

# Does the bank's nature heterogeneity matter? Environmental, social and governance (ESG) performance and corporate profitability

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## Abstract

**Purpose** – This study explores the impact of environmental, social and governance (ESG) performance on corporate profitability in Chinese commercial banks from 2012 to 2022, examining how inherent differences across bank types moderate this relationship.

**Design/methodology/approach** – Using two-way fixed effects, 2SLS (instrumental variables), simultaneity tests and system GMM, the study analyzes the effects of ESG on profitability while addressing endogeneity. To capture heterogeneity, the sample is stratified by ownership (state-owned vs non-state-owned), governance (joint-stock vs non-joint-stock) and location (urban vs rural).

**Findings** – The results show that ESG performance positively impacts profitability in both rural and urban commercial banks, with governance performance negatively affecting urban banks. ESG negatively influences profitability in state-owned banks, whereas non-state-owned banks benefit from positive ESG performance. Environmental performance positively affects profitability in both types of banks, but governance has a negative impact. ESG boosts profitability in joint-stock banks but detracts from it in non-joint-stock banks. Social activities positively affect profitability across both bank types, while environmental activities are insignificant. Governance activities enhance profitability in joint-stock banks but reduce it in non-joint-stock banks.

**Practical implications** – Policymakers should create tiered ESG regulations, incentivizing market-driven banks while subsidizing state-owned banks' compliance costs. Bank managers should tailor ESG investments, focusing on environmental and social initiatives based on location and investors must evaluate ESG scores contextually.

**Originality/value** – This study provides a granular analysis of ESG-profitability linkages across China's heterogeneous banking landscape, highlighting how institutional characteristics such as ownership, governance structure and geographic focus shape the financial implications of ESG.

**Keywords** Corporate profitability, ESG, Bank's nature, State-owned commercial banks,

Joint commercial banks, Urban commercial bank, Rural commercial banks

**Paper type** Research article

## 1. Introduction

The global surge in Environmental, Social, and Governance (ESG) adoption has transformed it from a corporate social responsibility initiative into a critical determinant

**JEL Classification** — G21, G30, G32, M14, Q56, C33

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of financial performance and investment attractiveness (Giannopoulos *et al.*, 2022; Townsend, 2020). With ESG assets projected to reach \$53tn by 2025, the financial sector, particularly banks, faces mounting pressure to integrate sustainability into core operations (Sani *et al.*, 2024; Sebastião *et al.*, 2024). China's regulatory push, exemplified by the "double-carbon" policy and ESG disclosure mandates further highlights this shift (Yuan *et al.*, 2022). Yet, the profitability implications of ESG in banking remain contested, with studies reporting positive (Zhang and Lucey, 2022), negative (Buallay, 2019, 2020), or neutral effects (Assaf *et al.*, 2024; Asteriou *et al.*, 2024; Friede *et al.*, 2015). These inconsistencies stem from a critical gap: Prior research predominantly examines carbon-intensive industries, overlooking the unique dynamics of financial institutions, especially in state-influenced economies like China, where banks operate under heterogeneous ownership and governance structures.

This study addresses this gap by analyzing how ESG performance impacts profitability across 42 Chinese-listed commercial banks (2012–2022), differentiating by state ownership, joint-stock status, and urban-rural divides. Employing two-way fixed effects, 2SLS, and system GMM, we reconcile conflicting theoretical perspectives: stakeholder theory (Freeman and McVea, 2001), which posits that ESG enhances profitability through trust and efficiency, and trade-off theory, which frames ESG as a cost burden (Fu and Zhang, 2025; Handoyo and Anas, 2024; Zumente and Bistrova, 2021). In this study, we provide the first granular evidence on the impact of ESG performance on profitability within China's banking sector, a critical yet less environmentally sensitive industry. Our analysis reveals that ESG effects are not uniform across all banks; rather, they are contingent upon institutional characteristics such as ownership, governance structure, and geographic location. Specifically, state-owned banks experience a reduction in profitability from ESG compliance, while private banks gain profitability through strategic ESG implementation. Governance structure also plays a significant role: joint-stock banks see profitability increases from ESG, whereas non-joint-stock banks experience profitability declines. Geographic differences further emerge, with rural banks benefiting overall, particularly from social initiatives, while urban banks face governance-related profitability challenges. The study also highlights the varying effects of ESG components; environmental factors generally have a positive impact on profitability, except for state-owned banks; social factors are universally beneficial, and governance factors have a mixed impact, being positive in joint-stock banks and negative in others.

This research contributes to the literature in several key ways: First, it provides sectoral novelty by examining ESG-profitability linkages in the banking sector, an area largely underexplored in ESG studies. Second, by accounting for institutional heterogeneity stratifying banks by ownership, governance, and location, we reveal how ESG effects are context-dependent, a nuance often overlooked in previous studies. Third, our findings have policy implications, advocating for tiered ESG regulations that offer subsidies for state-owned banks' compliance costs and market-driven incentives for private banks. Finally, our methodological rigor, incorporating robustness checks and disaggregation of ESG components, addresses endogeneity concerns and uncovers governance as a key challenge for urban banks.

The paper is organized as follows: [Section 2](#) reviews the literature and hypotheses, [Section 3](#) outlines the methodology, [Section 4](#) presents the results, and [Section 5](#) discusses the implications for policymakers and bankers.

## 2. Literature and hypotheses development

To evaluate the relationship between ESG performance and corporate performance, various theories can be used to support such a relationship. These theories provide both positive and negative perspectives on the impact of ESG performance on corporate profitability.

### 2.1 Theories supporting ESG performance and corporate profitability

Stakeholder Theory explains why firms disclose ESG activities (Freeman *et al.*, 2018; Harrison *et al.*, 2015). Freeman (2010) describes stakeholders as any group or individual who can affect or be affected by the attainment of an organization's objectives (Freeman *et al.*, 2010, 2018). Stakeholder theory and ESG studies are compatible since an organization's ESG practices aim to improve management, satisfy various stakeholders, and boost financial performance (Freeman, 1994). The theory asserts that different stakeholders are attracted to specific kinds of information, and firms face challenges in balancing the demands of diverse stakeholder groups. Central to a firm's survival, investors receive significant attention in ESG reporting (Talan *et al.*, 2024). The normative aspect of stakeholder theory supports the view that firms should consider the needs of all stakeholders—investors, employees, shareholders, and the community—within the sustainability framework (Abdi *et al.*, 2022). Thus, meeting the expectations of these stakeholders, in addition to enhancing investors' financial returns, is crucial for a firm's success. Companies that neglect social responsibility to reduce implicit costs may face more explicit costs in the long term, thereby negatively impacting their profitability (Szöcs and Montanari, 2025).

Agency Theory explains the relationship between agents (managers) and principals (shareholders) (Jensen and Meckling, 1976). Agency problems arise from the misalignment of interests between management, which focuses on profit maximization and compensation, and shareholders, who seek risk reduction and value increase (Cen *et al.*, 2025; Khandelwal *et al.*, 2023; Li *et al.*, 2020). Agency costs, including transaction and information costs, are prevalent in the relationship between agents and principals (Oviatt, 1988). Since ESG disclosures often address many of these agency-related issues, they help reduce information asymmetries and lower agency costs. As a result, enhancing ESG performance could lead to a reduction in agency costs and a subsequent increase in corporate profitability.

### 2.2 Theories against ESG performance and corporate profitability

The trade-off Theory submits an antagonistic relationship between corporate profitability (CP) and sustainability. Investing in environmental protection, increasing employee compensation, and supporting community initiatives are social and environmental goals that require significant investment but can reduce profitability and weaken competitive advantage (Wu and Tham, 2023). Hence, firms should only engage in ESG initiatives if these efforts result in surplus profits. (Martiny *et al.*, 2024) Found that compelling firms to undertake ESG activities can lower their profits. According to the trade-off theory, sustainable practices incur higher costs, which can adversely affect profitability (Pham *et al.*, 2021; Zhang and Xie, 2022).

Institutional Theory further refines our understanding by examining how regulatory and cultural factors shape the ESG-profitability relationship. Institutional theory proposes that firms are not merely economic entities but are also shaped by the institutional environment in which they operate. Institutional pressures, whether coercive (e.g. government regulations), normative (e.g. industry standards), or mimetic (e.g. adopting practices based on industry leaders), influence how firms implement ESG initiatives and how these initiatives, in turn, affect profitability (DiMaggio and Powell, 1983). In the context of banks in China, state-owned banks may face significant government-driven pressures to align with national sustainability goals, which could lead to profitability trade-offs. On the other hand, non-state-owned and rural banks, less constrained by government mandates, may leverage ESG initiatives as part of a competitive strategy, resulting in profitability gains. Thus, the impact of ESG on profitability can vary depending on a bank's institutional environment and ownership structure.

### 2.3 ESG performance and corporate profitability

A growing body of research has examined the impact of Environmental, Social, and Governance (ESG) practices on corporate profitability, yielding a spectrum of findings. Many

scholars highlight the strategic benefits of ESG integration across organizational functions, noting improvements in employee motivation, corporate reputation, and retention (Chen *et al.*, 2024a, b; Garrido-Ruso *et al.*, 2024). For instance, studies from the US context propose that firms with higher levels of ESG disclosure tend to exhibit superior market performance, particularly in the upper quantiles of ESG reporting (Veeravel *et al.*, 2024). Zhang and Lucey (2022) further assert that ESG performance significantly enhances firm outcomes, primarily by easing financial constraints, which in turn supports operational efficiency and long-term profitability. Similarly, Albitar *et al.* (2020) provide empirical evidence linking ESG disclosure scores to improved corporate performance, particularly after the adoption of integrated reporting standards.

However, the literature also presents countervailing evidence. Some scholars argue that ESG activities may impose financial burdens that outweigh their potential benefits. For example, Saygili *et al.* (2022) reveals that environmental disclosures can negatively affect a firm's financial outcomes. Buallay (2019, 2021) consistently find that ESG performance is inversely related to key financial indicators such as Return on Assets (ROA), Return on Equity (ROE), and Tobin's Q, especially within the banking and financial services sectors. Furthermore, global evidence from 60 countries indicates that ESG reporting may lead to declines in operational and market performance (AlAjmi *et al.*, 2023). In the healthcare sector, (Kalia and Aggarwal, 2023) and Dossa (2025) found mixed results. Dossa (2025), in particular, shows that while ESG, governance, and social disclosures enhance financial performance, environmental activities are negatively associated with both accounting and market-based performance metrics in Chinese healthcare firms. These contrasting findings emphasize the complexity and context-specific nature of the ESG-performance relationship. To contribute to this ongoing debate and provide new evidence from an emerging market perspective, particularly China's banking sector, we propose the following hypotheses:

- H1a. ESG performance positively influences corporate profitability.
- H1b. ESG performance negatively influences corporate profitability.

#### 2.4 Environmental performance corporate profitability

A growing body of research highlights the significant role of environmental performance in shaping corporate financial outcomes. Several studies advise that effective environmental strategies can enhance firm performance by improving efficiency, reducing operational risks, and fostering a positive corporate reputation (Gull *et al.*, 2022; Veeravel *et al.*, 2024). For example, Gull *et al.* (2022) found that the top-performing firms in terms of environmental initiatives outperformed average firms financially, while Li *et al.* (2024) demonstrated how enterprise-wide adoption of environmental standards can lower production costs and mitigate environmental risks, ultimately increasing profitability. Similarly, Wu and Tham (2023) observed that proactive environmental investments can substantially increase firm value over time. Zhu *et al.* (2024) further argued that transparent environmental disclosures, especially when framed around governance rather than investment costs, are more positively received by investors. This aligns with findings by Cojoianu *et al.* (2021) and Gerged *et al.* (2021) who emphasize that environmental transparency plays a key role in managing reputational risk and enhancing firm valuation.

However, the empirical evidence is not entirely consistent. Other studies report a negative association between environmental actions and financial outcomes. For instance, Khan *et al.* (2024) observe that excessive environmental investments may reduce earnings per share, indicating a potential trade-off between environmental responsibility and accounting profitability. Pekovic *et al.* (2018) provide a nuanced perspective, identifying an inverted U-shaped relationship between environmental performance and market value among French-listed companies. This recommends that while moderate environmental efforts enhance firm value, excessive engagement may lead to diminishing returns. Regional perspectives,

particularly from China's state-led environmental governance system, add valuable context (Chen and Li, 2024). The Chinese regulatory environment strongly incentivizes firms to adopt green practices through policy mechanisms, subsidies, and environmental scorecards. This top-down approach creates unique pressures and opportunities for firms, differentiating the Chinese context from more market-driven regulatory environments in the West (Zhang *et al.*, 2024; Zhang *et al.*, 2024). Hence, understanding environmental performance in China requires accounting for its institutional setting and government influence on corporate sustainability behavior. Drawing from this mixed evidence, we propose the following hypotheses:

- H2a. Environmental performance has a positive impact on corporate profitability.
- H2b. Environmental performance has a negative impact on corporate profitability.

### 2.5 Social performance and corporate profitability

Social performance encompasses a wide range of practices, including workforce diversity, employee welfare, community engagement, health and safety standards, social risk management, and product responsibility. These dimensions contribute not only to a company's ethical image but also to its financial standing. Empirical evidence suggests that strong social initiatives can significantly enhance firm performance. For instance, Garrido-Ruso *et al.* (2024), found that various facets of social performance, such as gender diversity, employee motivation, training, and product quality, positively influence the financial outcomes of firms in the tourism sector. Ding and Lee (2024) Argue that effective social strategies reduce investor-related risks and enhance perceptions of management quality, thereby giving firms a competitive edge. In line with this, Albuquerque *et al.* (2019) Emphasize that companies with higher social investments often experience reduced systemic risk and enhanced firm value, particularly when social responsibility is integrated into product differentiation strategies. Social investments can also elevate employee satisfaction, leading to higher productivity and innovation. Moreover, a strong record in corporate social responsibility (CSR) helps to build a positive public image and solidify stakeholder trust (Thomas *et al.*, 2024). From a strategic perspective, aligning social objectives with business goals allows companies to evolve from a purely profit-driven orientation to a socially responsible business model (Azmi *et al.*, 2021). However, this relationship is not universally positive. Eccles *et al.* (2020) Caution that while strong financial performance may encourage firms to engage in CSR, the reverse does not always hold; improved CSR practices do not necessarily result in better financial performance. Furthermore, Pekovic and Vogt (2021) Find that under certain ownership structures, particularly those with high concentration, CSR engagement may have a detrimental effect on firm profitability. Given the mixed empirical findings and contextual differences, the relationship between social performance and corporate profitability remains a subject of ongoing debate. Thus, we propose the following hypotheses:

- H3a. Social performance has a positive impact on corporate profitability.
- H3b. Social performance has a negative impact on corporate profitability

### 2.6 Governance performance and corporate profitability

Corporate governance encapsulates a range of mechanisms designed to ensure accountability, transparency, and fairness in a company's relationships with its stakeholders. These mechanisms include board composition, executive compensation, anti-corruption practices, shareholder rights, organizational structure, and customer protection policies. Among these, board structure and ownership design are among the most frequently studied in the context of corporate financial performance. Empirical evidence on the impact of governance performance on profitability presents mixed findings. For example, Fahad and Busru (2021) Analyzed Indian-listed firms and observed a negative association between governance-related

ESG scores and return on assets (ROA). In contrast, [Wu et al. \(2023\)](#), demonstrated a positive impact of governance performance on ROA, signifying that effective governance mechanisms can enhance firm outcomes. One important governance factor is the board leadership structure. [Banerjee et al. \(2020\)](#) and [Braun and Sharma \(2007\)](#) warned that a dual role where the board chair also serves as a top executive can compromise board independence and harm firm value. Similarly, empirical studies ([Karamanou and Vafeas, 2005](#); [Petersen, 2009](#)) have raised concerns about concentrated ownership, arguing that dominance ([Karamanou and Vafeas, 2005](#); [Petersen and Vredenburg, 2009](#)) Major shareholders can undermine minority shareholder interests and reduce firm value. This concern is particularly relevant in the Chinese context, where state and institutional ownership are prevalent in listed firms, potentially affecting governance efficiency.

On the other hand, internal governance elements, such as human capital practices, are positively associated with financial outcomes. Studies highlight that employee-centric governance through fair compensation, flexible work arrangements, diversity, and satisfaction enhances innovation, ROA, and return on equity ([Adu, 2022](#); [Gregory, 2022](#); [Sehen Issa et al., 2022](#); [Shafeeq Nimr Al-Maliki et al., 2023](#)). These findings accentuate the strategic importance of integrating social and governance priorities in corporate decision-making. There is also growing interest in how governance-related disclosures affect investor perceptions and firm performance. [Nekhili et al. \(2021\)](#) explored the role of employee representation on corporate boards, finding it potentially detrimental to investor confidence, even when aggregate ESG performance is high. Meanwhile, [Salehi and Bashirimanesh \(2024\)](#) argue that moderate levels of ESG disclosure, neither too limited nor overly extensive, are optimal for firm efficiency, as they balance transparency and cost. In the Chinese market, which is characterized by state-driven governance reforms and regulatory oversight, understanding how governance performance shapes profitability is increasingly vital. [Srairi \(2024\)](#) concludes that governance effectiveness, coupled with risk mitigation, significantly boosts ESG-related value creation. Based on the mixed but insightful body of literature, this study aims to explore how governance performance influences the profitability of listed banks in China. Accordingly, we propose the following hypotheses:

*H4a.* Governance performance has a positive impact on corporate profitability.

*H4b.* Governance performance has a negative impact on corporate profitability.

### 3. Methodology

#### 3.1 Data and sample

This study analyzes the impact of ESG performance on corporate profitability using data from listed commercial banks on China's Shanghai and Shenzhen stock exchanges between 2012 and 2022. The sample includes 42 banks of various types: five large state-controlled commercial banks (SOCBs), ten joint stock commercial banks (JSCBs), ten rural commercial banks (RCBs), and seventeen urban commercial banks (UCBs). Financial data were sourced from the China Stock Market and Accounting Research (CSMAR) database, and ESG data were obtained from the Chinese Research Data Services Platform (CNRDS). The ESG scores in CNRDS integrate both self-reported ESG disclosures and third-party verified assessments. This hybrid approach aligns with domestic and international ESG frameworks, enhancing objectivity and reducing the risk of greenwashing. Companies and firms that were delisted or had missing financial or ESG data were excluded from the sample. Additionally, all continuous variables were winsorized at the 1st and 99th percentiles to minimize the influence of outliers.

#### 3.2 Variables and measurement

Following previous literature, we use return on assets (ROA) as our main measure of corporate profitability, as it captures the historical performance well ([Chen et al., 2023a, b](#); [Khan, 2022](#);

Prashar, 2023). The ESG score from ESG score, Env score, Soc score, and Gov score as the main independent variables, ESG performance, and ESG performance individual components as used by other scholars (Bae *et al.*, 2021; Shakil, 2021; Zhou and Wen, 2022), obtained from CNRDS, which is rated based in line with disclosure standards such as ISO 26000, GRI standards, SASB standard, domestic and foreign well-established ESG databases, combined with China's relevant policies for ESG information.

In addition, we control for factors that affect firm profitability based on previous studies (Chen *et al.*, 2023a, b; Díaz *et al.*, 2021; Ding and Lee, 2024; Qu and Zhang, 2023). We control for equity concentration, cash asset ratio, growth capacity, leverage, board size, board independence, and firm size to prevent estimation bias caused by omitted variables that could also affect corporate profitability. See Table 1 for detailed measurements and definitions of the study's variables.

### 3.3 Empirical model

This paper used the static model 1 and 2 to check for fixed effect issues and dynamic model (3) to test how ESG in year t-1 impact corporate profitability while model (4) is to investigate the impact of the three components of ESG in year t-1 using panel data of listed commercial banks from 2012 to 2022.

$$ROA_{it} = \beta_0 + \beta_1 ESG_{i,t} + \varphi \sum Controls_{it} + \alpha_i + \lambda_t + \varepsilon_{it} \quad (1)$$

$$ROA_{it} = \beta_0 + \beta_1 Env_{i,t} + \beta_2 Soc_{it} + \beta_3 Gov_{it} + \varphi \sum Controls_{it} + \alpha_i + \lambda_t + \varepsilon_{it} \quad (2)$$

$$ROA_{it} = \beta_0 + \beta_1 ROA_{i,t-1} + \beta_2 ESG_{i,t-1} + \varphi \sum Controls_{it} + \alpha_i + \lambda_t + \varepsilon_{it} \quad (3)$$

$$ROA_{it} = \beta_0 + \beta_1 ROA_{i,t-1} + \beta_2 Env_{i,t-1} + \beta_3 Soc_{i,t-1} + \beta_4 Gov_{i,t-1} + \varphi \sum Controls_{it} + \alpha_i + \lambda_t + \varepsilon_{it} \quad (4)$$

Where i,t represents firm i in year t,  $\alpha_i$  is the individual-specific,  $\lambda_t$  time-specific effect and  $\varepsilon_{it}$  error term. Table 1 provides a detailed explanation of study variables and their measurement. The study applies two-way fixed-effect models for static. In addition, for further analysis, the two-step system generalized method of moments (GMM) estimator for equations 3 and 4, in line with previous studies that use dynamic models (Al-Malkawi and Javaid, 2018; Chen *et al.*, 2024a, b; Nguyen *et al.*, 2022). The GMM estimator can solve endogenous problems due to the presence of a lagged dependent variable as an independent variable in the model.

## 4. Empirical results and discussion

### 4.1 Descriptive statistics

Table 2 summarizes descriptive statistics based on 303 firm-year observations from 2012 to 2022. The average ROA and ROE are 0.038 and 0.063, indicating moderate profitability across the sample. ESG scores exhibit limited variation (mean = 0.733; SD = 0.050), suggesting a generally consistent ESG disclosure level among listed banks. On average, banks demonstrate moderate firm size (mean = 22.204) and leverage (0.423), though liquidity, as captured by the cash asset ratio (CAR), is relatively low (mean = 0.047), reflecting potential short-term funding pressures. Growth opportunities (GRW) are highly dispersed, and the average bank age is approximately 2.07 (log-transformed), indicating a relatively young sector in capital market terms. Governance characteristics suggest moderate board independence (mean B\_indep = 0.377), relatively small boards (mean Bsize = 2.115 in log form), and

**Table 1.** Variables, acronyms, measurement

Variable	Parameters	Symbol	Definition	Source	Reference
<i>Dependent</i>					
	Firm Performance	ROA <sub>it</sub>	The ratio of net income to total assets of firm <i>i</i> in year <i>t</i>	CSMAR	Chen <i>et al.</i> (2023a, b), Elamer and Boulhaga (2024), Khan (2022)
		ROE <sub>it</sub>	Natural logarithm of (Revenue divided by total carbon emissions) of firm <i>i</i> in year <i>t</i>	CSMAR	Prashar (2023), Truong (2024), Zimon <i>et al.</i> (2022)
		TobinsQ <sub>it</sub>	The ratio of firm market value to the asset's replacement value of firm <i>i</i> in year <i>t</i>	CSMAR	Khan (2022), Truong (2024), Zimon <i>et al.</i> (2022)
<i>Independent</i>					
	ESG score	ESG <sub>it</sub>	The ESG average score assigned to each firm is based on the Environmental, Social, and Governance pillars. Range from 0–100 score	CNRDS	Bae <i>et al.</i> (2021), Dossa (2025), Shakil (2021)
	Environmental score	Env <sub>it</sub>	It represents the weighted average of all key issues that fall under the environment pillar performance	CNRDS	Bae <i>et al.</i> (2021), Dossa (2025), Shakil (2021)
	Social score	Soc <sub>it</sub>	It represents the weighted average of all key issues that fall under the social pillar performance	CNRDS	Bae <i>et al.</i> (2021), Dossa (2025), Shakil (2021)
	Governance score	Gov <sub>it</sub>	It represents the weighted average of all key issues that fall under the governance pillar performance	CNRDS	Bae <i>et al.</i> (2021), Dossa (2025), Shakil (2021)
<i>Controls</i>					
	Size	Size <sub>it</sub>	Natural logarithm of total asset	CSMAR	Chen <i>et al.</i> (2023a, b), Ding and Lee (2024), Veeravel <i>et al.</i> (2024)
	Leverage	Lev <sub>it</sub>	The ratio of total liabilities to total assets	CSMAR	Casciello <i>et al.</i> (2024), Díaz <i>et al.</i> (2021)
	Cash asset ratio	CAR <sub>it</sub>	Cash and cash equivalent/Total asset	CSMAR	Agnese <i>et al.</i> (2024), Azmi <i>et al.</i> (2021), Zhang <i>et al.</i> (2024)
	Firms' growth	GRW <sub>it</sub>	The sales growth of the firm is calculated as (Sales <sub><i>t</i></sub> – Sales <sub><i>t-1</i></sub> )/Sales <sub><i>t-1</i></sub>	CSMAR	Díaz <i>et al.</i> (2021), Ding and Lee (2024), Zhang <i>et al.</i> (2024)
	Firm Age	Age <sub>it</sub>	Natural logarithm of years since firms have been established	CSMAR	Díaz <i>et al.</i> (2021), Ding and Lee (2024), Zhang <i>et al.</i> (2024)

(continued)

**Table 1.** Continued

Variable	Parameters	Symbol	Definition	Source	Reference
	Board size	Bsize <sub>it</sub>	Natural logarithm of total number of board members in firm <i>i</i> in year <i>t</i>	CSMAR	<a href="#">Veeravel et al. (2024)</a> , <a href="#">Zhang et al. (2024)</a>
	Independent Directors (board independence)	B_indp <sub>it</sub>	The proportion of independent directors is measured by the number of independent directors divided by the total number of directors on the board	CSMAR	<a href="#">Chen et al. (2023a, b)</a> , <a href="#">Khan (2022)</a> , <a href="#">Lu and Cheng (2023)</a>
	Liquidity ratio	Liq <sub>it</sub>	Current assets/Current liabilities in firm <i>i</i> in year <i>t</i>	CSMAR	<a href="#">Gregory (2022)</a> , <a href="#">Qu and Zhang (2023)</a>
	Equity concentration	Top1 <sub>it</sub>	The shareholding ratio of the largest shareholder measures the concentration of equity	CSMAR	<a href="#">Yuan et al. (2022)</a> , <a href="#">Q. Zhang et al. (2023)</a>
	CEO Duality	Duality <sub>it</sub>	A dummy variable that takes the value of 1 if the CEO also serves as the Chairman and 0 if they are separate positions	CSMAR	<a href="#">Khan (2022)</a> , <a href="#">Zhang et al. (2024)</a> , <a href="#">Zhang et al. (2024)</a>
	Board gender	Bgender <sub>it</sub>	The proportion of women on the board of directors is measured by the number of women on the board divided by the total number of directors	CSMAR	<a href="#">Khan (2022)</a> , <a href="#">Zhang et al. (2024)</a> , <a href="#">Zhang et al. (2024)</a>

**Note(s):** This table presents the definitions and data sources of the variables used in the analysis

**Source(s):** Authors' own work

concentrated ownership (Top1 = 0.342). CEO duality is present in 27.8% of observations, while female representation on boards remains low (Bgender = 0.132). Liquidity is highly variable (mean = 0.003; SD = 0.060), supporting the observed heterogeneity across the sample in terms of profitability, capital structure, governance, and ESG profiles.

To enhance the interpretability of the data, [Table 3](#) further disaggregates the descriptive statistics by bank type: joint stock commercial, large state-controlled commercial, rural commercial, and urban commercial banks. This stratification reveals important institutional heterogeneity. For instance, large state-controlled banks tend to exhibit higher leverage and lower ESG variation, reflecting stronger regulatory oversight and systemic importance. In contrast, rural commercial banks show relatively weaker profitability (lower ROA and ROE), greater variation in ESG scores, and lower board independence, indicating potential capacity and governance challenges. Urban commercial banks exhibit slightly better performance in ESG and profitability metrics compared to their rural counterparts, but also show greater variability in board gender diversity and growth indicators. These insights suggest that a bank's nature plays a significant role in shaping financial performance, governance structure, and ESG practices. Incorporating this classification allows for a more nuanced understanding of institutional behavior and contextual differences within the Chinese banking sector.

**Table 2.** Summary of statistics

Variables	N	Mean	SD	Min	P25	P50	P75	Max
TBQ	303	1.681	1.340	0.000	1.050	1.457	2.132	7.418
ROA	303	0.038	0.061	-0.218	0.013	0.038	0.069	0.204
ROE	303	0.063	0.147	-0.789	0.029	0.073	0.123	0.427
ESG	303	0.733	0.050	0.576	0.704	0.736	0.767	0.839
Size	303	22.204	1.297	19.951	21.266	21.990	22.913	26.352
Lev	303	0.423	0.210	0.053	0.253	0.414	0.580	0.918
CAR	303	0.047	0.070	-0.161	0.007	0.046	0.088	0.247
GRW	303	0.149	0.381	-0.540	-0.028	0.085	0.247	2.365
Age	303	2.070	0.921	0.000	1.386	2.303	2.833	3.367
B_indep	303	0.377	0.054	0.333	0.333	0.364	0.429	0.571
Bsize	303	2.115	0.195	1.609	1.946	2.197	2.197	2.639
Top1	303	0.342	0.147	0.087	0.229	0.320	0.439	0.741
Duality	303	0.278	0.448	0.000	0.000	0.000	1.000	1.000
Bgender	303	0.132	0.133	0.000	0.000	0.111	0.222	0.556
Liq	303	0.003	0.060	-2.455	-0.005	0.009	0.023	3.384

**Note(s):** This table presents the descriptive statistics for the main study variables. The sample consists of 303 firm-year observations spanning the period from 2012 to 2022. The table includes the number of observations (N), standard deviation (SD), minimum (Min), and maximum (Max) values, as well as the 25th (P25), 50th (P50), and 75th (P75) percentiles. Definitions of all variables are provided in [Table 1](#)

**Source(s):** Authors' own work

#### 4.2 ESG Variation Across Banks Nature

[Figure 1](#) illustrates ESG score variation among Chinese banks by type. The top panel shows mean scores with  $\pm 1$  SD, while the bottom panels include a boxplot and violin plot. Joint Stock Commercial Banks (JSCBs) lead with the highest and most consistent ESG scores, likely due to international exposure and investor accountability ([Bouattour et al., 2024](#)). Large State-Controlled Banks (LSCBs) follow, though with more variability, especially in the Environmental dimension, possibly due to legacy high-emission investments ([Dikau and Volz, 2021](#)). Urban (UCBs) and Rural Commercial Banks (RCBs) exhibit broader score dispersion and more outliers, with RCBs showing the lowest median and widest spread. This suggests challenges like weaker ESG infrastructure and regulatory gaps ([Berg et al., 2022](#)). The violin plot further shows concentrated high scores for JSCBs and fragmented distributions for RCBs, reinforcing that larger, market-oriented banks are ahead in ESG integration.

#### 4.3 Correlation matrix and multicollinearity

[Table 4](#) shows positive correlations between ESG, profitability (ROA, ROE), and liquidity (CAR), suggesting that banks with higher ESG scores and better liquidity tend to be more profitable. Leverage (Lev) negatively impacts profitability. Corporate governance factors like board independence and size show weaker, yet significant, correlations with profitability. The VIF values indicate no multicollinearity issues, ensuring reliable results. The result is acceptable as it does not exceed the threshold of 10, which is consistent with ([Al-Faryan and Alokla, 2023](#); [Firmansyah et al., 2023](#)).

#### 4.4 Baseline regression result

**4.4.1 State-owned commercial banks (SOCBs) vs non-state-owned commercial banks (non-SOCBs).** The findings from [Table 5](#) reveal that the impact of ESG performance on bank profitability varies significantly depending on the nature and structure of the bank. For state-owned commercial banks (SOCBs), the relationship between ESG and profitability is negative and statistically significant at the 1% level (coefficient:  $-0.012$ ). This aligns with the trade-off

**Table 3.** Summary of statistics by bank type

Bank type	Variables	N	Mean	SD	Min	P25	P50	P75	Max
Joint stock commercial	TBQ	96	1.72	1.354	-0.022	0.994	1.486	2.134	7.442
	ROA	96	0.057	0.035	-0.182	0.023	0.046	0.093	0.172
	ROE	96	0.051	0.129	-0.804	0.04	0.046	0.103	0.455
	ESG	96	0.788	0.021	0.535	0.699	0.718	0.816	0.834
	Size	96	22.248	1.318	20.011	21.286	21.974	22.918	26.391
	Lev	96	0.372	0.209	0.033	0.22	0.372	0.596	0.863
	CAR	96	0.03	0.072	-0.199	0.033	0.041	0.149	0.237
	GRW	96	0.17	0.394	-0.585	0.06	0.128	0.27	2.431
	Age	96	2.036	0.937	0.004	1.4	2.282	2.828	3.343
	B_indp	96	0.348	0.048	0.304	0.358	0.329	0.351	0.612
	Bsize	96	2.04	0.224	1.637	1.941	2.202	2.218	2.639
	Top1	96	0.307	0.178	0.084	0.238	0.345	0.421	0.751
	Duality	96	0.216	0.448	0.027	0.066	0.013	1.012	1.059
	Bgender	96	0.186	0.135	-0.018	0.04	0.121	0.226	0.551
	Liq	96	0.048	0.067	-2.457	0.036	0.022	0.019	3.351
Large state-controlled commercial	TBQ	55	1.696	1.34	-0.048	1.084	1.489	2.22	7.46
	ROA	55	0.01	0.088	-0.18	0.073	0.048	0.093	0.19
	ROE	55	0.08	0.18	-0.814	0.023	0.099	0.096	0.422
	ESG	55	0.766	0.006	0.581	0.737	0.709	0.769	0.866
	Size	55	22.165	1.3	19.957	21.277	21.981	22.948	26.358
	Lev	55	0.452	0.201	0.033	0.308	0.44	0.583	0.916
	CAR	55	0.078	0.087	-0.202	0.029	0.094	0.064	0.253
	GRW	55	0.2	0.388	-0.461	0.022	0.045	0.194	2.33
	Age	55	2.077	0.927	0.011	1.367	2.34	2.826	3.369
	B_indp	55	0.427	0.056	0.345	0.286	0.393	0.41	0.556
	Bsize	55	2.171	0.163	1.614	1.923	2.198	2.237	2.662
	Top1	55	0.321	0.148	0.117	0.178	0.315	0.394	0.721
	Duality	55	0.345	0.422	-0.005	0.045	-0.018	1.022	0.994
	Bgender	55	0.177	0.141	-0.004	0.004	0.081	0.179	0.537
	Liq	55	0.009	0.048	-2.482	-0.024	0.021	-0.005	3.408
Rural commercial	TBQ	52	1.664	1.33	-0.002	1.048	1.456	2.157	7.37
	ROA	52	0.055	0.081	-0.216	-0.007	0.018	0.082	0.222
	ROE	52	-0.027	0.128	-0.84	0.045	0.067	0.125	0.429
	ESG	52	0.743	0.04	0.578	0.7	0.708	0.84	0.799
	Size	52	22.239	1.29	19.922	21.321	21.974	22.936	26.374
	Lev	52	0.424	0.193	0.092	0.207	0.461	0.597	0.896
	CAR	52	0.085	0.061	-0.147	-0.012	0.011	0.13	0.264
	GRW	52	0.126	0.401	-0.526	0	0.112	0.269	2.377
	Age	52	1.997	0.926	0.032	1.374	2.298	2.789	3.38
	B_indp	52	0.253	0.098	0.395	0.316	0.395	0.444	0.567
	Bsize	52	2.129	0.193	1.622	1.943	2.214	2.158	2.639
	Top1	52	0.315	0.145	0.086	0.25	0.35	0.435	0.781
	Duality	52	0.256	0.461	0.05	-0.003	-0.001	0.993	1.008
	Bgender	52	0.105	0.118	-0.018	-0.018	0.104	0.218	0.495
	Liq	52	0.059	0.044	-2.434	0.019	0.027	-0.015	3.379
Urban commercial	TBQ	100	1.751	1.366	-0.001	1.039	1.501	2.097	7.394
	ROA	100	0.026	0.07	-0.226	-0.003	0.092	0.06	0.162
	ROE	100	0.078	0.134	-0.81	0.056	0.037	0.153	0.448
	ESG	100	0.753	0.07	0.617	0.673	0.787	0.752	0.849
	Size	100	22.241	1.286	19.962	21.274	22.029	22.876	26.354
	Lev	100	0.437	0.185	0.055	0.243	0.397	0.579	0.932
CAR	100	0.053	0.082	-0.197	0.007	0.065	0.094	0.315	

(continued)

**Table 3.** Continued

Bank type	Variables	N	Mean	SD	Min	P25	P50	P75	Max
	GRW	100	0.081	0.404	-0.518	-0.022	0.096	0.267	2.368
	Age	100	2.025	0.921	-0.015	1.37	2.304	2.848	3.422
	B_indp	100	0.354	0.058	0.373	0.314	0.357	0.42	0.583
	Bsize	100	2.128	0.187	1.537	1.986	2.156	2.176	2.649
	Top1	100	0.296	0.159	0.067	0.248	0.272	0.468	0.781
	Duality	100	0.274	0.481	-0.008	0.003	0.036	0.984	1.006
	Bgender	100	0.087	0.13	0.029	0.06	0.183	0.249	0.493
	Liq	100	0.02	0.043	-2.439	0.026	0.008	0.005	3.383

**Note(s):** This table presents the descriptive statistics for the main study variables, categorized by bank nature. The sample consists of 303 firm-year observations spanning the period from 2012 to 2022. The table includes the number of observations (*N*), standard deviation (*SD*), minimum (*Min*), and maximum (*Max*) values, as well as the 25th (*P25*), 50th (*P50*), and 75th (*P75*) percentiles. Definitions of all variables are provided in [Table 1](#)

**Source(s):** Authors' own work

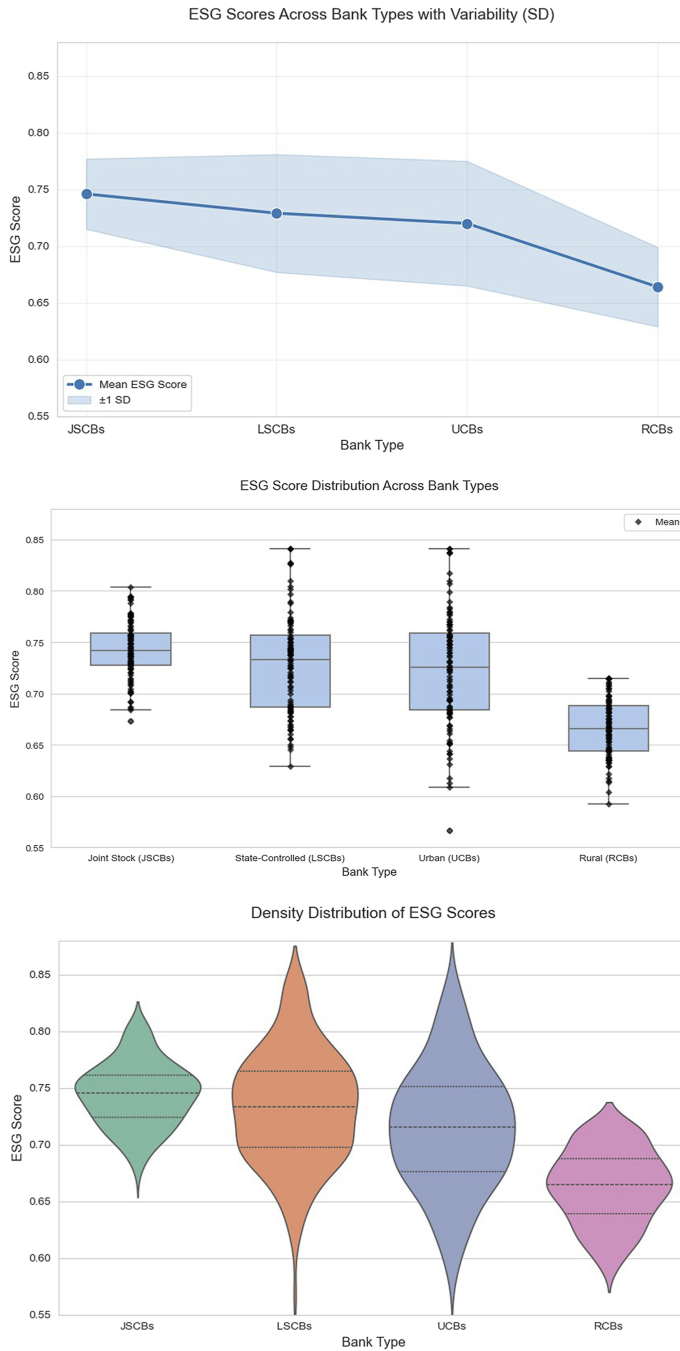
theory ([Cardillo and Basso, 2025](#); [Shaddady and Alnor, 2024](#)), which suggests that ESG initiatives, though socially desirable, often come with substantial compliance costs, especially in highly regulated sectors like state-owned banking. SOCBs may be mandated to fulfill national policy goals and public service obligations, such as inclusive financing or green development, which can reduce profitability. Empirical research by [Buallay \(2019\)](#) and [Zhang et al. \(2023\)](#) confirms that mandatory ESG engagement in such settings often results in reduced financial performance.

In contrast, non-state-owned commercial banks (non-SOCBs) show a positive and highly significant relationship with ESG performance at the 1% level (coefficient: 0.008). This result is consistent with stakeholder theory ([Freeman, 1994](#)), which argues that firms responding to a broader set of stakeholder interests, including customers, employees, and socially responsible investors, can enhance long-term profitability. Non-SOCBs, which operate under more market-oriented conditions, can more effectively align ESG practices with business strategies. Studies such as [Babajee et al. \(2022\)](#) and [Zhang and Lucey \(2022\)](#) support this finding, signifying that ESG transparency increases investor confidence and reduces capital constraints, thereby improving firm value.

**4.4.2 Joint stock commercial banks (JSCB) and non-joint commercial banks (Non-JSCB).** Joint-stock banks in [Table 5](#) exhibit a moderately positive and significant impact of ESG performance on profitability at the 1% level (coefficient: 0.006). This can be explained by agency theory ([Jensen and Meckling, 1976](#)), which postulates that ESG disclosures reduce information asymmetry between management and shareholders. In these banks, internal governance mechanisms often support efficient decision-making, allowing ESG to serve both accountability and performance-enhancing roles. [Christensen et al. \(2021\)](#) emphasized how such disclosures can minimize agency costs and strengthen investor trust, ultimately contributing to profitability. These banks benefit from institutional flexibility while also responding to increasing stakeholder pressure.

On the other hand, non-joint-stock banks show a marginally negative relationship with ESG performance, significant at the 5% level (coefficient: -0.003). This may be attributed to their more traditional governance frameworks and limited adaptability. These institutions may lack the strategic orientation or internal capacity to translate ESG investments into financial gains. As a result, ESG expenditures may appear more like compliance costs than value-adding initiatives. This outcome reflects the limitations of ESG adoption in rigid institutional environments and highlights the need for stronger governance support in these banks.

**4.4.3 Urban commercial banks (UCB) and rural commercial banks (RCB).** Urban banks display in [Table 5](#) a mildly negative but statistically significant relationship between ESG



**Figure 1.** ESG variation across banks nature. Source: Authors' own work

**Table 4.** Correlation analysis and multicollinearity test

No.	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	VIF
1	TBQ	1.000															
2	ROA	0.177*	1.000														
3	ROE	0.086*	0.800*	1.000													
4	ESG	0.055*	0.226*	0.193*	1.000												1.13
5	Size	-0.204*	-0.005	0.114*	0.224*	1.000											1.56
6	Lev	-0.182*	-0.384*	-0.158*	-0.098*	-0.095*	1.000										1.14
7	CAR	0.124*	0.431*	0.301*	0.095*	0.092*	0.059*	1.000*									1.05
8	GRW	0.088*	0.220*	0.230*	-0.010	-0.008	0.055*	0.057*	1.000								1.00
9	Age	0.083*	-0.224*	-0.092*	-0.127*	-0.122*	0.408*	0.410*	-0.014	1.000							1.32
10	B_Indp	-0.015*	-0.024*	-0.021*	0.082*	0.080*	0.031*	-0.002	-0.013	-0.010	1.000						1.46
11	Bsize	-0.032*	0.018*	0.046*	0.017*	0.016*	0.221*	0.138*	0.025*	0.011	0.139*	1.000					1.60
12	Top1	-0.070*	0.131*	0.131*	0.112*	0.103*	0.170*	0.038*	0.080*	0.008	-0.079*	0.060*	1.000				1.12
13	Duality	0.017*	0.049*	-0.001	-0.001	0.001	-0.212*	-0.183*	-0.001	0.010	-0.292*	0.081*	-0.177*	1.000			1.17
14	Bgender	0.115*	0.074*	0.031*	0.027*	0.027*	-0.118*	-0.109*	0.041*	0.012	-0.119*	0.017*	-0.067*	0.001	1.000		1.22
15	Liq	0.035*	-0.024*	-0.051*	0.018*	0.123*	-0.145*	0.401*	0.031*	0.018	0.201*	0.015*	-0.034*	0.036*	0.213*	1.000	1.37
	Mean																1.26
	VIF																

**Note(s):** This table presents the Pearson correlation coefficients between the study variables, highlighting the relationships between ESG factors and bank profitability. Significance levels are indicated at the 10%, 5%, and 1% levels. The table also includes the Variance Inflation Factor (VIF) to assess multicollinearity, with all values within acceptable limits, indicating no concerns

**Source(s):** Authors' own work

**Table 5.** The impact of ESG on corporate profitability (state-owned bank, non-state-owned bank, joint stock, non-joint, rural, and Urban banks)

Variables	(1) SOCB ROA	(2) Non-SOCB ROA	(3) Joint ROA	(4) Non-joint ROA	(5) Rural ROA	(6) Urban ROA
ESG	-0.012*** (0.004)	0.008*** (0.002)	0.006*** (0.002)	-0.003*** (0.001)	0.005*** (0.002)	-0.002*** (0.002)
Size	0.008*** (0.002)	0.010*** (0.001)	0.009*** (0.001)	0.007*** (0.002)	0.011*** (0.001)	0.006*** (0.002)
Lev	-0.120*** (0.010)	-0.150*** (0.008)	-0.130*** (0.009)	-0.140*** (0.008)	-0.110*** (0.010)	-0.160*** (0.009)
CAR	0.150** (0.060)	0.200** (0.050)	0.180** (0.055)	0.160** (0.065)	0.170** (0.055)	0.140** (0.060)
GRW	0.025*** (0.005)	0.030*** (0.004)	0.028*** (0.004)	0.022*** (0.0505)	0.035*** (0.004)	0.020*** (0.005)
Age	-0.008** (0.002)	-0.010** (0.002)	-0.009** (0.003)	-0.007** (0.004)	-0.012** (0.004)	-0.006** (0.003)
B_Indp	-0.010** (0.005)	-0.012** (0.004)	-0.011** (0.004)	-0.009** (0.005)	-0.015** (0.004)	-0.008** (0.005)
Bsize	0.003 (0.003)	0.002 (0.002)	0.004* (0.002)	0.001 (0.003)	0.005** (0.002)	-0.002 (0.003)
Top1	0.038*** (0.008)	0.045*** (0.006)	0.042*** (0.007)	0.035*** (0.008)	0.050*** (0.006)	0.030*** (0.008)
Duality	-0.001 (0.001)	0.003*** (0.002)	0.002** (0.001)	0.001 (0.001)	0.004*** (0.002)	0.001 (0.001)
Bgender	0.008*** (0.003)	0.012*** (0.002)	0.010*** (0.002)	0.007*** (0.003)	0.015*** (0.002)	0.006*** (0.003)
Liq	0.013*** (0.002)	0.011*** (0.001)	0.004*** (0.003)	0.013*** (0.002)	0.002*** (0.002)	0.031*** (0.003)
Constant	-0.162*** (0.006)	-0.185*** (0.008)	-0.042*** (0.009)	-0.294*** (-0.026)	-0.042*** (0.089)	-0.005*** (0.009)
Observations	55	248	96	207	52	100
R-squared	0.950	0.951	0.404	0.395	0.404	0.395
Number of firms	5	37	10	32	10	17
Firm FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

**Note(s):** This table reports fixed effects regression results estimating the effect of ESG performance on return on assets (ROA) across different bank categories: state-owned (SOCB), non-state-owned, joint-stock, non-joint-stock, rural, and urban banks. All models include firm and year fixed effects. Robust standard errors are in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively

**Source(s):** Authors' own work

performance and profitability at the 10% level (coefficient: -0.002). This finding aligns with legitimacy theory (Buallay, 2019), which suggests that ESG practices in urban institutions may be more driven by societal expectations and regulatory pressure than by strategic value creation. Urban banks face heightened scrutiny and higher operational costs associated with ESG implementation, such as emissions reporting, green lending regulations, and labor compliance. As such, these efforts may result in a short-term trade-off between compliance and profitability, though potentially yielding reputational or long-term gains.

Conversely, rural banks show a slightly positive relationship between ESG performance and profitability, statistically significant at the 1% level (coefficient: 0.005). This is likely because these banks prioritize social ESG dimensions, such as community outreach, inclusive banking, and support for local development initiatives that build customer loyalty and social trust. Stakeholder engagement theory and real-world examples like the Grameen Bank (Yunus, 2010) illustrate how such banks, operating in underserved regions, can achieve social impact

while maintaining financial stability. ESG efforts thus act as differentiators that help rural banks strengthen their local customer base and secure long-term sustainability.

These findings emphasize that ESG performance does not yield uniform outcomes across all banks. Instead, its impact depends on organizational structure, governance mechanisms, regulatory exposure, and geographic positioning. Policymakers should consider these contextual differences when designing ESG-related regulations or incentives, and investors must assess ESG outcomes in light of bank type and environment. Bank managers, meanwhile, should tailor ESG strategies to align with their institutional characteristics, ensuring that sustainability goals are integrated into profitable and pragmatic business models.

#### 4.5 Robustness check and further analysis

**4.5.1 Endogeneity test.** To address potential endogeneity concerns arising from omitted variable bias or reverse causality between ESG performance and firm profitability, this study employs a two-stage least squares (2SLS) instrumental variable (IV) approach, following prior empirical studies (El Ghoul *et al.*, 2011; Fiorillo *et al.*, 2025; Kuai *et al.*, 2025; Yu *et al.*, 2024). We use the average ESG scores of other firms operating in the same city, province, or industry as instruments for firm-level ESG performance.

These instruments are theoretically and empirically justified on two grounds: first, regarding relevance, firms located in the same geographic or industry context often face similar regulatory pressures, social expectations, and stakeholder norms, which leads to convergence in ESG behavior. This is supported by the strong first-stage results in Table 6, where the instruments significantly predict firm-level ESG scores at the 1% level. Second, concerning exclusion restriction, while regional or industry-average ESG levels influence a firm's ESG disclosure practices, they are unlikely to directly affect the profitability of the firm (ROA), once the firm's own ESG score is controlled for. These broader averages reflect exogenous environmental and institutional conditions that shape ESG behavior, but not firm-specific operational outcomes. Thus, their impact on ROA is assumed to be mediated solely through firm-level ESG, satisfying the exclusion restriction.

Table 6 presents the results. The first-stage regressions (Models M1, M3, M5) demonstrate strong, statistically significant associations between the instruments and firm-level ESG. In the second stage (Models M2, M4, M6), ESG remains positively associated with ROA, with coefficients ranging from 0.076 to 0.321, all statistically significant. Diagnostic tests support the validity of our instruments. The Cragg-Donald Wald F-statistics and Kleibergen-Paap rk LM statistics are well above the standard thresholds, indicating that the instruments are not weak. Furthermore, the Hansen J test fails to reject the null hypothesis of instrument validity, suggesting that the instruments are not correlated with the error term in the second stage. Collectively, these results confirm that ESG performance has a causal and robust effect on firm profitability, and that our instrument set is both valid and effective for addressing endogeneity concerns.

**4.5.2 Change of dependent variable, independent variable.** To ensure the robustness of the results, the study changes both the independent and dependent variables. The robustness test results in Table 7 examine the impact of different ESG ratings (from CNRDS and Bloomberg) on corporate profitability, with the dependent variable changed to ROE and Tobin's Q. In the first two columns (M1 and M2), ESG ratings from CNRDS are used with ROE and Tobin's Q as dependent variables, demonstrating a positive impact of ESG ratings on corporate profitability. Specifically, CNRDS ESG ratings significantly influence ROE (0.117,  $p < 0.01$ ) and Tobin's Q (0.411,  $p < 0.10$ ). The next two columns (M3 and M4) utilize ESG ratings from Bloomberg, showing that ESG ratings positively affect ROA and ROE, with coefficients of 0.002 ( $p < 0.01$ ) for ROA and 0.005 ( $p < 0.01$ ) for ROE. These results indicate that ESG performance, regardless of whether measured by CNRDS or Bloomberg ratings, significantly enhances corporate profitability and market valuation. Furthermore, the consistency of these findings, despite changes in both dependent and independent variables, strengthens the

**Table 6.** Endogeneity resolution using 2SLS instrumental variable approach

Variable	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage
	(M1) ESG	(M2) ROA	(M3) ESG	(M2) ROA	(M3) ESG	(M4) ROA
ESG_City (IV)	0.861*** (0.012)	–	–	–	–	–
ESG_Province (IV)	–	–	0.821*** (0.026)	–	–	–
ESG_Industry (IV)	–	–	–	–	0.013*** (0.003)	–
ESG	–	0.138*** (0.019)	–	0.076** (0.034)	–	0.321*** (0.093)
Size	0.013*** (0.000)	0.007*** (0.000)	0.014*** (0.000)	0.008*** (0.001)	0.015*** (0.000)	0.328*** (0.037)
Lev	–0.042*** (0.002)	–0.103*** (0.002)	–0.047*** (0.002)	–0.106*** (0.003)	–0.050*** (0.002)	–0.148 (0.175)
CAR	0.018*** (0.004)	0.287*** (0.005)	0.019*** (0.004)	0.288*** (0.005)	0.023*** (0.004)	1.010*** (0.262)
GRW	–0.002*** (0.001)	0.035*** (0.001)	–0.003*** (0.001)	0.034*** (0.001)	–0.003*** (0.001)	–0.114 (0.165)
Age	–0.008*** (0.000)	–0.007*** (0.000)	–0.010*** (0.000)	–0.008*** (0.000)	–0.011*** (0.000)	0.095*** (0.025)
B_Indp	0.070*** (0.000)	–0.027*** (0.006)	0.079*** (0.006)	–0.022*** (0.007)	0.073*** (0.006)	–0.022** (0.009)
Bsize	0.010*** (0.002)	0.008*** (0.002)	0.011*** (0.002)	0.008*** (0.002)	0.007*** (0.002)	0.091* (0.055)
Top1	0.012*** (0.002)	0.030*** (0.002)	0.012*** (0.002)	0.030*** (0.002)	0.010*** (0.002)	–0.157 (0.359)
Duality	–0.003*** (0.008)	–0.002*** (0.001)	–0.003*** (0.001)	–0.002*** (0.001)	–0.002*** (0.001)	0.034 (0.153)
Bgender	0.010*** (0.002)	0.010*** (0.002)	0.012*** (0.002)	0.011*** (0.229)	0.011*** (0.013)	0.018 (0.241)
Liq	0.001*** (0.002)	0.003*** (0.001)	0.016*** (0.002)	0.021*** (0.012)	0.014*** (0.014)	0.016 (0.041)
Constant	–0.209*** (0.011)	–0.918*** (0.042)	–0.206*** (0.020)	–0.918*** (0.002)	0.383*** (0.007)	0.918*** (0.042)
Cragg-Donald Wald	4235.96	4235.963	1155.83	1155.835	14.98	14.975
Kleibergen-Paap	4802.77	4802.775	996.86	996.865	15.93	15.933
Hansen J	–	0.000	–	0.000	–	0.000
Anderson-Rubin Wald	0.0000	–	0.0277	–	0.0000	–
Stock-wright LM	0.0000	–	0.0278	–	0.0000	–
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs	303	303	303	303	303	303

**Note(s):** This table presents the results from the two-stage least squares (2SLS) approach used to address endogeneity issues. In the first stage (M1, M3, M5), the instrument variables (IV) for ESG are used to predict ESG scores. In the second stage (M2, M4, M6), the estimated ESG values are then regressed on corporate profitability, measured by ROA, to resolve potential endogeneity problems. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% levels, respectively. Robust standard errors are reported in parentheses for all columns

**Source(s):** Authors' own work

**Table 7.** Robustness change of dependent and independent variable

$\Delta$ Variables	Corporate profitability		ESG rating bloomberg	
	(M1) ROE	(M2) TBQ	(M3) ROA	(M4) ROE
ESG	0.117*** (0.030)	0.411* (0.215)	0.002*** (0.000)	0.005*** (0.001)
Size	0.029*** (0.016)	-0.333*** (0.029)	0.013*** (0.001)	0.030*** (0.004)
Lev	-0.278 *** (0.021)	-0.584 *** (0.103)	-0.147*** (0.005)	-0.279*** (0.016)
CAR	0.334*** (0.021)	0.867*** (0.137)	0.180*** (0.008)	0.334*** (0.021)
GRW	0.078*** (0.003)	0.175*** (0.023)	0.032*** (0.001)	0.078*** (0.003)
Age	-0.036 (0.034)	1.183*** (0.029)	-0.011*** (0.001)	-0.001 (0.003)
B_Indp	-0.036 (0.034)	-0.079 (0.283)	-0.014 (0.011)	-0.035 (0.034)
Bsize	-0.004 (0.013)	0.107 (0.089)	0.001 (0.004)	-0.004 (0.013)
Top1	0.112*** (0.023)	0.502*** (0.160)	0.042*** (0.007)	0.112*** (0.023)
Duality	0.007* (0.004)	-0.008 (0.027)	0.002* (0.001)	0.007 * (0.004)
Bgender	0.000* (0.004)	0.808*** (0.102)	0.000 (0.004)	-0.022* (0.012)
Liq	0.031*** (0.002)	0.013*** (0.001)	0.012*** (0.002)	0.001*** (0.001)
Constant	-0.023*** (0.012)	6.799*** (0.647)	-0.186*** (0.025)	-0.490*** (0.086)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R <sup>2</sup>	0.162	0.087	0.292	0.162
Obs	303	303	303	303

**Note(s):** The table presents robustness test results where the dependent variables have been changed to ROA (Return on Assets) and Tobin's Q (TBQ). In the first two columns, ESG ratings from CNRDS are used to assess the impact on firm profitability. In the third column, ESG ratings from Bloomberg are employed to check their impact on firm profitability in terms of ROA and ROE. The *p*-values, calculated using robust standard errors, are reported in parentheses, with statistical significance indicated by \*\*\*, \*\*, and \* at the 1%, 5%, and 10% levels, respectively

**Source(s):** Authors' own work

robustness and reliability of the relationship between ESG performance and corporate profitability.

**4.5.3 Simultaneity issues.** Table 8 presents the results from addressing potential simultaneity issues and concerns in the relationship between ESG and corporate profitability. The first-stage results in column M1 report the instrumented variable, ESG\_L, while columns M2 through M4 examine the dynamic relationship by incorporating one-period lag values for the independent and control variables. In column M1, ESG lagged by one period (ESG *t*-1) significantly influences ROA (0.039, *p* < 0.01) and ROE (0.079, *p* < 0.01), indicating that past ESG performance has a positive effect on future profitability. Columns M2 and M4 show similar results for ESG's impact on ROA and ROE, with coefficients of 0.037 (*p* < 0.01) and 0.108 (*p* < 0.01), respectively, reinforcing the positive effect of ESG on profitability. Control variables such as Size, Leverage, Cash Flow from Operations (CFLOA), Growth, and Top1 (the largest shareholder) also exhibit significant relationships with firm performance, with lagged values showing robust correlations. The robustness of these findings is confirmed by the consistency of significant coefficients across multiple specifications. The results indicate that ESG, alongside other key financial factors, significantly drives corporate profitability, with adjustments for simultaneity further strengthening the reliability of the findings.

**4.5.4 Change of estimation technique.** The results from the System GMM analysis in Table 9 point to a clear and meaningful link between ESG performance and bank profitability in China. A higher ESG score is associated with better financial outcomes, specifically, a one-standard-deviation improvement in ESG performance is linked to a 1% point increase in return on assets (ROA), with the coefficient standing at 0.010 and statistically significant at the 1%

**Table 8.** Simultaneity issues

Variable	Corporate profitability			
	(M1) ROA	(M2) ROA	(M3) ROE	(M4) ROE
ESG <sub>t-1</sub>	0.039*** (0.010)	0.037*** (0.010)	0.079*** (0.029)	0.108*** (0.028)
Size <sub>t-1</sub>	–	–0.002*** (0.001)	–	–0.013*** (0.002)
Lev <sub>t-1</sub>	–	–0.024*** (0.004)	–	–0.012 (0.011)
CFLOA <sub>t-1</sub>	–	0.114*** (0.007)	–	0.219*** (0.017)
Growth <sub>t-1</sub>	–	0.015*** (0.001)	–	0.038*** (0.003)
Age <sub>t-1</sub>	–	–0.000 (0.001)	–	0.001 (0.002)
Ind_Dr <sub>t-1</sub>	–	–0.004 (0.011)	–	0.006 (0.028)
Board <sub>t-1</sub>	–	–0.004 (0.003)	–	–0.011 (0.010)
Top1 <sub>t-1</sub>	–	0.012*** (0.004)	–	0.044*** (0.012)
Duality <sub>t-1</sub>	–	0.002 (0.001)	–	0.004 (0.003)
Bgender <sub>t-1</sub>	–	–0.025*** (0.004)	–	–0.039*** (0.011)
Liq <sub>t-1</sub>	0.021*** (0.004)	0.003*** (0.001)	0.003*** (0.001)	0.001*** (0.000)
Constant	0.039*** (0.10)	0.082*** (0.017)	0.012*** (0.002)	–0.065*** (0.006)
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Adjusted R <sup>2</sup>	0.014	0.092	0.005	0.055
Obs	303	303	303	303

**Note(s):** This table presents results from the simultaneity approach, addressing potential endogeneity in the relationship between ESG and corporate profitability. The first-stage results in column M1 show the instrumented variable, ESG\_L, while M2 reports the panel regression using the estimated ESG values. M3 and M4 examine the dynamic relationship by including a one-period lag for the independent and control variables. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% levels, respectively. Robust standard errors are reported in parentheses for all columns

**Source(s):** Authors' own work

level. When we break ESG down into its components, environmental and governance factors emerge as the strongest drivers of profitability, with coefficients of 0.020 and 0.013, respectively, both significant at the 1% level. Social factors also have a positive effect (0.017), though slightly weaker and significant at the 5% level. The positive and significant coefficient on lagged ROA (ranging from 0.235 to 0.248) reflects the persistence of profitability over time, consistent with prior research on dynamic panels. Importantly, all diagnostic tests support the validity and strength of our model. The Hansen and Sargan tests confirm the reliability of our instruments, while the lack of second-order autocorrelation and a favorable Durbin-Wu-Hausman test ( $p = 0.11$ ) confirm robustness and help rule out endogeneity concerns. Findings emphasize that investing in ESG, especially in environmental and governance dimensions, can pay off financially for banks, and these results hold steady even under alternative estimation methods like Difference GMM.

*4.6 Further analysis of ESG individual components' impact on corporate profitability*

Table 10 presents the impact of ESG individual components on corporate profitability (ROA) across different firm types in China's banking sector. The findings show diverse relationships between ESG factors and profitability, influenced by the nature of the banks and their operational environments. Environmental (E) factors have a generally negative effect on profitability for State-Owned Commercial Banks (SOCBs) (–0.002, significant at the 1% level) and non-joint banks (–0.007, significant at the 1% level), likely due to the financial burden of complying with stringent environmental regulations in state-controlled sectors. This aligns with Buallay et al. (2019), who highlight how mandatory sustainability practices in heavily regulated sectors can impose short-term costs on profitability, supporting the trade-off

**Table 9.** System GMM

Variables	(1) GMM-ESG (Collapsed)	(2) GMM-E-S-G (Robust)	(3) Diff-GMM (Robustness)
Full sample	ROA	ROA	
ESG	0.010*** (0.021)		0.009*** (0.019)
Env		0.020*** (0.031)	–
Soc		0.017*** (0.035)	–
Gov		0.013** (0.024)	–
L.ROA	0.235*** (0.485)	0.248*** (0.341)	0.221*** (0.402)
Controls	YES	YES	YES
Constant	–0.162* (0.006)	–0.185* (0.008)	–0.042 (0.089)
AR (1) ( <i>p</i> -value)	0.077	0.082	0.085
AR (2) ( <i>p</i> -value)	0.732	0.566	0.701
Hansen ( <i>p</i> -value)	0.722	0.874	0.815
Sargan test (Prob > Chi2)	0.903	0.70	
Hansen test	0.722	0.874	

**Note(s):** This table reports dynamic panel estimates using System GMM and Difference GMM to assess the impact of ESG and its components on ROA. Models account for potential endogeneity with lagged dependent variables and include firm-level controls. Standard errors are robust to heteroskedasticity. Diagnostic tests (AR (1), AR (2), Hansen, and Sargan) confirm instrument validity and model specification. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively

**Source(s):** Authors' own work

theory (Pham *et al.*, 2021). In contrast, non-SOCBs (0.004, significant at the 1% level) and Joint Banks (0.005, significant at the 1% level) show positive effects, suggesting that green investments align with business strategies and enhance profitability, especially with the integration of foreign expertise in green finance. Interestingly, the positive environmental coefficient for SOCBs challenges the findings of Khan *et al.* (2024), signifying that China's unique policy landscape might enable faster returns from green investments compared to other jurisdictions. Social (S) components also yield mixed results. For SOCBs, the coefficient is negative (–0.007, significant at the 1% level), indicating that social initiatives may not yield immediate financial returns, possibly due to state-imposed inefficiencies and rigid compliance frameworks. However, for Non-SOCBs (0.012, significant at the 1% level), Joint Banks (0.010, significant at the 1% level), and Rural Banks (0.015, significant at the 1% level), positive effects are observed. These results reflect that socially responsible practices, such as community engagement and employee welfare, enhance customer trust and lead to increased business performance, findings consistent with stakeholder theory (Freeman, 2010) and the global evidence of Zhang and Lucey (2022). Specifically, rural banks' strong social performance empirically supports Yunus' (2010) microfinance model, where local engagement drives profitability by strengthening community ties. Governance (G) factors show a negative effect for urban banks (–0.003, significant at the 1% level), proposing that the complex governance requirements in urban settings increase operational costs. This finding supports the “compliance cost hypothesis” outlined by Maji and Lohia (2023), which argues that urban banks face elevated regulatory burdens that may offset governance benefits. On the other hand, non-SOCBs (–0.004, significant at the 1% level) and Rural Banks (–0.001,

**Table 10.** ESG individual components and corporate profitability

Variables	(1) SOCB ROA	(2) Non-SOCB ROA	(3) Joint ROA	(4) Non-joint ROA	(5) Rural ROA	(6) Urban ROA
Env	-0.002*** (0.001)	0.004*** (0.002)	0.005*** (0.002)	-0.007*** (0.004)	0.003*** (0.002)	-0.006*** (0.002)
Soc	-0.007*** (0.003)	0.012*** (0.002)	0.010*** (0.002)	0.013*** (0.002)	0.015*** (0.002)	0.001 (0.002)
Gov	-0.005** (0.003)	-0.004*** (0.001)	0.001* (0.001)	0.0002* (0.001)	-0.001** (0.001)	-0.003*** (0.001)
Size	0.004*** (0.002)	0.012*** (0.001)	0.003*** (0.001)	0.006*** (0.002)	0.013*** (0.001)	0.006*** (0.002)
Lev	-0.004*** (0.010)	-0.145*** (0.008)	-0.130*** (0.009)	-0.120*** (0.008)	-0.140*** (0.010)	-0.120*** (0.009)
CAR	0.042** (0.060)	0.121** (0.050)	0.170** (0.055)	0.150** (0.065)	0.150** (0.055)	0.120** (0.060)
GRW	0.006*** (0.005)	0.038*** (0.004)	0.001*** (0.004)	0.003*** (0.0505)	0.034*** (0.004)	0.022*** (0.005)
Age	-0.045** (0.003)	-0.013** (0.002)	-0.041** (0.003)	-0.002** (0.004)	-0.012** (0.003)	-0.004** (0.003)
B_Indp	-0.010** (0.005)	-0.012** (0.004)	-0.011** (0.004)	-0.009** (0.005)	-0.015** (0.004)	-0.008** (0.005)
Bsize	0.006 (0.003)	0.002 (0.002)	0.004* (0.002)	0.001 (0.003)	0.005** (0.002)	-0.002 (0.003)
Top1	0.004*** (0.006)	0.041*** (0.005)	0.081*** (0.005)	0.033*** (0.006)	0.046*** (0.006)	0.030*** (0.005)
Duality	-0.004 (0.001)	0.005*** (0.002)	0.006** (0.001)	0.002 (0.001)	0.005*** (0.002)	0.001 (0.001)
Bgender	0.007*** (0.003)	0.014*** (0.002)	0.012*** (0.002)	0.006*** (0.003)	0.013*** (0.002)	0.006*** (0.003)
Liq	0.009*** (0.002)	0.013*** (0.001)	0.014*** (0.003)	0.009** (0.002)	0.015*** (0.002)	0.006** (0.003)
Constant	-0.162*** (0.006)	-0.185*** (0.008)	-0.042*** (0.009)	-0.294*** (-0.026)	-0.042*** (0.089)	-0.005*** (0.009)
Observations	55	248	96	207	52	100
R-squared	0.921	0.892	0.851	0.882	0.912	0.874
Number of firms	5	37	10	32	10	17
Firm FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

**Note(s):** This table presents fixed effects regression estimates of the relationship between the environmental (Env), social (Soc), and governance (Gov) components of ESG performance and return on assets (ROA), across different bank categories. All models include firm and year fixed effects. Robust standard errors are shown in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively

**Source(s):** Authors' own work

significant at the 5% level) also show negative coefficients, potentially reflecting the costs of implementing governance structures in environments with limited regulatory support. Notably, Joint Banks report a marginally positive governance effect (0.001), extending the insights of [Bătae et al. \(2021\)](#) by illustrating how joint ventures' hybrid governance models, often combining domestic and foreign oversight, can better balance compliance efforts with performance gains. The results suggest that the nature of the bank (state-owned vs private, urban vs rural) plays a significant role in how ESG factors influence profitability. State-owned banks are likely constrained by government priorities that emphasize non-financial objectives, resulting in less favorable ESG-profitability relationships. In contrast, private and joint banks benefit more from market-driven ESG practices, where green and social initiatives align with

profitability goals. Joint banks, in particular, benefit from cross-border governance integration, while rural banks leverage social initiatives to foster community connections and improve financial performance, echoing the success model of microfinance institutions like Grameen Bank (Ahmed Chowdhury and Somani, 2020; Yunus *et al.*, 2010). These findings reinforce the importance of tailoring ESG strategies to a firm's institutional and operational context to maximize financial and societal value.

#### 4.7 Summary of hypothesis testing results

To consolidate the empirical findings across different models and subgroups, Table 11 summarizes the outcomes of hypothesis testing. The results confirm that ESG-performance relationships vary across bank types and components. While positive profitability effects dominate in private and joint-stock banks, state-owned and urban banks exhibit more constrained or negative associations, especially in the environmental and governance dimensions.

## 5. Conclusion, implications, and limitations

### 5.1 Conclusion

The study analyzes the impact of ESG performance on the corporate profitability (CP) of listed Chinese commercial banks, considering their nature difference from 2012 to 2022 with a focus

**Table 11.** Summary of hypothesis testing results

Hypothesis	Description	Result	Supported?	Remarks
H1a	ESG performance positively influences profitability	Supported in Non-SOCBs, JSCBs, RCBs	Yes	Strong positive coefficients at 1% level
H1b	ESG performance negatively influences profitability	Supported in SOCBs, UCBs	Yes	SOCBs (−0.012), UCBs (−0.002)
H2a	Environmental performance positively impacts profitability	Supported in Non-SOCBs, JSCBs	Yes	Coefficients: 0.004 and 0.005 at 1% level
H2b	Environmental performance negatively impacts profitability	Supported in SOCBs, Non-JSCBs	Yes	Coefficients: −0.002 and −0.007 at 1% level
H3a	Social performance positively impacts profitability	Supported in Non-SOCBs, JSCBs, RCBs	Yes	Strongest for RCBs (0.015), all significant at 1%
H3b	Social performance negatively impacts profitability	Supported in SOCBs	Yes	Coefficient: −0.007 at 1% level
H4a	Governance performance positively impacts profitability	Weak evidence in JSCBs only	Partially	JSCBs (0.001, marginal)
H4b	Governance performance negatively impacts profitability	Supported in UCBs, Non-SOCBs, RCBs	Yes	Negative coefficients across groups, significant at 1–5%

**Note(s):** This table summarizes the results of hypotheses H1a–H4b across different bank types. The findings reflect the heterogeneity in the relationship between ESG components (Environmental, Social, and Governance) and corporate profitability (ROA). “Supported” indicates statistical significance in the expected direction; “Not Supported” denotes insignificant or opposite-direction results. Significance levels are based on  $p$ -values: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$

**Source(s):** Authors' own work

on how institutional characteristics shape this relationship. The findings highlight significant differences across various types of banks, recommending that ESG's impact on profitability is not uniform but rather contingent on the bank's nature and institutional context. For state-owned commercial banks (SOCBs), the study reveals a negative association between ESG performance and profitability, which supports the trade-off theory. This indicates that the costs associated with ESG compliance, often driven by policy mandates, may outweigh immediate financial gains. On the other hand, non-state-owned commercial banks (non-SOCBs), joint-stock commercial banks (JSCBs), and rural commercial banks (RCBs) generally experience a positive relationship between ESG performance and profitability. This finding aligns with stakeholder theory, which advocates that market-oriented institutions can convert sustainability efforts into competitive advantages, thereby enhancing long-term financial performance.

The study also emphasizes the urban-rural divide in ESG impacts. Urban banks often face challenges due to compliance-heavy ESG frameworks, while rural banks leverage community-focused initiatives that contribute to profitability. These findings are robust across various econometric techniques, including system GMM and instrumental variable approaches, underscoring that the financial implications of ESG initiatives should be assessed within the specific regulatory and institutional context of each bank type. Ultimately, the study calls for tailored ESG strategies that consider the unique characteristics and operating environments of different banks.

### *5.2 Theoretical and practical implications*

The varying impacts of ESG performance across different types of banks offer valuable theoretical and practical insights. Theoretically, this study integrates multiple perspectives. It affirms the role of stakeholder theory in explaining ESG-driven success within market-oriented, flexible institutions, while also showing that trade-off theory and legitimacy theory better capture the ESG adoption challenges faced by policy-driven or geographically constrained banks. This highlights the importance of contextualizing ESG efforts rather than applying uniform expectations across institutions. Additionally, institutional theory (DiMaggio and Powell, 1983) provides a compelling framework for understanding the variation in ESG practices across different types of banks. State-owned banks, shaped by strong regulatory mandates and public service obligations, primarily operate under coercive institutional pressures rules, laws, and policies imposed by the state. These banks often pursue ESG compliance as a means of fulfilling national objectives, such as environmental protection and social equity, rather than immediate financial gain. Their ESG engagement is largely driven by alignment with government-led sustainability agendas, exemplified by instruments like the Green Credit Guidelines and financial inclusion mandates.

In contrast, joint-stock and urban commercial banks are more exposed to mimetic pressures, which arise from the tendency to imitate successful peers in uncertain or competitive environments. These banks adopt ESG practices strategically, not only to remain competitive but also to meet evolving stakeholder expectations and signal legitimacy to investors. Similarly, rural commercial banks experience a mix of mimetic and normative pressures, where professional standards and community engagement norms influence their ESG behavior often focusing on social sustainability through local development and inclusive financing.

By explicitly recognizing how different types of institutional pressures shape ESG motivation coercive for state-owned, mimetic for market-driven, and normative for community-based institutions this study adds theoretical nuance to the ESG-performance nexus. Understanding these dynamics helps explain why the financial implications of ESG adoption differ across bank types. It also underscores the necessity of tailoring ESG strategies to fit each bank's institutional context and prevailing pressure mechanisms.

Practically, these insights stress the urgency of designing tailored ESG strategies based on the institutional nature. For instance:

- (1) State-owned banks could benefit from more explicit regulatory guidance and preferential treatment when implementing ESG-related lending. China's Green Credit Guidelines (2012) and PBOC's Green Financial Reform Pilot Zones already represent early examples of tiered ESG regulation, offering flexible policy implementation in regions like Zhejiang and Guangdong. These initiatives can serve as scalable templates for differentiated ESG mandates.
- (2) Joint-stock banks, such as China Merchants Bank, have successfully issued green bonds and ESG-linked loans, reflecting the feasibility of market-based ESG strategies. These banks should be encouraged to scale such efforts with incentives like tax deductions for green financing returns.
- (3) Rural commercial banks, such as Jiangsu Rural Commercial Bank, have pioneered microfinance programs supporting sustainable agriculture. These banks could be further supported with policy subsidies to expand ESG-linked community development initiatives, reinforcing their role in rural revitalization.

From a regulatory standpoint, our findings advocate for the adoption of tiered ESG frameworks that reflect institutional diversity. Rather than applying uniform ESG disclosure requirements, regulators like the China Banking and Insurance Regulatory Commission (CBIRC) should differentiate ESG benchmarks for state-owned, joint-stock, and rural banks. For example, CBIRC's 2021 green finance guidelines can evolve into tiered systems by linking ESG compliance to each bank's ownership, market exposure, and regional role.

Investors should also interpret ESG signals within institutional contexts. A high ESG score at a joint-stock bank may indicate operational efficiency and market leadership, while a similar score at a state-owned bank may reflect regulatory compliance without profitability gains. Contextual awareness is thus essential for accurate ESG valuation.

Policymakers must recognize these institutional dynamics. ESG policies and incentives should be stratified, e.g. introducing ESG performance-based subsidies for state-owned banks pursuing long-term green infrastructure projects, while allowing private banks more flexibility to innovate with ESG-linked investment products.

Finally, bank managers must customize ESG strategies. State-owned banks should align ESG efforts with national strategic goals (e.g. "Dual Carbon" targets), even if financial returns are delayed. Joint-stock banks should integrate ESG into market differentiation strategies. Rural commercial banks, with their community focus, should emphasize social ESG dimensions such as financial inclusion, digital literacy, and green microfinance.

### 5.3 Future research directions

Future studies could test the generalizability of our findings across different regulatory environments, particularly by comparing China's state-driven model with Western market-based systems. Cross-country analyses with diverse ESG frameworks would enhance the understanding of global ESG profitability dynamics. Additionally, with the growing influence of digital banking and fintech, research should explore how these innovations interact with ESG strategies and influence firm sustainability and profitability. Further, this study relied on CNRDS and CSMAR databases, which, while authoritative for Chinese listed firms, are focused on domestic frameworks. This may limit generalizability to other markets or unlisted firms, and CNRDS's ESG metrics may differ from global standards. To address this, future research could draw on international ESG datasets such as Refinitiv, Bloomberg, or MSCI to enhance comparability and external validity. Finally, future work could adopt Bayesian analytical approaches as an alternative to frequentist methods, allowing for the integration of prior knowledge and offering a more nuanced interpretation of uncertainty in ESG-performance relationships.

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