in the baseline estimations, indicating no significant collinearity concerns.

3.3. *Empirical model*

Based on the previous discourse in the theory and hypothesis development section, it is rational to formulate the role of informal and formal institutions in ESG and bank stability nexus as.

Table 3
Correlations and VIF.

Variables	VIF	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) ESG	1.25	1.00													
(2) SIZE	2.93	0.34	1.00												
(3) EQ_AS	1.28	−0.14	−0.31	1.00											
(4) LO_AS	1.09	−0.06	−0.11	0.14	1.00										
(5) ROE	1.04	−0.01	0.03	0.03	−0.001	1.00									
(6) CA_AS	1.11	−0.09	−0.03	0.15	−0.107	0.01	1.00								
(7) HHI	1.11	0.04	−0.05	0.01	0.049	0.01	0.12	1.00							
(8) EC_GR	1.25	−0.11	0.08	0.01	−0.006	0.10	−0.06	−0.12	1.00						
(9) INF	1.12	0.09	0.04	0.02	−0.04	0.12	−0.01	0.001	0.19	1.00					
(10) IDV	3.63	−0.04	−0.58	0.03	0.11	−0.07	0.02	0.09	−0.23	−0.13	1.00				
(11) UAI	1.34	0.08	0.13	0.01	0.02	−0.04	0.16	0.18	−0.22	0.04	−0.07	1.000			
(12) PDI	2.72	0.04	0.41	0.03	−0.05	0.09	−0.04	−0.15	0.29	0.14	−0.68	0.093	1.000		
(13) LTO	1.49	0.14	0.46	−0.35	−0.16	−0.06	−0.04	−0.02	−0.03	−0.15	−0.12	−0.02	0.09	1.00	
(14) FOR_INS	3.38	0.04	−0.15	−0.05	0.09	−0.086	0.13	0.22	−0.33	−0.16	0.66	0.20	−0.68	0.04	1.00
Mean VIF	1.77														

Note: This table displays the correlation and VIF among variables used in our baseline empirical analyses.

$$Zscore_{i,j,t} = \alpha + \beta_1 ESG_{i,t} + \beta_2 CULTURE_j + \beta_3 \left(ESG_{i,t} * CULTUREj\right) + \sum (FirmLevelControls)_{i,j,t} + \sum (CountryLevelControls)_{j,t} + \varepsilon_{i,j,t} \quad (1)$$

$$Zscore_{i,j,t} = \alpha + \beta_1 ESG_{i,j,t} + \beta_2 FORM_{INST\,j,t} + \beta_3 \left(ESG_{i,j,t} * FOR_{INSj,t}\right) + \sum (FirmLevelControls)_{i,j,t} + \sum (CountryLevelControls)_{j,t} + \varepsilon_{i,j,t} \quad (2)$$

Where Zscore is the measure of bank stability for bank i in year t, ESG is environmental, social, and governance performance for banks i, country j in year t, CULTURE, national cultural dimensions (IDV, UAI, PDI, LTO) for country j (time-invariant), FOR_INS stands for formal institutions for country j in year t, and interactions terms.

The above equation suggests that national culture and formal institutions play a role in ESG and bank stability. Therefore, the study tends to explore how national culture, (as an informal institution) and formal institutions shape ESG bank stability nexus.

We employed multilevel regression models to analyze hierarchical data with firms nested within countries (Shin et al., 2023). This approach accounts for cross-level variations and provides a robust framework to assess the relationships between ESG performance,

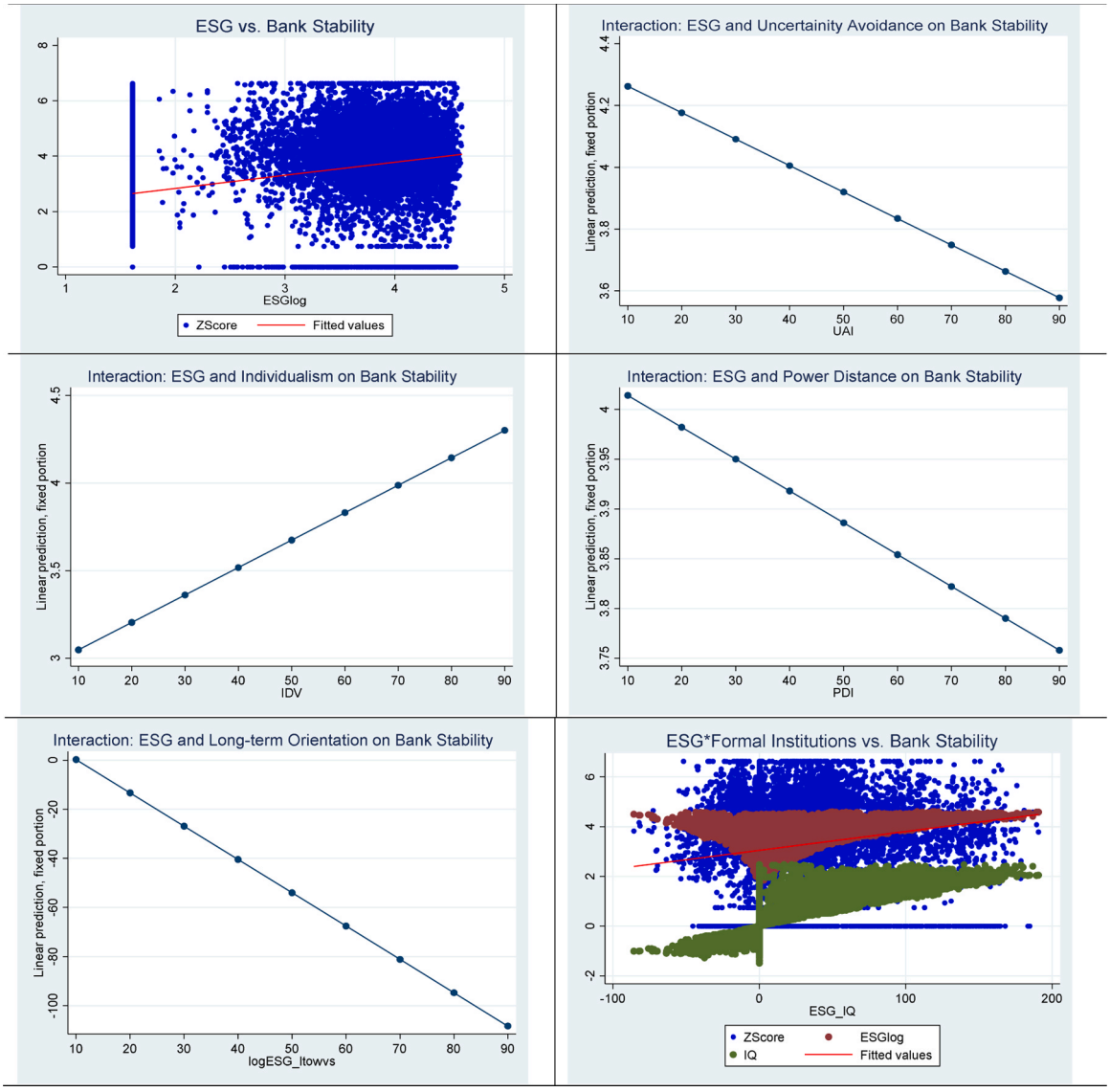

Fig. 3. The moderating role of national culture and formal institutions. Note: The figure illustrates the contrasting effects on the ESG-Bank Stability relationship. For instance, Panel (b) shows a stronger positive relationship (steeper slope) in highly individualistic societies versus a weaker relationship (flatter slope) in collectivist societies. Conversely, Panels (c-e) show how high levels of Uncertainty Avoidance, Power Distance, and Long-Term Orientation diminish or invert the positive relationship observed in societies with low scores on these dimensions.

bank stability, and moderating cultural and institutional factors.

To address potential endogeneity arising from omitted variables, measurement error, and reverse causality, we implemented an instrumental variables (IV) approach. Given the difficulty in identifying valid external instruments in macro-financial contexts, we adopted Lewbel (2012) heteroskedasticity-based identification strategy, which constructs internal instruments from heteroskedastic errors in exogenous regressors. Estimation was conducted using the ivreg2h command in Stata (Baum and Lewbel, 2019).

Lewbel's method relies on two key identification conditions: the covariance between instruments and the squared residuals of the endogenous regressors must be nonzero ($Cov(Z, \varepsilon^2) \neq 0$), and the covariance between instruments and the product of structural residuals must be zero ($Cov(Z, \xi \cdot \varepsilon) = 0$). We verified the first condition via Breusch-Pagan tests, which strongly rejected homoskedasticity across all specifications ($\chi^2 = 1186–2817$; $p < 0.0001$), confirming the presence of heteroskedasticity necessary for instrument construction (see Table 5). Instrument relevance was supported by large Kleibergen-Paap LM statistics (1016–2359) and Cragg-Donald Wald F statistics (972–1015), well above conventional thresholds, indicating strong instruments without under identification. Overidentification was tested using Hansen J statistics, which were statistically significant across models ($p < 0.05$), consistent with the heteroskedasticity exploited for identification in Lewbel's approach (Baum and Lewbel, 2019). Importantly, Sargan C statistics failed to reject the null hypothesis of instrument exogeneity, supporting the validity of the internally generated instruments.

Overall, these diagnostics confirm the strength and validity of the instruments, underpinning the robustness of our causal estimates.

Table 4
Multilevel regression results.

Variables	(1) Z-score	(2) Z-score	(3) Z-score	(4) Z-score	(5) Z-score	(6) Z-score
ESG	0.191***	−0.160	0.886***	0.886***	0.880***	0.164***
	(0.0228)	(0.143)	(0.298)	(0.298)	(0.303)	(0.0248)
IDV		−0.0149***				
		(0.00263)				
ESG*IDV		0.278***				
		(0.108)				
UAI			0.00403			
			(0.00503)			
ESG*UAI			−0.620***			
			(0.240)			
PDI				0.0180***		
				(0.00518)		
ESG*PDI				−0.632**		
				(0.255)		
LTO					0.0482***	
					(0.00480)	
ESG*LTO					−0.679***	
					(0.218)	
FOR_INS						−0.0179
						(0.0561)
ESG* FOR_INS						0.00284***
						(0.00104)
SIZE	0.00357	−0.0570***	−0.0135	−0.0135	−0.224***	0.00750
	(0.00980)	(0.0134)	(0.0109)	(0.0109)	(0.0262)	(0.0103)
EQ_AS	0.957**	0.681	0.942**	0.942**	0.361	1.099**
	(0.486)	(0.425)	(0.463)	(0.463)	(0.396)	(0.493)
LO_AS	−0.153**	−0.135	−0.146*	−0.146*	−0.0123	−0.143**
	(0.0632)	(0.0830)	(0.0831)	(0.0831)	(0.0747)	(0.0630)
CA_AS	−0.0175***	−0.0133**	−0.0124*	−0.0124*	−0.000167	−0.0178***
	(0.00541)	(0.00671)	(0.00701)	(0.00701)	(0.00665)	(0.00539)
ROE	0.00468	0.00450*	0.00444*	0.00444*	0.00450	0.00463
	(0.00300)	(0.00251)	(0.00243)	(0.00243)	(0.00300)	(0.00297)
HHI	−0.358***	−0.245***	−0.188**	−0.188**	−0.320***	−0.407***
	(0.0630)	(0.0724)	(0.0836)	(0.0836)	(0.0649)	(0.0641)
EC_GR	0.0170***	0.0227***	0.0214***	0.0214***	0.0231***	0.0165***
	(0.00579)	(0.00546)	(0.00575)	(0.00575)	(0.00603)	(0.00581)
INF	−0.0311***	−0.0344***	−0.0339***	−0.0339***	−0.0329***	−0.0295***
	(0.00290)	(0.00292)	(0.00289)	(0.00289)	(0.00276)	(0.00298)
Intercept	2.479***	3.444***	4.819***	4.819***	3.384***	2.383***
	(0.171)	(0.400)	(0.523)	(0.523)	(0.577)	(0.192)
Random Intercept	0.5452	0.6210	0.6380	0.3482	0.5242	0.5480
Residual Variance	1.4483	1.6374	1.1581	1.0298	1.1612	1.4443
Log-likelihood	−7191.54	−4842.99	−4865.87	−3915.12	−4843.078	−7186.73
AIC	14407.08	9713.99	9759.75	7858.25	9714.15	14401.46
BIC	14483.49	9798.31	9844.14	7940.26	9798.54	14490.61

Note: This table presents the multilevel regression results of ESG and bank stability relationship with the role of national culture and formal institutions. ***, **, * denote that the coefficient is significant at the 1 %, 5 % and 10 % levels, respectively, corresponding to 99 %, 95 % and 90 % confidence intervals.

This methodology aligns with recent applications of heteroskedasticity-based IV estimation (Acheampong et al., 2021; Fang et al., 2023).

To further address endogeneity, we complemented the IV analysis with Kinky Least Squares (KLS) estimation (Kiviet, 2023), which adjusts for endogeneity without relying on instruments. The consistent findings across these approaches bolster the credibility of our results.

4. Empirical results and discussion

4.1. Graphical analysis

Fig. 3 provides a visual representation of our core findings, offering sharply contrasting illustrations of the heterogeneous effects predicted by our hypotheses. Panel (a) establishes the baseline positive correlation between ESG performance and bank stability. The subsequent panels (b-e) demonstrate how this relationship is profoundly shaped by the national cultural context. For instance, the slope is significantly steeper in highly individualistic societies (Panel b) compared to collectivist ones, visually confirming the strengthening effect of individualism (H2a). Conversely, the relationship is visibly weakened or even inverted under conditions of high uncertainty avoidance (Panel c), high power distance (Panel d), and long-term orientation (Panel e), illustrating the diminishing effects posited in H2b, H2c, and H2d. Finally, Panel (f) highlights the reinforcing positive role of strong formal institutions (H3). These stark contrasts empirically underscore that the ESG-stability nexus is not universal but is fundamentally contingent on the institutional environment, providing strong preliminary support for our hypotheses and motivating the rigorous regression analysis that follows.

4.2. Benchmark regression analysis

We analyze the multilevel regression results in Table 4 across six models. Model (1) examines ESG's direct impact on bank stability. Models (2) – (5) assess how cultural dimensions (IDV, UAI, PDI, LTO) moderate this relationship. Model (6) investigates the role of formal institutions in the ESG-bank stability nexus.

In Model (1), the ESG coefficient is 0.191, indicating that a 1 % rise in ESG performance increases bank stability by 0.191 %. This supports Peloza (2006) argument that sustainability fosters prudent banking, strengthens financial relationships, and enhances reputation. Our findings align with the 'risk mitigation view' of stakeholder theory, framing CSR as an insurance mechanism (Chiaramonte et al., 2022; Godfrey, 2005; Godfrey et al., 2009). However, subsequent models show that cultural and institutional contexts shape this relationship

With reference to the role of national culture in the ESG-bank stability nexus, model (2) shows that the coefficient for the interaction term ESG*IDV is 0.278, indicating that a 1 % increase in ESG performance moderated by IDV results in a significant 0.278 % increase in banks stability. These findings support hypothesis 2 (a), which posits the positive role of individualism in ESG performance and bank stability. In individualistic societies, trust enhances financial inclusion and deposit stability (Fungáčová et al., 2019; Lu et al., 2021), while sound decision-making mitigates herding behavior (Berger et al., 2021). Aligning ESG practices with economic goals in individualistic cultures (Shin et al., 2023) enhances banks' stability and resilience.

Next, in model (3) UAI loads significant negative effects on ESG and bank stability relationship. The interaction term ESG*UAI indicates that a 1 % increase in ESG performance moderated by UAI results in a significant 0.620 % decrease in bank stability. In high uncertainty avoidance societies, risk aversion, and rigid norms hinder voluntary ESG engagement, weakening its impact on bank stability (Shin et al., 2023). Risk-averse behaviors, such as lower savings and low-yield investments, constrain bank profitability (Wang et al., 2016). This compliance-driven approach to ESG reduces its value as a stability enhancer, limiting its positive association with financial resilience (Godfrey et al., 2009).

Turning to models (4) and (5), the interaction terms ESG*PDI and ESG*LTO have coefficients of −0.632 and −0.679, respectively. These results indicate that increases in these cultural dimensions significantly diminish the effect of ESG performance on bank stability by 0.632 % and 0.679 %, respectively. In high power distance societies, low trust (Bjørnskov, 2008), and high transaction costs hinder ESG adoption (Steenkamp and Geyskens, 2012) weakening its impact on bank profits and stability. On the other hand, LTO, for which we developed a non-directional hypothesis, reported a negative association between ESG and bank stability nexus. In future-oriented societies, focus on long-term results can lead to lower immediate profitability (Shin et al., 2023), limiting financial resources available for ESG investments and weakening the link between ESG performance and bank stability.

Finally, model (6) presents the role of FOR_INS in ESG and bank stability nexus. The coefficients of interaction term 0.0028 provide that an increase in the quality of formal institutions enhances the positive effects of ESG performance on bank stability, supporting Hypothesis 3. Robust formal institutions promote prudent risk-taking, enhance governance, and strengthen corruption control and rule of law (Sodokin et al., 2023), thereby improving risk governance and effectively mitigating bank risk (Nguyen and Dang, 2023) which ultimately boosts bank stability.

To further check the practical relevance of our results, we assess the economic significance of the interactive effects. The standard deviation of our dependent variable bank stability (Z-score) is 2.347 (see Table 1). The coefficient of ESG*IDV (0.278) implies that a 1-unit increase in ESG performance (moderated by individualism) enhances bank stability by approximately 11.8 % of one standard deviation indicating a non-negligible effect. In a similar vein, the coefficients of ESG *UAI (–0.620), ESG * PDI (–0.632), and ESG * LTO (–0.679) correspond to 26.4 %, 26.9 %, and 28.9 % of one standard deviation in Z-score, respectively. Although the ESG * FOR_INS interaction coefficient (0.0028) is numerically small, it is statistically significant. Given substantial variation in institutional quality across countries, its economic relevance may accumulate in high-governance environments. In sum, these effect sizes suggest that

cultural and institutional contexts exert not only statistical but also economically significant impact on the ESG–bank stability nexus.

For the control variables, bank size exhibits inconsistent significance, while equity-to-assets ratio and economic growth positively influence stability. Conversely, higher market concentration (HHI) and inflation rates exert negative impacts on Z-scores across models.

Overall, our baseline results align with the normative and coercive pressure view of institutional theory, suggesting that both cultural systems and formal institutions can explain variations in sustainability practices and bank stability across countries.

4.3. Endogeneity and identification

Although the OLS estimates provide consistent support for our main hypotheses, potential endogeneity concerns arising from measurement error, omitted variables, or reverse causality may bias the results. To address this, we apply Lewbel (2012) heteroskedasticity-based instrumental variable. This estimator constructs internal instruments from heteroskedasticity in the error terms of exogenous regressors, thereby eliminating the need for external instruments.

Table 5 reports the full results and diagnostics. The Breusch–Pagan tests confirm the presence of strong heteroskedasticity across all specifications ($\chi^2 = 1186–2817$; $p < 0.0001$), fulfilling the key identification condition of the Lewbel approach. The Kleibergen–Paap rank Wald F-statistics range from 648 to 1196, well above the conventional weak-instrument thresholds (Staiger and Stock, 1994), confirming that the generated instruments are highly relevant.

The Hansen J statistics (p-values between 0.0000 and 0.0131) are statistically significant, which is not uncommon in the Lewbel framework, where identification derives from heteroskedasticity rather than exclusion restrictions (Baum and Lewbel, 2019; Lewbel,

Table 5
Endogeneity: Lewbel (2012).

Variables	(1) Z-score	(2) Z-score	(3) Z-score	(4) Z-score	(5) Z-score	(6) Z-score
ESG	0.0592**	−1.368***	0.511**	0.324	2.534***	0.0190
	(0.0240)	(0.189)	(0.204)	(0.269)	(0.254)	(0.0232)
IDV		−0.032***				
		(0.0034)				
ESG*IDV		1.042***				
		(0.147)				
UAI			0.0064*			
			(0.0039)			
ESG*UAI			−0.577***			
			(0.166)			
PDI				0.012***		
				(0.004)		
ESG*PDI				−0.410*		
				(0.217)		
LTO					0.056***	
					(0.004)	
ESG*LTO					−2.088***	
					(0.198)	
FOR_INS						−0.236***
						(0.024)
ESG* FOR_INS						0.0046***
						(0.0006)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	3.436***	2.991***	5.735***	4.989***	7.681	3.671
	(0.023)	(0.405)	(0.453)	(0.472)	(0.475)	0.152
F statistics	45.15***	54.02***	45.08***	38.62***	68.48***	52.16***
Kleibergen-Paap rk LM statistic	2056.701	1016.845	1039.061	1102.055	1083.567	2359.648
P value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cragg-Donald Wald F statistic	1003.965	983.280	1015.813	983.555	972.528	986.075
Kleibergen-Paap rk Wald F stats	884.429	648.342	693.711	669.683	810.181	1196.046
10 % maximum IV size	36.19	46.62	46.62	46.62	46.62	46.62
15 % maximum IV size	19.71	24.96	24.96	24.96	24.96	24.96
20 % maximum IV size	14.01	17.61	17.61	17.61	17.61	17.61
25 % maximum IV size	11.07	13.84	13.84	13.84	13.84	13.84
Breusch-Pagan χ^2	2254.06	1188.15	1191.25	1186.02	1186.02	2816.77
BP p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hansen J statistic	25.173	40.785	36.789	42.194	31.280	22.414
Hansen J p-value	0.0015	0.0000	0.0000	0.0000	0.0005	0.0131
C statistics (Sargan)	3.614	3.190	0.624	1.651	0.469	0.002
C statistic p-value	0.0573	0.0741	0.4297	0.1988	0.4932	0.9619

Note: This table presents the Lewbel 2SLS results of ESG and bank stability relationship with the role of national culture and formal institutions. ***, **, * denote that the coefficient is significant at the 1 %, 5 % and 10 % levels, respectively, corresponding to 99 %, 95 % and 90 % confidence intervals.

2012). Importantly, the C statistics for all models show p-values well above the 0.05 significance threshold (ranging from 0.0573 to 0.9619), meaning we fail to reject the null hypothesis of instrument exogeneity in all cases. This provides strong empirical support for the validity of our instruments. Collectively, these diagnostics confirm the robustness and empirical validity of our identification strategy.

Turning to the substantive results, the coefficients associated with ESG performance in column (1) are positive and statistically significant at the 1 % level, corroborating previous results that ESG performance enhances bank stability. In columns (2) through (6), when ESG performance is combined with cultural dimensions and formal institutions, the coefficients retain their signs, supporting the benchmark analysis, with only a slight variation in the significance level for the interaction between ESG and PDI. Overall, the Lewbel 2SLS results confirm that our main findings are robust to endogeneity corrections. The combination of strong instrument diagnostics, consistent coefficient patterns, and theoretically coherent interaction effects reinforces the causal interpretation of ESG performance as a driver of bank stability with the role of institutions.

4.4. Robustness checks and further analysis

To ensure the validity of our findings, we conducted a series of robustness checks and additional analyses. The detailed outcomes of these tests are reported in the subsequent sections.

As a first robustness check, we re-estimated our model using alternative estimation technique, specifically Kinky Least Squares (KLS) as outlined by Kiviet (2023). The results, summarized in Table 6, are consistent with those from our benchmark analysis and Lewbel 2SLS approach. Our results are, therefore, robust to the inclusion of alternative estimation techniques.

In the primary analysis, the Z-score was used as the dependent variable to measure bank stability. In this subsection, we employ non-performing loans (NPL) as an alternative measure of bank stability to test the robustness of our findings. The results, presented in Table 7, reveal significant inverse coefficients, consistent with the fact that NPL and the Z-score are the inverse proxies of bank stability. These findings corroborate with the results of the primary analysis, further reinforcing the robustness of our findings.

In the preceding analysis, we use the ESG performance index, provided by Refinitiv, as an explanatory factor. This composite measure comprises three distinct sub-indicators: environmental (E), social (S), and governance (G) performance. In the current section, we follow Ioannou and Serafeim (2012) and Shin et al. (2023) to construct an alternative ES score to isolate the effects of environmental and social pillars by taking the average of the E and S scores of banks' sustainability performance. This approach tests whether non-governance sustainable activities independently contribute to stability. The results of this exercise, as reported in Table 8, confirm

Table 6
Kinky least square results.

Variables	(1) Z-score	(2) Z-score	(3) Z-score	(4) Z-score	(5) Z-score	(6) Z-score
ESG	0.699***	−1.201***	0.616***	0.388	2.476***	0.00639
	(0.0989)	(0.125)	(0.227)	(0.268)	(0.239)	(0.0219)
IDV		−0.0283***				
		(0.00251)				
ESG*IDV		0.895***				
		(0.0965)				
UAI			0.00756**			
			(0.00375)			
ESG*UAI			−0.649***			
			(0.184)			
PDI				0.0132***		
				(0.00480)		
ESG*PDI				−0.457**		
				(0.220)		
LTO					0.0550***	
					(0.00415)	
ESG*LTO					−2.045***	
					(0.186)	
FOR_INS						−0.236***
						(0.0243)
ESG* FOR_INS						0.00481***
						(0.000643)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	2.100***	3.315***	5.875***	5.100***	7.655***	3.679***
	(0.245)	(0.347)	(0.432)	(0.478)	(0.408)	(0.132)
xkurtosis	245.286	275.242	274.855	274.855	274.855	245.286
grid_min	−0.75	−0.39	−0.22	−0.18	−0.20	−0.75
grid_max	0.75	0.39	0.22	0.18	0.20	0.75
grid_step	0.01	.01	0.01	0.01	0.01	0.01

Note: This table presents the Kinky least square (used as an alternative estimation technique for a robustness check) results of ESG and bank stability relationship with the role of national culture and formal institutions. ***, **, * denote that the coefficient is significant at the 1 %, 5 % and 10 % levels, respectively, corresponding to 99 %, 95 % and 90 % confidence intervals.

Table 7
NPL as a measure of bank stability.

Variables	(1) NPL	(2) NPL	(3) NPL	(4) NPL	(5) NPL	(6) NPL
ESG	−0.536***	−2.073*	−0.0595***	−0.0564***	−0.0723***	0.263***
	(0.0874)	(1.205)	(0.0149)	(0.0152)	(0.0150)	(0.0989)
IDV		−0.0387				
		(0.0262)				
ESG*IDV		−0.798***				
		(0.311)				
UAI			0.0277*			
			(0.0155)			
ESG*UAI			.886***			
			(0.559)			
PDI				−0.0141		
				(0.0203)		
ESG*PDI				1.806***		
				(0.571)		
LTO					−0.0877***	
					(0.0164)	
ESG*LTO					2.299***	
					(0.555)	
FOR_INS						0.0597
						(0.110)
ESG* FOR_INS						−0.0297***
						(0.00281)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	9.530***	5.622**	−7.005**	−3.115	−4.933	9.785***
	(1.104)	(2.719)	(3.489)	(3.387)	(3.303)	(0.671)
Random Intercept	21.295	21.245	19.551	20.972	20.107	27.951
Residual Variance	12.912	11.174	11.121	11.065	11.048	20.437
Log-likelihood	−9470.60	−7203.961	−7228.947	−7233.701	−7225.544	−10307.325
AIC	18965.20	14435.92	14485.89	14495.41	14479.09	20640.65
BIC	19038.57	14517.90	14567.95	14577.46	14561.14	20720.14

Note: This table presents the multilevel regression results of ESG and bank stability (taking non-performing loans as an alternative measure of bank stability for a robustness check) relationship with the role of national culture and formal institutions. ***, **, * denote that the coefficient is significant at the 1 %, 5 %, and 10 % levels, respectively, corresponding to 99 %, 95 %, and 90 % confidence intervals

our baseline findings.

We re-estimate our model using the governance (Gov) pillar separately from the aggregated ESG index to address concerns about the exclusion of governance in earlier specifications. This allows us to isolate its role in bank stability. Table 9 shows that governance alone has a positive and significant impact on bank stability. This impact is significant at the 5 % level. Moreover, the interaction terms between governance and cultural dimensions are also significant, confirming that the role of governance is contingent upon a country's cultural and institutional context. These findings affirm the robustness of our main conclusions and address potential concerns regarding the exclusion of the governance component from ESG.

We also verify robustness by replacing Hofstede's measures with comparable GLOBE cultural dimensions: societal in-group collectivism (inverse of individualism), uncertainty avoidance, power distance, and future orientation. All GLOBE variables are standardized prior to estimation. Results in Table 10 show that the ESG–culture interaction terms remain significant and directionally consistent with our main analysis, confirming that our findings are not framework-specific.

To ensure that our baseline results are not sensitive to the construction of the formal institutions index, we conducted two additional robustness exercises. First, we replaced the equally weighted index with a three-year moving average of the formal-institutions dimensions (FOR_INS _ma3) and interacted with ESG performance. Second, we employed a PCA–based index (FOR_INS _pca) and included its interaction with ESG.

The results, reported in Table 11, confirm our main findings. In both specifications, the interaction between ESG and formal institutions is positive and highly significant, indicating that ESG enhances bank stability more strongly in contexts with stronger formal institutions. The main effects of ESG remain positive and significant, while the control variables retain their expected signs. These exercises demonstrate that our conclusions are robust to alternative operationalizations of formal institutions, enhancing the credibility and replicability of our findings.

To address potential concerns about the overrepresentation of U.S. banks (42.12 % of the sample), we re-estimate our baseline model after excluding all U.S. banks. The results, reported in Table 12, remain qualitatively and statistically consistent, confirming the robustness and generalizability of our findings.

To further strengthen the credibility of our findings and address potential endogeneity concerns, we implement a placebo test in which lagged bank stability (ZScore) is used to predict subsequent ESG performance. As reported in Table 13, the coefficient is statistically insignificant, implying that stability does not forecast future ESG engagement. This alleviates concerns that our results are merely capturing reverse causality, whereby financially stable banks invest more heavily in ESG activities.

Table 8
Average of ES scores.

Variables	(1) Z-score	(2) Z-score	(3) Z-score	(4) Z-score	(5) Z-score	(6) Z-score
ES	0.00578***	−0.00800***	0.00744***	0.00676***	0.0189***	0.0126***
	(0.000995)	(0.00200)	(0.00236)	(0.00247)	(0.00253)	(0.00184)
IDV		−0.0125***				
		(0.00176)				
ES*IDV		0.386***				
		(0.0744)				
UAI			0.00196			
			(0.00188)			
ES*UAI			−0.279***			
			(0.0924)			
PDI				0.00707***		
				(0.00230)		
ES*PDI				−0.249**		
				(0.0991)		
LTO					0.0222***	
					(0.00224)	
ES*LTO					−0.710***	
					(0.0958)	
FOR_INS						0.803***
						(0.150)
ES* FOR_INS						0.308***
						(0.0597)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	3.296***	2.038***	5.225***	4.873***	7.366***	3.573***
	(0.172)	(0.447)	(0.521)	(0.540)	(0.536)	(0.289)
Random Intercept				0.477	0.444	0.499
Residual Variance				1.151	1.152	1.208
Log-likelihood				−9478.253	−9464.152	−7754.214
AIC				18982.51	19978.70	15534.43
BIC				19069.68	20059.17	15618.8

Note: This table presents the multilevel regression results of ES (taking an average of environmental and social components of sustainability performance) and bank stability relationship with the role of national culture and formal institutions. ***, **, * denote that the coefficient is significant at the 1 %, 5 %, and 10 % levels, respectively, corresponding to 99 %, 95 %, and 90 % confidence intervals

Moreover, we augment our baseline specification with firm-specific linear time trends to account for unobserved, persistent dynamics that could jointly shape both ESG and stability outcomes. The inclusion of these trends absorbs underlying trajectories, yet the estimated effect of ESG remains statistically indistinguishable from zero, while firm-trend terms capture the expected heterogeneity. This suggests that the observed association is not driven by spurious bank-level dynamics or omitted long-term factors.

Since cultural and formal institutions may operate simultaneously, we jointly estimate ESG × culture and ESG × institutions interactions. Table 14 shows that the positive moderation of individualism remains robust, while uncertainty avoidance, power distance, and long-term orientation continue to weaken the ESG–stability relationship. Formal institutional quality has a generally positive but weaker effect, significant only in selected models. Overall, culture and institutions act as complementary yet uneven layers (North, 1990), jointly shaping but not equally conditioning the ESG–stability nexus.

4.5. Channel analysis

In the hypothesis development section, we posit that ESG performance affects bank stability through the channels of liquidity and funding cost. Empirically, we regress ESG performance on bank liquidity, funding costs, and bank stability. Following Lee et al. (2024), bank liquidity is measured by the change in liquidity. The results in Table 15 show that ESG performance enhances liquidity, but the increased liquidity is associated with a reduction in bank stability. Specifically, the significant negative coefficient of –0.0868 for liquidity on bank stability suggests that excessive liquidity provision may elevate risk and undermine financial resilience.

While the liquidity creation hypothesis argues that liquidity strengthens stability by reducing funding constraints and supporting intermediation (Berger and Bouwman, 2009), our findings align with the alternative view that excessive liquidity may lead to fragility, particularly in weaker institutional settings. Theoretical models by Diamond and Dybvig (1983) and empirical studies such as Fungacova et al. (2021) and Zhang et al. (2021) show that high liquidity creation can increase vulnerability to bank runs, promote risky lending, and heighten systemic risk especially in emerging markets. This finding underscores the context-dependent nature of the liquidity–stability relationship. In contrast, ESG performance is found to reduce funding costs, as indicated by the negative coefficient of –0.00404 (significant at the 5 % level). Lower funding costs enhance profitability and capital buffers, which in turn strengthen financial stability (Levine et al., 2020).

In short, these results support our proposed channels: bank liquidity and funding cost mediate the relationship between ESG performance and stability. However, the observed negative effect of liquidity on stability highlights the importance of institutional

Table 9
Governance component of ESG.

Variables	(1) Z-score	(2) Z-score	(3) Z-score	(4) Z-score	(5) Z-score	(6) Z-score
Gov	0.126**	−0.213**	0.305**	0.292**	0.353***	−0.0989**
	(0.0508)	(0.0948)	(0.124)	(0.131)	(0.0862)	(0.0416)
IDV		−0.0213***				
		(0.00580)				
Gov*IDV		0.00338**				
		(0.00148)				
UAI			0.0164**			
			(0.00748)			
Gov*UAI			−0.00533***			
			(0.00192)			
PDI				0.0263***		
				(0.00875)		
Gov*PDI				−0.00571**		
				(0.00226)		
LTO					0.0389***	
					(0.00625)	
Gov*LTO					−0.00712***	
					(0.00161)	
FOR_INS						−0.396***
						(0.0324)
Gov* FOR_INS						0.115***
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	3.028***	5.548***	2.752***	2.476***	2.135***	3.725***
	(0.316)	(0.417)	(0.492)	(0.520)	(0.368)	(0.219)
Random Intercept	0.653	0.784	0.802	0.806	0.784	0.696
Residual Variance	1.188	1.810	1.829	1.832	1.762	1.724
Log-likelihood	−4394.552	−4697.490	−4712.220	−4714.187	−4660.969	−4630.869
AIC	8813.104	9420.980	9450.441	9454.375	9347.945	9287.738
BIC	8884.084	9497.875	9527.347	9531.272	9424.834	9364.633

Note: This table presents the multilevel regression results of governance component of sustainability performance and bank stability relationship with the role of national culture and formal institutions. ***, **, * denote that the coefficient is significant at the 1 %, 5 %, and 10 % levels, respectively, corresponding to 99 %, 95 %, and 90 % confidence intervals.

Table 10
Robustness using GLOBE cultural dimensions.

Variables	(1) Z-score	(2) Z-score	(3) Z-score	(4) Z-score
ESG	0.00831***	0.666***	0.604***	0.979***
	(0.00154)	(0.142)	(0.0859)	(0.283)
G_IDV (In-group collectivism (Societal)	0.0657***			
	(7.82e−05)			
ESG*G_IDV	−0.000114***			
	(2.34e−05)			
G_UAI		1.934***		
		(0.102)		
ESG*G_UAI		−0.116***		
		(0.0289)		
G_PDI			1.821***	
			(0.0524)	
ESG*G_PDI			−0.0979***	
			(0.0151)	
G_ LTO (future orientation)				0.108
				(0.178)
ESG*G_LTO				−0.152***
				(0.0516)
Controls	Yes	Yes	Yes	Yes
Intercept	−0.249***	−6.280***	−6.866***	2.449**
	(0.00584)	(0.508)	(0.304)	(0.981)
Random Intercept	0.0203	6.014	1.506	0.552
Residual Variance	4.030	0.169	0.423	1.504

Note: This table reports regressions of bank stability (Z-score) on ESG performance and its interaction with GLOBE cultural dimensions. Columns (1)–(4) substitute Hofstede's dimensions with societal in-group collectivism, uncertainty avoidance, power distance, and future orientation, respectively. All regressions include bank-level and macro controls.

Table 11
Alternative construction of formal institutions (three years average and PCA).

Variables	(1) Z-score	(2) Z-score
ESG	0.0683**	0.229***
	(0.0327)	(0.0253)
FOR_INS _ma3	−0.399**	
	(0.160)	
ESG* FOR_INS _ma3	0.214***	
	(0.0438)	
FOR_INS _pca		−0.123***
		(0.0451)
ESG* FOR_INS _pca		0.0472***
		(0.0125)
Controls	Yes	Yes
Intercept	2.503***	2.227***
	(0.276)	(0.226)
Random Intercept	0.621	0.552
Residual Variance	1.371	1.441
Log-likelihood	−5349.508	−7184.245
AIC	8681.58	12483.66
BIC	8764.18	12570.71

Note: This table reports regressions of bank stability (Z-score) on ESG performance and its interaction with formal institutions constructed through three years moving average and PCA.

Table 12
Excluding U.S. banks from the sample.

Variables	(1) Z-score	(2) Z-score	(3) Z-score	(4) Z-score	(5) Z-score	(6) Z-score
ESG	0.204***	−0.415*	0.807*	0.997**	2.261***	0.180***
	(0.0247)	(0.251)	(0.446)	(0.428)	(0.391)	(0.0256)
IDV		−0.0247***				
		(0.00611)				
ESG*IDV		0.513**				
		(0.205)				
UAI			0.00251			
			(0.00745)			
ESG*UAI			−0.227***			
			(0.073)			
PDI				0.0199**		
				(0.00788)		
ESG*PDI				−0.723**		
				(0.356)		
LTO					0.0487***	
					(0.00718)	
ESG*LTO					−1.715***	
					(0.315)	
FOR_INS						0.00333
						(0.0662)
ESG*FOR_INS						0.00311***
						(0.00111)
Intercept	2.451***	2.939***	4.689***	3.439***	6.181***	2.316***
	(0.241)	(0.578)	(0.855)	(0.744)	(0.708)	(0.249)
Random Intercept	0.5421	0.6335	0.6494	0.3246	0.5286	0.5414
Residual Variance	1.4833	1.2277	1.2242	1.0799	1.2273	1.4782
Log-likelihood	−6233.80	−4321.62	−4347.36	−3484.22	−4326.79	−6227.82
AIC	12491.62	8671.24	8722.73	6996.44	8681.58	12483.66
BIC	12566.23	8753.76	8805.33	7076.67	8764.18	12570.71

Note: This table presents the results of the baseline model re-estimated after excluding all U.S. banks from the sample. ***, **, * denote that the coefficient is significant at the 1 %, 5 %, and 10 % levels, respectively, corresponding to 99 %, 95 %, and 90 % confidence intervals.

context and risk governance in shaping these dynamics.

4.6. Sub-sample analysis

The Paris Agreement, signed in December 2015, marked a milestone, with nations responsible for 97 % of global greenhouse gas emissions agreeing to take action to limit global warming to below 2°C above pre-industrial levels (Naseer et al., 2024) As the first

Table 13
Placebo test and firm-specific time trends.

	(1) Panel A: Placebo (DV = ESG_{t + 1})	(2) Panel B: Firm Trends (DV = ZScore)
L.ZScore	−0.008 (0.006)	
ESG		0.052 (0.044)
Controls	Yes	Yes
Fixed effect	Yes	Yes
Year effect	Yes	Yes
Observations	4000	4304
R^2	0.15	0.22

Note: Panel A tests whether lagged stability (ZScore) predicts future ESG performance (placebo). Panel B includes firm-specific linear time trends to absorb unobserved dynamics. All models control for firm and year fixed effects, with standard errors clustered at the firm level.

Table 14
ESG, culture and institutions on bank stability.

Variables	(1) Z-score	(2) Z-score	(3) Z-score	(4) Z-score
ESG	0.101***	0.495**	0.540*	2.454***
	(0.132)	(0.234)	(0.278)	(0.246)
IDV	−0.0339***			
	(0.00257)			
ESG*IDV	0.830***			
	(0.0961)			
UAI		0.00756**		
		(0.00380)		
ESG*UAI		−0.602***		
		(0.188)		
PDI			0.0212***	
			(0.00503)	
ESG*PDI			−0.609***	
			(0.221)	
LTO				0.0550***
				(0.00419)
ESG*LTO				−2.054***
				(0.186)
FOR_INS	0.228***	−0.0546	0.0830	−0.0374
	(0.0772)	(0.0751)	(0.0781)	(0.0725)
ESG*FOR_INS	0.00214	0.00273*	0.00262*	0.00139
	(0.00141)	(0.00145)	(0.00144)	(0.00140)
Controls	Yes	Yes	Yes	Yes
Intercept	3.532***	5.772***	4.946***	7.718***
	(0.385)	(0.499)	(0.499)	(0.446)

Note: Mixed-effects regressions with Z-score as the dependent variable. Models include interactions of ESG with cultural dimensions (IDV, UAI, PDI, LTO) and formal institutional quality (FOR_INS). Controls for bank-specific and macroeconomic variables are included. Robust standard errors in parentheses. Significance: $p < 0.10$, $p < 0.05$, $p < 0.01$.

comprehensive climate deal, this agreement explicitly recognizes the need to align financial flows with pathways toward low greenhouse gas emissions and climate-resilient development, promoting a reorientation of capital allocation (Article 2.1(c))

Following the Paris Agreement, banks have increasingly recognized climate risks (Reghezza et al., 2022). A survey by Krueger et al. (2020) found that 50 % of financial institutions report climate risks materializing, up from only 10 % expecting them to emerge in a decade. Banks have started charging higher lending rates to firms with poor CSR, environmental practices, or unclear carbon emissions while offering lower rates to greener firms (Ehlers et al., 2022). Additionally, they now raise credit costs for fossil fuel-dependent firms, reflecting increased awareness of transition risks (Delis et al., 2018).

To capture the Paris agreement effect, we segmented the sample into pre- and post- Paris agreement periods. In Table 16, Post- Paris agreement results reveal a positive association between ESG performance and bank stability, indicating greater responsiveness to climate-related risks. In contrast, pre-Paris agreement findings reveal weaker negative associations, highlighting the PA's role in fostering ESG integration within banking practices (Reghezza et al., 2022).

Regarding interaction effects, cultural dimensions, and formal institutions exhibit distinct effects on this relationship. In the post-Paris agreement period, IDV significantly enhances the stability benefits of ESG, while LTO diminishes them. UAI and PDI show insignificant relevance. Similarly, formal institutions reinforce the positive ESG-stability connection. Contrastingly, Pre- Paris agreement, these dynamics are less evident like IDV's role is insignificant, UAI reduces the stability impact of ESG, and PDI like post Paris agreement remains irrelevant. LTO continues to weaken the relationship but to a lesser extent, while formal institutions lack significance.

Overall, sub-sample analysis reveals that the Paris Agreement strengthened the ESG-bank stability relationship, with post- Paris

Table 15
ESG and bank stability result in liquidity creation and funding costs as channels.

	Liquidity creation		Funding cost	
Variables	(1) Bank Liquidity	(2) Z-score	(1) Funding cost	(2) Z-score
ESG	0.114***	0.0958***	−0.00404**	0.0882**
	(0.0210)	(0.0363)	(0.00118)	(0.0393)
Bank Liquidity		- 0.0868***		
		(0.0317)		
Funding cost				−5.525***
				(1.934)
Baseline Controls	Yes		Yes	
Variance of Liquidity creation (residual)	0.897***			
	(0.0509)			
Variance of Funding cost (residual)			0.00156***	
			(0.000443)	
Variance of Z-score (residual)		1.174***		1.912***
		(0.0547)		(0.119)
Intercept	−2.944***	2.789***	−0.0146	3.170***
	(0.179)	(0.279)	(0.0109)	(0.441)

Note: This table presents the structural equation modelling (SEM) results in which liquidity creation and banks funding cost have been used as a channel in ESG and bank stability relationship. ***, **, * denote that the coefficient is significant at the 1 %, 5 % and 10 % levels, respectively, corresponding to 99 %, 95 % and 90 % confidence intervals.

agreement periods showing greater responsiveness to climate risks. These findings highlight the evolving influence of cultural and institutional factors across different time periods.

We further divided our sample into banks operating in developed and developing countries to test the effects based on the level of development. A split-sample analysis (Table 17) shows that in developing countries IDV strengthens the ESG–stability link, while in developed countries it weakens it.

To formally validate this divergence, we estimated a three-way interaction model (ESG × IDV × Developed). Results reported in Table 18 confirm a negative and significant coefficient ($\beta = -0.006$, $p < 0.05$), demonstrating that the moderating role of IDV differs fundamentally between developed and developing economies.

The economic significance is illustrated in Fig. 4. In high-IDV developing countries (90th percentile), a one-unit ESG improvement raises the Z-score by 0.41, compared with only 0.16 in developed countries over 2.5 times larger. This difference highlights substantial managerial relevance like ESG investments yield markedly higher stability payoffs in entrepreneurial, developing contexts.

These findings reflect underlying institutional and cultural contrasts. In developed economies, high individualism aligns with shareholder primacy (Aracil et al., 2021), where ESG is often regarded as a cost to short-term returns (Salim et al., 2023). By contrast, in developing economies individualism often manifests in entrepreneurial openness (Mihet, 2013), enabling banks to leverage ESG adoption for access to international sustainable finance, diaspora investment, and multilateral funding. This "ESG arbitrage" helps offset institutional voids and enhances resilience.

Finally, LTO consistently weakens the relationship across both contexts, while UAI and PDI show no significant effects. Formal institutions exert a positive moderating effect, somewhat stronger in developed markets due to more mature governance frameworks (Saif-Alyousfi et al., 2023).

5. Conclusion and policy implications

This study provides robust evidence that the stability-enhancing effects of ESG performance in banking are fundamentally shaped by institutional and cultural contexts. Using a global dataset of 660 banks across 58 countries, we show that while ESG activities generally support financial stability, their effectiveness is contingent on national culture and formal institutional quality. ESG initiatives are more effective in individualistic societies and in countries with strong governance frameworks, whereas their impact weakens or may even reverse under conditions of high uncertainty avoidance, power distance, or long-term orientation. Bank liquidity and funding costs emerge as key transmission mechanisms through which ESG influences stability, but their efficacy depends on the broader institutional environment. Our findings also reveal a structural shift following the 2015 Paris Agreement, suggesting that global policy interventions can reshape the ESG–stability relationship by altering institutional incentives. Our integrated framework, which examines the dual roles of culture and formal institutions, provides a more complete explanation than studies focusing on either factor in isolation, thereby reconciling and extending earlier findings on cultural influence and reputational channels.

The results carry important implications for regulators, policymakers, and bank executives. Efforts to promote ESG in banking should be sensitive to national differences in institutional capacity and cultural norms. A one-size-fits-all regulatory approach is unlikely to be effective. In countries with weaker formal institutions or cultural traits resistant to change, stronger regulatory oversight and enforcement may be required to ensure ESG commitments translate into genuine improvements in stability. Conversely, in contexts with robust governance and individualistic cultural traits, market-driven incentives and voluntary frameworks may be sufficient to encourage meaningful ESG adoption.

Table 16
ESG and bank stability: the role of culture and formal institutions -pre- and post-Paris agreement.

	Post-Paris Agreement						Pre- Paris Agreement					
Variables	**(1) Z-score**	**(2) Z-score**	**(3) Z-score**	**(4) Z-score**	**(5) Z-score**	**(6) Z-score**	**(1) Z-score**	**(2) Z-score**	**(3) Z-score**	**(4) Z-score**	**(5) Z-score**	**(6) Z-score**
ESG	0.306***	−1.44***	0.429	0.0836	2.383***	−0.361	−0.0768*	−0.775*	1.003**(0.458)	0.333	1.872***	−0.77***
	(0.0571)	(0.523)	(0.815)	(0.915)	(0.819)	(0.311)	(0.0427)	(0.442)		(0.550)	(0.474)	(0.183)
IDV		−0.03***						−0.020**				
		(0.009)						(0.008)				
ESG*IDV		0.195***						0.541				
		(0.081)						(0.352)				
UAI			0.00439						0.014*			
			(0.0138)						(0.008)			
ESG*UAI			−0.357						−0.961**			
			(0.627)						(0.385)			
PDI				6.45e−05						0.012		
				(0.0167)						(0.009)		
ESG*PDI				−0.0765						−0.389		
				(0.702)						(0.454)		
LTO					0.045***						0.050***	
					(0.014)						(0.009)	
ESG*LTO					−1.893***						−1.610***	
					(0.655)						(0.368)	
FOR_INS						−0.412***						−0.201***
						(0.110)						(0.059)
ESG* FOR_INS						0.00937***						0.00165
						(0.00306)						(0.00125)
	(0.017)	(0.028)	(0.026)	(0.026)	(0.028)	(0.028)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Intercept	1.933***	1.389	3.723***	3.090**	6.437***	3.446***	3.976***	4.024***	6.397***	4.833***	4.833***	3.330***
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Random Intercept	0.712	0.692	0.901	0.904	0.796	0.810	0.723	0.668	0.124	0.705	0.552	0.608
Residual Variance	1.651	1.137	1.111	1.111	1.120	1.098	0.979	1.001	0.085	0.998	0.997	0.999
Log-likelihood	−3071.48	−1226.11	−1233.47	−1233.78	−1228.97	−1223.651	−3563.08	−3290.50	−3315.14	−3317.94	−3284.34	−3298.90
AIC	6166.978	2480.234	2495.958	2495.560	2485.946	2477.302	7150.171	6609.017	6658.299	6663.893	6596.698	6627.818
BIC	6232.539	2545.101	2559.824	2560.426	2550.812	2546.802	7219.148	6688.285	6737.665	6743.259	6676.064	6712.853

Note: This table presents the multilevel regression results of ESG and bank stability relationship with the role of national culture and formal institutions. In this exercise sample is divided into pre and post Paris agreement. ***, **, * denote that the coefficient is significant at the 1 %, 5 % and 10 % levels, respectively, corresponding to 99 %, 95 % and 90 % confidence intervals.

Table 17
ESG and bank stability: the role of culture and formal institutions -banks in developed and developing countries.

	Banks in developed countries						Banks in developing countries					
Variables	(1) Z-score	(2) Z-score	(3) Z-score	(4) Z-score	(5) Z-score	(6) Z-score	(1) Z-score	(2) Z-score	(3) Z-score	(4) Z-score	(5) Z-score	(6) Z-score
ESG	0.220***	0.532**	0.944	0.312	.260***	0.119**	0.197***	−.922***	0.521	0.159	.786***	0.173***
	(0.0414)	(0.123)	(0.878)	(0.638)	(0.906)	(0.0588)	(0.0272)	(0.368)	(0.492)	(0.748)	(0.403)	(0.0273)
IDV		0.0255**						−0.0882***				
		(0.0112)						(0.0132)				
ESG*IDV		−1.176**						1.834***				
		(0.592)						(0.301)				
ESG*UAI			−0.677						−0.214			
			(0.716)						(0.418)			
PDI				−0.00491						0.00489		
				(0.0135)						(0.0130)		
ESG*PDI				−0.156						0.0965		
				(0.522)						(0.633)		
LTO					0.0510***						0.0431***	
					(0.0159)						(0.00758)	
ESG*LTO					−.518***						−.287***	
					(0.220)						(0.131)	
FOR_INS						−0.0322						−0.316***
						(0.177)						(0.0619)
ESG*FOR_INS						0.00672***						0.00464***
						(0.00190)						(0.00118)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	2.626***	4.602***	4.207***	3.072***	7.739***	2.772***	2.949***	1.271*	4.822***	3.145**	5.995***	2.594***
	(0.355)	(1.598)	(1.610)	(1.058)	(1.545)	(0.469)	(0.294)	(0.699)	(0.950)	(1.377)	(0.739)	(0.295)
Random Intercept	0.543	0.512	0.516	0.512	0.487	0.534	0.465	0.468	0.572	0.588	0.433	0.430
Residual Variance	1.580	1.388	1.389	1.391	1.387	1.575	1.295	0.948	0.945	0.946	0.944	1.282
Log-likelihood	−3144.72	−2304.52	−2305.38	−2305.62	−2301.05	−3140.82	−3981.17	−2463.92	−2500.75	−2504.12	−2479.27	−3962.83
AIC	6313.45	4637.05	4638.77	4639.24	4630.11	6309.64	7986.35	4955.84	5029.51	5036.24	4986.55	7953.67
BIC	6379.63	4710.34	4712.06	4712.54	4703.41	6386.86	8056.08	5031.65	5105.46	5112.18	5062.50	8035.02

Note: This table presents the multilevel regression results of ESG and bank stability relationship with the role of national culture and formal institutions. In this exercise sample is divided into banks operating in developed vs developing countries. ***, **, * denote that the coefficient is significant at the 1 %, 5 % and 10 % levels, respectively, corresponding to 99 %, 95 % and 90 % confidence intervals.

Table 18
ESG × individualism × developed country interaction and bank stability.

Variables	Coefficient	Std. Error	z	p-value
ESG	0.115	0.060	1.91	0.056
IDV	−0.020**	0.008	−2.61	0.009
ESG × IDV	0.003	0.002	1.67	0.095
Developed dummy	−1.606***	0.601	−2.67	0.008
ESG × Developed	0.340**	0.150	2.27	0.023
IDV × Developed	0.029***	0.010	2.88	0.004
ESG × IDV × Developed	−0.006**	0.003	−2.48	0.013
SIZE	−0.022	0.019	−1.16	0.244
EQ_AS	0.731*	0.400	1.83	0.068
LO_AS	−0.141**	0.064	−2.22	0.026
CA_AS	−1.759***	0.452	−3.89	0.000
ROE	0.004***	0.001	4.06	0.000
HHI	−0.333***	0.070	−4.76	0.000
EC_GR	0.015**	0.006	2.41	0.016
INF	−0.032***	0.004	−7.50	0.000
Intercept	3.524***	0.369	9.56	0.000
Random effects: var(cons) = 0.514; var(resid) = 1.447				
Model fit: Log likelihood = −7181.99; Wald $\chi^2(15) = 238.70$; Prob > $\chi^2 = 0.000$				

Note: Mixed-effects regression of bank stability (Z-score) on ESG, individualism (IDV), and development status. Robust standard errors in parentheses. ***, **, * indicate significance at the 1 %, 5 %, and 10 % levels.

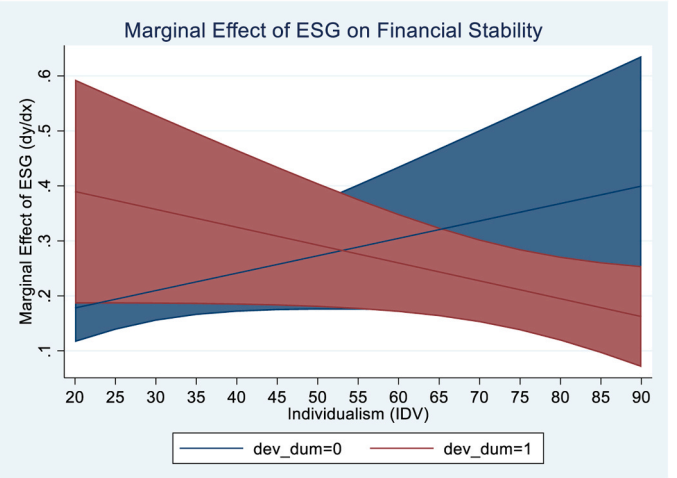

Fig. 4. Marginal effect of ESG on bank Stability by individualism and development. Note: This figure plots the average marginal effect of ESG scores on bank stability (Z-score) across the range of individualism (IDV), separately for developed and developing countries. Shaded areas represent 95 % confidence intervals. In developing countries, the ESG effect strengthens with higher individualism, while in developed countries it weakens.

Strengthening formal institutions should be viewed as a precondition for successful ESG integration. Enhancements in rule of law, regulatory quality, and government effectiveness not only create an enabling environment for ESG but also amplify its stabilizing effects. Additionally, international coordination such as that achieved through the Paris Agreement can serve as a powerful catalyst for aligning local practices with global sustainability goals. However, these efforts must remain flexible enough to accommodate institutional diversity and cultural specificity.

For bank executives, the findings underscore the importance of aligning ESG strategies with local institutional realities. Transparent ESG reporting, internal governance reforms, and close monitoring of liquidity and funding metrics are essential for realizing the stability benefits of sustainability initiatives. By adopting a context-sensitive approach, banks can better navigate the complex interplay between ESG performance and financial resilience in an evolving regulatory landscape.

Overall, this our discourse demonstrates that the ESG–stability relationship is highly context-dependent. By integrating cultural and institutional contingencies with financial mechanisms, we advance both theory and practice. The results provide a strategic blueprint for designing adaptive, locally grounded ESG policies that enhance financial resilience in a post-Paris financial system.

CRediT authorship contribution statement

Mirza Muhammad Naseer: Writing – review & editing, Resources, Investigation, Formal analysis. **Josanco Floreani:** Writing –

review & editing, Supervision, Resources, Investigation, Conceptualization. **Idrees Liaqat:** Writing – original draft, Methodology, Formal analysis, Conceptualization.

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.

Appendix A

Table A1
Sample distribution by country

Country	No. Banks	%contribution	Country	No. of Banks	% contribution
Argentina	6	0.91	Mexico	5	0.76
Australia	7	1.06	Morocco	5	0.76
Austria	3	0.45	Netherlands	2	0.30
Belgium	1	0.15	New Zealand	1	0.15
Brazil	8	1.21	Nigeria	3	0.45
Canada	9	1.36	Norway	7	1.06
Chile	5	0.76	Pakistan	6	0.91
China	40	6.06	Peru	5	0.76
Colombia	5	0.76	Philippines	6	0.91
Czech Republic	2	0.30	Poland	9	1.36
Denmark	6	0.91	Portugal	1	0.15
Egypt	4	0.61	Puerto Roco	3	0.45
Finland	3	0.45	Qatar	8	1.21
France	3	0.45	Romania	2	0.30
Germany	4	0.61	Russia	4	0.61
Greece	5	0.76	Saudi Arabia	10	1.52
Hong Kong	5	0.76	Singapore	3	0.45
Hungary	1	0.15	Slovenia	1	0.15
Iceland	2	0.30	South Africa	5	0.76
India	14	2.12	Spain	6	0.91
Indonesia	9	1.36	Sweden	5	0.76
Ireland	3	0.45	Switzerland	10	1.52
Israel	4	0.61	Taiwan	12	1.82
Italy	13	1.97	Thailand	9	1.36
Japan	24	3.64	Turkey	10	1.52
Jordan	5	0.76	United Arab Emirates	14	2.12
Korea Republic	9	1.36	United Kingdom	13	1.97
Kuwait	7	1.06	United States	278	42.12
Malysia	9	1.36	Vietnam	1	0.15

Table A2
Variables definitions and data sources

Variable	Definition	Source
Z-score	Sum of equity to total assets (ETA) and return on average assets (ROAA), divided by the standard deviation of ROAA.	Refinitiv ASSET4 (Authors' calculation)
Non-performing loan (NPL)	Non-performing loans / Total loans	Refinitiv ASSET4 (Authors' calculation)
ESG Performance (ESG)	Composite score based on several ESG parameters	Refinitiv ASSET4
Environmental Performance (E)	Score based on several environmental parameters	Refinitiv ASSET4
Social Performance (S)	Score based on several social parameters	Refinitiv ASSET4
Governance Performance (G)	Score based on several governance parameters	Refinitiv ASSET4
Individualism (IDV)	Individualism vs Collectivism	Hofstede (2001)
Uncertainty Avoidance (UAI)	Uncertainty Avoidance Index	Hofstede (2001)
Power Distance (PDI)	Power Distance Index	Hofstede (2001)
Long Term Orientation (LTO)	Long-term orientation vs short term	Hofstede (2010)

(*continued on next page*)

Table A2 (*continued*)

Variable	Definition	Source
Formal Institutions (FOR_INS)	An index of six governance indicators (Regulatory Quality, Political Stability, Government Effectiveness, Rule of Law, Control of Corruption, Voice and Accountability)	World Governance Indicators (WGI) https://www.worldbank.org/en/publication/worldwide-governance-indicators
Bank Size (SIZE)	Natural logarithms of total assets	Refinitiv ASSET4 (Authors' calculation)
Cash to Assets (CA_AS)	Cash to total assets	Refinitiv ASSET4 (Authors' calculation)
Equity to Assets (EQ_AS)	Equity to total assets	Refinitiv ASSET4 (Authors' calculation)
Loan Share (LO_AS)	Loans to total assets	Refinitiv ASSET4 (Authors' calculation)
Return on Equity (ROE)	Net income to equity	Refinitiv ASSET4 (Authors' calculation)
HHI	Calculated using loan market shares to measure market concentration	Refinitiv ASSET4 (Authors' calculation)
Inflation (INF)	Proxy for monetary instability	World development Indicators (WDI)
Economic Growth (EC_GR)	Percentage change in GDP	WDI

Table A3
Comparison of banks with and without ESG Scores

Variable	Banks with ESG (mean, SD)	Banks without ESG (mean, SD)
SIZE	10.808 (3.237)	10.810 (3.240)
ROE	11.279 (19.589)	11.200 (19.600)
CA_AS	0.034 (0.060)	0.033 (0.059)
EQ_AS	0.083 (0.066)	0.082 (0.065)
LO_AS	−0.357 (0.415)	−0.356 (0.414)
FOR_INS	0.673 (0.519)	0.670 (0.518)

Note: Values are means with standard deviations in parentheses. Results indicate that banks with missing ESG scores do not differ systematically from banks with ESG scores in terms of size, profitability, capital structure, loan share, or institutional context.

Table A4
ESG and bank stability: the role of culture and institutions (without including equity share as a controlling factor

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	**Z-score**	**Z-score**	**Z-score**	**Z-score**	**Z-score**	**Z-score**
ESG	0.195***	−1.211***	0.654***	0.823***	2.285***	0.171***
	(0.0227)	(0.125)	(0.228)	(0.259)	(0.377)	(0.0243)
IDV		−0.0286***				
		(0.00252)				
ESG*IDV		0.910***				
		(0.0967)				
UAI			0.00824**			
			(0.00376)			
ESG*UAI			−0.675***			
			(0.185)			
PDI				0.0191***		
				(0.00456)		
ESG*PDI				−0.719***		
				(0.213)		
LTO					0.0487***	
					(0.00691)	
ESG*LTO					−1.731***	
					(0.303)	
FOR_INS						−0.0235
						(0.0605)
ESG* FOR_INS						0.00261**
						(0.00103)
SIZE	−0.00482	−0.0478***	−0.0192**	−0.231***	−0.0917***	−0.00279
	(0.0140)	(0.0101)	(0.00873)	(0.0151)	(0.0172)	(0.0145)
LO_AS	−0.145**	−0.320***	−0.349***	−0.116**	−0.0924	−0.133**
	(0.0634)	(0.0613)	(0.0620)	(0.0564)	(0.0763)	(0.0636)
CA_AS	−1.857***	−2.724***	−2.602***	−0.931**	−1.736***	−1.896***
	(0.450)	(0.415)	(0.424)	(0.404)	(0.521)	(0.451)
ROE	0.00471***	0.00560***	0.00503***	0.00436***	0.00466***	0.00467***

(*continued on next page*)

Table A4 (*continued*)

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	**Z-score**	**Z-score**	**Z-score**	**Z-score**	**Z-score**	**Z-score**
	(0.00111)	(0.00148)	(0.00150)	(0.00149)	(0.00138)	(0.00111)
HHI	−0.355***	−0.387***	−0.297***	−0.444***	−0.208***	−0.398***
	(0.0668)	(0.0469)	(0.0498)	(0.0459)	(0.0703)	(0.0687)
EC_GR	0.0175***	0.0217***	0.0144**	0.0239***	0.0247***	0.0170***
	(0.00600)	(0.00707)	(0.00733)	(0.00686)	(0.00632)	(0.00601)
INF	−0.0311***	−0.0377***	−0.0352***	−0.0328***	−0.0308***	−0.0298***
	(0.00431)	(0.00413)	(0.00414)	(0.00365)	(0.00425)	(0.00439)
Intercept	2.680***	3.139***	5.826***	4.034***	6.474***	2.629***
	(0.197)	(0.331)	(0.430)	(0.459)	(0.644)	(0.213)

Note: This table presents the multilevel regression results of ESG and bank stability relationship with the role of national culture and formal institutions by excluding equity share from controlling variables list.

Data availability

Data will be made available on request.

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