

ESG INTEGRATION, GREEN BANKING AND BANK STABILITY: A PANEL DATA ANALYSIS OF INDIAN COMMERCIAL BANK

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ABSTRACT

This study examines the role of **green banking practices and ESG (Environmental, Social and Governance) performance in improving the financial stability of Indian commercial banks**. It uses secondary data collected from annual reports, BRSRs, sustainability reports, RBI publications, ESG disclosures and financial statements. Bank stability is measured through indicators such as **Z-score, GNPA, NNPA, CRAR, ROA and ROE**. Panel-data regression is used to analyse the relationship between ESG performance and bank stability. Strong ESG practices can improve risk management, operational efficiency and stakeholder confidence. Green banking can also help banks support environmentally sustainable and socially responsible economic activities. The study is aligned with **SDGs 7, 8, 12, 13 and 16**. It also considers the improved financial position of Indian commercial banks in recent years. Overall, the study seeks to determine whether stronger ESG integration contributes to **greater financial stability, resilience and sustainable growth of Indian banks**.

Keywords: Green Banking, ESG Performance, Bank Stability, Sustainable Finance, Indian Commercial Banks, SDGs, Climate Finance, and Financial Resilience

1. INTRODUCTION

The global financial system is increasingly being reshaped by environmental, social and governance considerations. Banks occupy a distinctive position in this transition because they do not merely undertake their own operational activities; they allocate capital to businesses, households and projects whose activities influence environmental sustainability, social development and economic growth. Consequently, the sustainability orientation of banks can

Green banking represents the integration of environmental considerations into banking operations, lending, and investment and risk-management decisions. It includes paperless banking, electronic payments, digital banking, green deposits, green loans, renewable-energy financing, environmentally responsible credit allocation and climate-risk assessment. The concept has consequently evolved from reducing the environmental footprint of bank branches towards integrating sustainability into the core financial intermediation process.

India has progressively strengthened its sustainable-finance architecture. The Reserve Bank of India (RBI) introduced the **Framework for Acceptance of Green Deposits** in April 2023 to encourage regulated entities to mobilise funds for green activities and projects, while also addressing greenwashing and protecting depositors' interests. The RBI has also identified climate-related financial risks as an issue relevant to financial stability and has undertaken work relating to climate-risk disclosures, scenario analysis and stress testing.

The regulatory environment for ESG disclosure has simultaneously developed through the Securities and Exchange Board of India (SEBI). The BRSR framework and BRSR Core have increased the availability and comparability of sustainability-related information among listed entities. SEBI introduced a phased assurance requirement for BRSR Core, covering the top 150 listed entities in FY2023–24, top 250 in FY2024–25, top 500 in FY2025–26 and top 1,000 in FY2026–27. This development creates an increasingly useful secondary-data environment for empirical research on ESG and corporate performance.

The relevance of the issue is reinforced by the recent strength of the Indian banking sector. According to the RBI's June 2025 Financial Stability Report, the GNPA ratio of Scheduled Commercial Banks (SCBs) had declined to 2.3% by March 2025 and the NNPA ratio to 0.5%, while the capital position remained strong. The Ministry of Finance subsequently reported that the SCB CRAR remained at 17.2% as of September 2025 and that the recovery rate of NPAs had improved substantially between FY2018 and FY2025.

The broader economic environment also supports the importance of sustainable finance. The World Bank reports that India's GDP reached approximately US\$3.96 trillion in 2025, with annual GDP growth of 7.6%. Internet usage reached 70% of the population, while access to

electricity was approximately 99.5% in the latest available data. India's per-capita CO₂ emissions were 2.2 tonnes in 2024. The World Bank has also recently supported India's solar-rooftop programme, highlighting the scale of investment required for the country's low-carbon transition.

Despite these developments, an important research question remains: **Does stronger ESG performance and green banking orientation contribute to the financial stability of Indian commercial banks?**

Much of the existing discussion surrounding green banking focuses on environmental benefits, customer adoption, operational efficiency or sustainable-development outcomes. Comparatively less attention is given to the possibility that ESG integration itself may contribute to bank stability by improving risk management, reducing exposure to environmentally vulnerable borrowers, strengthening governance and supporting long-term stakeholder confidence.

Therefore, this study investigates the relationship between green banking, ESG performance and bank stability among Indian commercial banks using secondary data.

2. REVIEW OF LITERATURE:

1. Bansal et al. (2021)

Bansal and co-authors studied **green banking practices in the Delhi NCR region**. Their study examined how commercial banks are adopting environmentally friendly banking practices and the difficulties they face in implementing them. They used **interviews along with secondary information**. The study is relevant because it provides evidence about the **actual implementation, benefits and limitations of green banking practices in India**. It helps the present study understand the practical challenges associated with green banking.

2. Rastogi et al. (2024)

Rastogi and co-authors focused on the relationship between **Environmental, Social and Governance (ESG) practices and financial distress**. They used **12 years of panel data**, which allowed them to examine the relationship over a longer period. Their study found that ESG-related factors are connected with the **financial risk and stability of firms**. This is

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relevant to the present study because it establishes that sustainability and ESG practices are not only environmental concerns but can also have an important **financial and risk-management dimension**.

3. Thapliyal et al. (2025)

Thapliyal and co-authors examined the relationship between **green banking and environmental performance** in the Indian banking sector. The study used data related to **Indian banks** to assess whether green banking practices contribute to better environmental outcomes. The findings support the view that green banking can help banks improve their **environmental performance and sustainability practices**. This study is particularly relevant because it provides a direct link between **green banking practices and environmental sustainability**, which forms an important foundation for the present research.

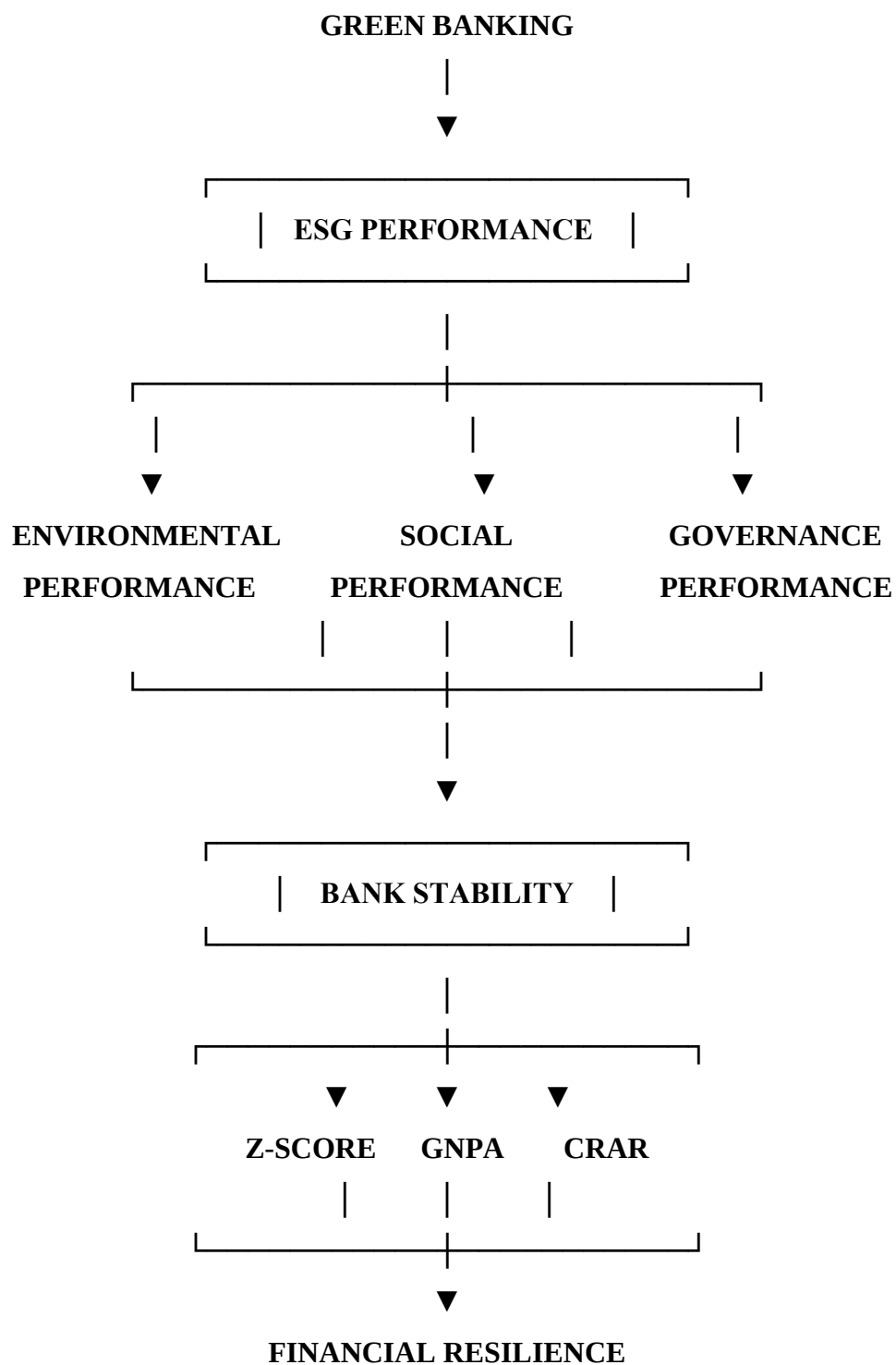
4. Prasad & Mondal (2025)

Prasad and Mondal investigated the relationship between **ESG practices and financial performance** among **28 Indian banks during 2021–2023**. By using banking-sector data, they examined whether stronger ESG performance is associated with better financial outcomes. Their study establishes that ESG practices can influence **bank performance and financial sustainability**. This is relevant to the present study because it demonstrates that sustainability-oriented practices can have implications beyond environmental benefits and may contribute to the **overall performance of banks**.

5. Thapliyal & Gupta (2026)

Thapliyal and Gupta examined the relationship between **green banking practices and bank performance** using evidence from **Indian banks**. As a recent study, it provides contemporary evidence on whether the adoption of green banking practices can contribute to improved banking performance. The study is highly relevant to the present research because it connects **green banking with measurable organisational and financial outcomes**. It also helps identify the need for further research into how green banking, ESG practices and sustainable development are interconnected.

3. CONCEPTUAL MODEL



4. RESEARCH METHODOLOGY

4.1 Research Design

The study adopts a **descriptive and analytical research design** based exclusively on secondary data. A longitudinal panel-data approach is proposed because it permits examination of differences across banks and changes over time.

4.2 Population and Sample

The population comprises Indian commercial banks listed on Indian stock exchanges for which consistent ESG and financial information is available.

A practical sample may include approximately **10–15 major listed commercial banks**, subject to data availability.

Potential banks include:

- State Bank of India;
- Bank of Baroda;
- Punjab National Bank;
- Canara Bank;
- Union Bank of India;
- Indian Bank;
- HDFC Bank;
- ICICI Bank;
- Axis Bank;
- Kotak Mahindra Bank;
- IndusInd Bank; and
- Federal Bank.

4.3 Study Period

A suitable period is: **FY 2019–20 to FY 2024–25**

4.4 VARIABLES:

SECTION	VARIABLE	MEASUREMENT / INDICATORS	FORMULA
Dependent Variable	Bank Stability	Bank stability is measured using Bank Z-score, GNPA Ratio, NNPA Ratio and CRAR.	Bank Stability can be represented by individual indicators or a composite index.
1	Bank Z-score	Measures the distance of a bank from insolvency risk. A higher Z-score indicates greater stability.	$Z\text{-score} = (\text{ROA} + \text{CAR}) / (\text{ROA})$
2	GNPA Ratio	Measures the proportion of gross non-performing assets relative to gross advances. A lower ratio indicates better asset quality.	$\text{GNPA Ratio} = (\text{Gross NPA} / \text{Gross Advances}) \times 100$
3	NNPA Ratio	Measures net non-performing assets after accounting for provisions. A lower ratio indicates lower credit risk.	$\text{NNPA Ratio} = (\text{Net NPA} / \text{Net Advances}) \times 100$
4	CRAR	Measures the capital adequacy and resilience of the bank. A higher CRAR indicates stronger capitalisation.	$\text{CRAR} = (\text{Eligible Regulatory Capital} / \text{Risk-Weighted Assets}) \times 100$
Independent Variable	ESG Performance	ESG performance can be measured using an ESG score obtained from a recognised database. Where commercial ESG scores are unavailable, an ESG Disclosure Index can be constructed using annual reports and BRSR disclosures.	ESG Index = (Total ESG items disclosed / Total ESG items applicable) $\times$ 100
Environmental (E)	Environmental Performance	Energy consumption; Renewable energy; Carbon emissions; Environmental policy; Green financing; Green deposits; Climate-risk management.	$\text{E-Score} = (\text{Environmental items disclosed} / \text{Total Environmental items}) \times 100$
Social (S)	Social Performance	Employee welfare; Gender diversity; Financial inclusion; Customer protection; Community development; Financial literacy; Human-rights policies.	$\text{S-Score} = (\text{Social items disclosed} / \text{Total Social items}) \times 100$
Governance (G)	Governance Performance	Board independence; Board diversity; Audit committee; Risk-management committee; Ethics and anti-corruption; Whistle-blower mechanism; Transparency and disclosure.	$\text{G-Score} = (\text{Governance items disclosed} / \text{Total Governance items}) \times 100$
Overall ESG Disclosure Index	ESG Performance	Combines Environmental, Social and Governance dimensions.	ESG Index = (E-Score + S-Score + G-Score) / 3

5. OBJECTIVES OF THE STUDY

- To examine the relationship between ESG performances, green banking practices and the financial stability of Indian commercial banks.
- To assess whether environmental, social and governance dimensions significantly influence bank stability after controlling for bank-specific and macroeconomic factors.

6. DISCUSSION AND FINDINGS

6.1 Banking-sector resilience

The available secondary evidence indicates a substantial improvement in the resilience of Indian commercial banks. The decline in GNPA and NNPA ratios, combined with stronger capital adequacy and profitability, indicates significant improvement in asset quality and financial strength.

The findings suggest that bank stability should not be assessed exclusively through profitability. Capital adequacy, asset quality and risk exposure are equally important. This supports the use of a multidimensional stability measure in the proposed empirical model.

6.2 Growing importance of green banking

The RBI's green-deposit framework represents an important shift from voluntary sustainability initiatives towards a more structured sustainable-finance ecosystem. The framework requires regulated entities that accept green deposits to follow specified requirements concerning eligible activities, external review, reporting and disclosure.

Green banking may therefore contribute to stability by encouraging banks to evaluate the environmental and transition risks associated with financed activities.

6.3 ESG and risk management

The governance component of ESG is particularly relevant to bank stability. Effective board oversight, risk-management systems, internal controls and transparency can reduce information asymmetry and improve risk identification.

The environmental dimension can also influence stability because climate change can affect borrowers' ability to repay loans. RBI research indicates that physical and transition climate risks can transmit into credit, market and liquidity risks within the banking system.

Consequently, banks with stronger ESG risk-management capabilities may be better positioned to identify and manage emerging risks.

6.4 ESG disclosure and transparency

SEBI's phased BRSR Core assurance framework creates greater standardisation and credibility in ESG reporting. The expansion of mandatory ESG reporting among large listed entities provides researchers with increasingly consistent secondary data.

This development is important because the quality of ESG research depends substantially on the reliability and comparability of ESG information.

6.5 Expected empirical relationship

The proposed empirical analysis is expected to test whether banks with stronger ESG performance exhibit:

- Higher Z-scores;
- Lower GNPA ratios;
- Lower NNPA ratios;
- Stronger CRAR;
- Better ROA; and
- Greater resilience during periods of economic or financial stress.

However, **actual regression coefficients, p-values, R^2 and hypothesis decisions should be reported only after calculating them from the selected bank-level dataset.** They should not be inferred from sector-wide statistics.

7. SUGGESTIONS

Based on the conceptual framework, regulatory developments and secondary evidence, the following suggestions are proposed.

- **Strengthen Climate-Risk Integration:** Integrate physical and transition climate risks into credit appraisal, portfolio management and enterprise risk management.
- **Expand Green Lending:** Increase financing for renewable energy, energy efficiency, sustainable transportation, green buildings, waste management and other eligible green activities.
- **Improve ESG Data Quality:** Adopt standardised ESG measurement and reporting systems to improve data reliability, transparency and comparability.
- **Strengthen Governance:** Enhance board-level oversight of sustainability, ESG performance and climate-related risks.
- **Set Bank-Specific Green-Finance Targets:** Establish measurable targets for green loans, green deposits, renewable-energy financing and reduction of financed emissions.
- **Integrate ESG into Credit Decisions:** Include environmental and social risks as an important part of borrower assessment and lending decisions.
- **Encourage Independent ESG Assurance:** Use independent assurance mechanisms to improve ESG reporting credibility and reduce the risk of greenwashing.
- **Strengthen Regulatory Data Infrastructure:** RBI and other regulators should promote standardised bank-level ESG and climate-risk datasets to support better assessment of sustainability and financial stability.

8. CONCLUSION

The Indian banking sector is undergoing a transition in which financial stability and sustainability are becoming increasingly interconnected. Recent evidence shows that Indian Scheduled Commercial Banks have achieved substantial improvements in asset quality, capital adequacy and profitability. At the same time, the financial sector is increasingly exposed to climate-related physical and transition risks.

Green banking provides an important mechanism for linking financial intermediation with sustainable development. The RBI's green-deposit framework and its wider work on climate

The present study proposes that ESG performance and green banking practices can influence bank stability through improved risk management, responsible lending, stronger governance, stakeholder confidence and greater alignment with sustainable economic activities. The conceptual model therefore positions ESG performance and green banking as potential determinants of bank resilience.

The study contributes to the emerging literature by integrating **green banking, ESG performance and bank stability** within a single secondary-data framework. It also aligns the banking-sector perspective with SDGs 7, 8, 12, 13 and 16.

For a publishable empirical paper, the next step is to construct a bank-year panel dataset and estimate the proposed models using actual ESG/BRSR and financial data. The resulting regression coefficients, significance levels, robustness tests and bank-level comparisons would provide the empirical evidence required to validate the proposed relationships.

Overall, sustainable banking should not be viewed merely as an environmental responsibility. It represents a strategic component of long-term financial resilience. As India's economy moves towards a low-carbon and digitally enabled growth trajectory, the ability of banks to incorporate ESG considerations into capital allocation and risk management will become increasingly important for both **financial stability and sustainable development**.

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