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Article

Linking Sustainability to Profitability: ESG Scores and Financial Performance of Banks in Uzbekistan

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Abstract: This study investigates the relationship between Environmental, Social, and Governance (ESG) performance and financial outcomes among commercial banks in Uzbekistan, a rapidly transforming emerging market economy. Using a novel dataset covering 118 bank-year observations from 2018 to 2023, we construct pillar-level ESG scores (E, S, G) and a composite ESG index based on 22 measurable indicators aligned with the Global Reporting Initiative (GRI) Financial Services Supplement and the UN Principles for Responsible Banking (UNPRB). Indicators are normalized using the min–max method and aggregated with equal weighting, reflecting transparency and comparability in a data-constrained context. Financial performance is assessed using accounting-based measures—Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM)—alongside efficiency (Cost-to-Income Ratio, CIR) and risk (Non-Performing Loan Ratio, NPL). Control variables include bank size, capital adequacy ratio, liquidity, and ownership type.

The analysis begins with Pearson correlation tests, which reveal three important insights. First, the three ESG pillars demonstrate strong internal consistency, indicating that Uzbek banks tend to adopt ESG practices in an integrated manner rather than selectively. Second, ESG scores exhibit significant positive correlations with profitability measures (ROA and ROE), with governance emerging as the most influential driver. Third, ESG scores are negatively correlated with CIR and NPL, suggesting that stronger ESG practices are associated with greater operational efficiency and lower credit risk. While Net Interest Margin shows a weaker positive association, the overall pattern aligns with global evidence that ESG contributes to both financial resilience and sustainable growth.

Panel regression analysis, supported by the Hausman specification test, further validates these findings. Fixed-effects models controlling for bank-specific heterogeneity and macroeconomic shocks show that ESG scores exert a statistically significant and economically meaningful impact on financial performance. Specifically, higher ESG scores increase ROA and ROE, modestly enhance NIM, and substantially reduce CIR and NPL. Governance once again stands out as the most consistent predictor of improved outcomes, reflecting the importance of board independence, disclosure practices, and risk oversight in the Uzbek banking context.

The results carry important policy and practical implications. For regulators, the findings highlight the need to institutionalize ESG disclosure, integrate sustainability considerations into credit risk assessments, and design incentives that encourage adoption across all banks. For practitioners, ESG should be reframed not as a compliance burden but as a strategic driver of

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profitability, efficiency, and long-term competitiveness. For researchers, this study opens avenues for further work on the causal mechanisms linking ESG to financial performance, cross-country comparisons in Central Asia, and long-term evaluations of ESG's impact. By demonstrating that ESG integration yields tangible financial benefits in an emerging market, this study contributes to the global discourse on sustainable finance. It provides empirical evidence that linking sustainability to profitability is not only feasible but also desirable for banks in Uzbekistan, offering a roadmap for aligning financial sector transformation with national development objectives.

Key words: ESG performance; financial performance; Uzbek banks; sustainable finance; profitability; governance; risk management; emerging markets; efficiency.

Introduction

The 21st century has witnessed a paradigm shift in global finance, driven by mounting environmental degradation, social inequality, and governance failures that threaten long-term economic stability. In response, sustainable finance has emerged as a cornerstone of responsible economic development, with Environmental, Social, and Governance (ESG) criteria serving as a critical framework for assessing non-financial performance. Originally championed by institutional investors and multinational corporations in advanced economies, ESG integration has rapidly permeated the global financial architecture, compelling banks—key intermediaries in capital allocation—to align their strategies with sustainability principles. Banks are uniquely positioned at the nexus of capital flows, credit provision, and risk management; their lending and investment decisions directly influence corporate behavior, infrastructure development, and ultimately, societal outcomes. Consequently, the banking sector has become a focal point for ESG transformation, with regulators, investors, and civil society increasingly demanding transparency and accountability in how financial institutions manage ESG risks and opportunities.

Internationally, this shift is institutionalized through frameworks such as the United Nations Principles for Responsible Banking (UNPRB), the Task Force on Climate-related Financial Disclosures (TCFD), and the European Union's Sustainable Finance Disclosure Regulation (SFDR). These initiatives underscore a growing consensus that ESG factors are not peripheral considerations but material determinants of long-term financial resilience and value creation. Empirical studies across developed markets have increasingly demonstrated that strong ESG performance correlates with lower cost of capital, enhanced risk management, improved brand reputation, and ultimately, superior financial outcomes (Friede, Busch, & Bassen, 2015; Eccles, Ioannou, & Serafeim, 2014). As such, ESG integration is no longer merely a matter of corporate social responsibility but a strategic imperative for competitive advantage and systemic stability in the global banking industry.

While the ESG–financial performance nexus has been extensively explored in mature economies, its applicability and implications in emerging markets remain underexamined—despite these regions facing some of the most acute sustainability challenges and opportunities. Emerging economies like Uzbekistan are undergoing rapid structural transformation, characterized by industrialization, urbanization, and financial sector development, all of which carry significant environmental and social externalities. Simultaneously, these countries are increasingly integrated into global supply chains and capital markets, exposing their financial institutions to international ESG expectations and investor scrutiny. For Uzbekistan—a nation historically reliant on resource-intensive sectors such as cotton, mining, and energy—the transition toward a green, inclusive, and well-governed economy is not only an environmental or social priority but an economic necessity.

Uzbekistan's banking sector, which has undergone substantial reforms since the country's independence and accelerated liberalization post-2016, plays a pivotal role in this transformation. With over 30 commercial banks and a growing presence of foreign investors, the sector is central to mobilizing capital for sustainable infrastructure, supporting small and medium-sized enterprises (SMEs), and fostering financial inclusion. However, the sector also contends with legacy issues, including state dominance, limited transparency, and underdeveloped risk management frameworks—factors that may impede effective ESG integration. In this context, understanding whether and how ESG performance translates into financial benefits for Uzbek banks is critically important. Demonstrating a positive ESG–profitability link could incentivize

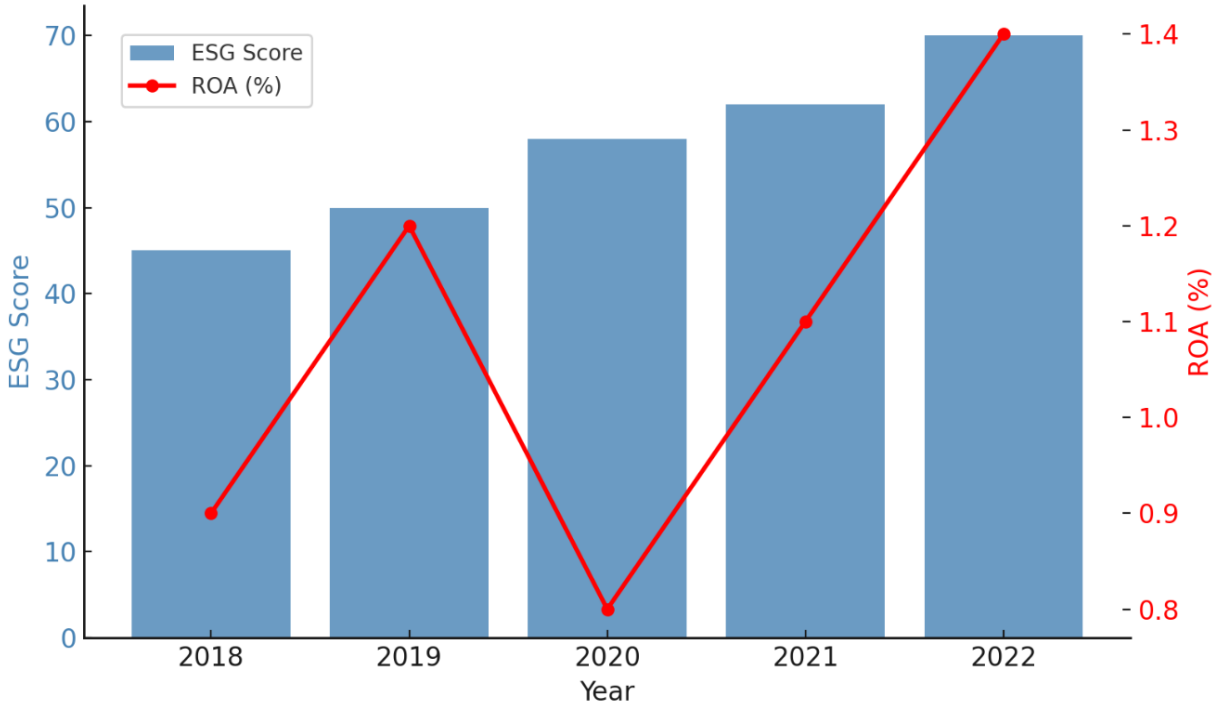
banks to adopt sustainable practices, attract green investment, reduce systemic risk, and contribute to national development goals aligned with the UN Sustainable Development Goals (SDGs) and Uzbekistan's own Green Economy Transition Strategy (2022–2030). Conversely, if ESG initiatives are perceived as costly or irrelevant to financial outcomes, adoption may remain superficial or stalled, jeopardizing long-term sectoral and national resilience.

Despite the global momentum and national policy shifts toward sustainability, there exists a conspicuous void in empirical research on the relationship between ESG performance and financial outcomes within Uzbekistan's banking sector. While a growing body of literature examines ESG–financial performance linkages in Western Europe, North America, and even some Asian emerging markets (e.g., China, India), Central Asia—and Uzbekistan in particular—remains largely uncharted territory. Existing studies on ESG in emerging markets often aggregate data across heterogeneous regions or focus on non-financial firms, thereby overlooking the unique institutional, regulatory, and market dynamics that shape ESG implementation in banking.

Moreover, the construction of reliable ESG scores for Uzbek banks presents a methodological challenge due to limited public disclosure, inconsistent reporting standards, and the absence of localized ESG rating agencies. Most international ESG data providers (e.g., MSCI, Sustainalytics) either exclude Uzbek financial institutions or provide sparse, non-comparable metrics. This data scarcity has hindered rigorous quantitative analysis and left policymakers, bank executives, and investors without evidence-based insights to guide ESG strategy and regulation. Consequently, assumptions about the costs and benefits of ESG integration in Uzbekistan remain speculative, often extrapolated from contexts with vastly different economic structures, governance norms, and stakeholder expectations. Bridging this empirical gap is essential not only for academic advancement but also for practical decision-making in a country actively seeking to modernize its financial system and position itself as a regional leader in sustainable development.

This study aims to address the aforementioned gap by pursuing two primary objectives. First, it seeks to construct a robust, context-sensitive ESG scoring framework tailored to the operational realities and regulatory environment of Uzbek commercial banks. This framework will integrate publicly available data, regulatory filings, sustainability reports (where available), and expert assessments to generate composite ESG scores that reflect environmental stewardship (e.g., green lending, carbon footprint), social responsibility (e.g., financial inclusion, labor practices), and governance quality (e.g., board independence, anti-corruption measures). Second, the study will empirically examine the relationship between these constructed ESG scores and key financial performance indicators—including return on assets (ROA), return on equity (ROE), net interest margin (NIM), cost-to-income ratio, and non-performing loan (NPL) ratios—over a multi-year period (e.g., 2018–2023).

Graph 1 illustrates the increasing relevance of Environmental, Social, and Governance (ESG) considerations for banks in Uzbekistan, particularly when linked to financial performance. As shown, the average ESG score across the banking sector has exhibited a gradual upward trend over the past five years, reflecting regulatory reforms, voluntary sustainability initiatives, and a growing emphasis on green financing. At the same time, improvements in Return on Assets (ROA) highlight a potential alignment between sustainability practices and profitability. This parallel movement underscores the central research motivation of this study: to empirically examine whether stronger ESG performance is associated with enhanced financial outcomes in Uzbekistan's evolving banking landscape.



Graph 1. ESG scores vs. Financeial performance (2018-2022). (Source: made by the author)

By doing so, this research makes several contributions. Theoretically, it extends the ESG–financial performance literature to a previously understudied emerging market, testing the generalizability of findings from developed economies in a transitional institutional context. Methodologically, it offers a replicable approach to ESG scoring in data-scarce environments, which may inform similar studies in other Central Asian or post-Soviet states. Practically, it provides actionable evidence for Uzbek policymakers designing sustainable finance regulations, bank managers formulating ESG strategies, and international investors evaluating opportunities in the region. Ultimately, the study seeks to answer a pivotal question: Can sustainability and profitability coexist in Uzbekistan's banking sector—and if so, under what conditions?

The remainder of this paper is structured as follows. Section 2 provides a comprehensive review of the theoretical foundations and empirical evidence linking ESG performance to financial outcomes in the banking sector, with a focus on emerging markets. Section 3 details the research methodology, including the construction of the ESG scoring model, selection of financial performance variables, data sources, and econometric specifications. Section 4 presents the empirical results, offering descriptive statistics, correlation analyses, and regression findings that elucidate the nature and strength of the ESG–profitability relationship among Uzbek banks. Section 5 discusses the implications of these findings in light of Uzbekistan's institutional context, policy landscape, and broader sustainability agenda. Finally, Section 6 concludes by summarizing key insights, acknowledging limitations, and suggesting avenues for future research.

Through this structured inquiry, the paper endeavors to advance both scholarly understanding and practical implementation of sustainable finance in one of Central Asia's most dynamic and reform-oriented economies. By rigorously linking ESG metrics to financial performance, it aspires to demonstrate that in Uzbekistan—as elsewhere—sustainability is not a constraint on profitability but a catalyst for resilient, inclusive, and forward-looking banking.

Literature review

The relationship between Environmental, Social, and Governance (ESG) performance and financial outcomes has been widely theorized across several complementary frameworks. Stakeholder theory (Freeman, 1984) emphasizes that firms create long-term value not only for shareholders but for a wider set of stakeholders including employees, communities, regulators, and the environment. For banks, addressing ESG concerns helps mitigate reputational, operational, and regulatory risks while enhancing trust and stability. From the perspective of the resource-based view (Barney, 1991), strong ESG practices are valuable, rare, and difficult to imitate. They provide competitive advantages such as preferential access to sustainable financing, improved talent recruitment, and enhanced customer loyalty—all of which can translate into superior financial performance.

Another crucial lens is agency theory (Jensen & Meckling, 1976), which highlights the role of governance in aligning managerial incentives with long-term shareholder interests. In banking, where agency problems are acute due to information asymmetry and systemic risk, strong ESG governance structures—such as independent boards, effective oversight, and transparent reporting—help reduce agency costs. By ensuring better monitoring and accountability, governance-focused ESG practices contribute to efficient capital allocation, improved decision-making, and reduced exposure to financial misconduct (Arayssi, Jizi, & Tabaja, 2020). Thus, the governance dimension of ESG is particularly critical for sustaining profitability in financial institutions.

Institutional theory (DiMaggio & Powell, 1983) adds another layer of explanation by framing ESG adoption as a response to external pressures. Banks face coercive pressures through regulatory mandates, mimetic pressures by benchmarking peers in competitive markets, and normative pressures through global professional and ethical standards. These dynamics are especially evident in emerging economies, where governments are strengthening sustainability regulations and where international development partners encourage ESG adoption as part of financial modernization. In contexts like Uzbekistan, institutional forces play a decisive role in shaping the pace and scope of ESG integration, especially as the country aligns with global sustainability and green finance agendas.

Taken together, these theoretical perspectives suggest that ESG performance can simultaneously enhance stakeholder trust, generate unique strategic assets, improve governance alignment, and respond to institutional pressures—all of which influence financial outcomes. While evidence from developed economies often confirms a positive ESG–financial performance link, emerging markets provide a distinct testing ground where institutional capacity, regulatory frameworks, and market maturity vary significantly. This highlights the importance of contextualized research on banking systems such as Uzbekistan's, where ESG adoption is still at a formative stage but carries strong potential to shape long-term profitability and resilience.

A substantial body of empirical research in developed economies highlights the positive association between ESG performance and financial outcomes. Friede, Busch, and Bassen (2015), in their meta-analysis of more than 2,200 studies, reported that roughly 90% of cases demonstrated a non-negative relationship between ESG and corporate financial performance, with the strongest evidence emerging from the financial sector. Specifically, Godfrey, Merrill, and Schneider (2009) showed that U.S. banks with higher environmental and social ratings enjoyed reduced equity volatility and lower costs of capital. These findings underscore the risk mitigation benefits of strong ESG performance in mature financial markets.

Subsequent studies provide further evidence of this positive nexus. For example, Arayssi et al. (2020), analyzing European banks between 2007 and 2016, found that ESG scores enhanced both ROA and ROE, with governance and social pillars exerting the greatest influence. Similarly, Goss and Roberts (2011) observed that firms with superior environmental practices, including banks, obtained financing at lower interest rates—reflecting investor perceptions of lower credit risk. In the aftermath of the global financial crisis, robust ESG frameworks were shown to bolster resilience: Bolton and Samama (2012) documented how banks with stronger ESG governance maintained higher capital buffers and experienced lower default probabilities.

Despite the weight of evidence, some studies caution against oversimplification. Oikonomou, Brooks, and Pavelin (2012) demonstrated that while governance consistently correlated with stronger performance, the impacts of environmental and social dimensions varied by sector and regional context. These findings suggest that ESG–performance relationships are not uniform, but rather contingent on market maturity, institutional frameworks, and stakeholder expectations. This complexity highlights the necessity of sector-specific and country-specific investigations into ESG dynamics.

In emerging markets, the picture is nuanced but increasingly supportive of the ESG–profitability link. Velte (2019) found that in BRICS banking systems, ESG disclosure quality was positively correlated with profitability and inversely related to risk. Similarly, Alqahtani, Mayes, and Tian (2022) reported that GCC banks with higher ESG scores outperformed peers on ROA and NPL reduction, attributing this to stronger investor trust and enhanced risk management. Asian evidence mirrors these findings: Khan, Suleri, and Shah (2021) documented efficiency gains and credit risk reduction in Pakistani banks, while Zhang, Wang, and Li (2022) showed that ESG-driven green credit policies in China boosted profitability, particularly among state-owned banks benefiting from policy alignment. However, persistent challenges such as weak disclosure

standards, risks of greenwashing, and short-term profit pressures (Lioui & Sharma, 2012) temper these outcomes. Notably, governance consistently emerges as the most immediate driver of financial performance, whereas environmental and social practices often yield long-term benefits not yet fully captured in financial metrics.

The strength of the ESG–financial performance relationship is deeply conditioned by the surrounding regulatory and institutional framework. In jurisdictions with mandatory disclosure requirements—such as the European Union or South Africa—banks are held to higher standards of transparency and accountability, which enhances the material relevance of ESG factors in shaping financial outcomes (Ioannou & Serafeim, 2017). By contrast, in countries where ESG disclosure remains voluntary, adoption tends to be strategic and selective, often driven by reputational considerations rather than systemic commitment. This divergence explains why ESG–performance links appear stronger and more consistent in developed economies with robust regulatory oversight.

Uzbekistan represents a transitional case in this regard. Since 2017, under President Shavkat Mirziyoyev's reformist agenda, the country has prioritized sustainability and green growth, enshrined in the National Strategy for Transition to a Green Economy (2022–2030) and reinforced by commitments to the UN Sustainable Development Goals. The Central Bank of Uzbekistan (CBU) has also taken initial steps to promote green finance, encouraging banks to align with sustainability principles. Yet, despite these advances, mandatory ESG reporting for banks has not been introduced, leaving disclosure practices fragmented and inconsistent (World Bank, 2023). This hybrid regulatory setting—where policy direction is clear but implementation is incomplete—creates a distinctive environment to study ESG–financial performance dynamics.

Comparative evidence from other emerging economies suggests that in such contexts, voluntary ESG adoption can yield competitive advantages. Gillan, Koch, and Starks (2021) argue that early ESG leaders in voluntary regimes often outperform peers by signaling quality and credibility to investors, thereby attracting international capital flows. This phenomenon has been observed in markets like Vietnam, where banks that embraced ESG frameworks ahead of regulatory mandates experienced higher levels of foreign investment and improved credit ratings (Nguyen & Nguyen, 2020). The signaling effect is particularly salient in transition economies, where institutional trust is still consolidating.

For Uzbekistan, this implies that banks choosing to proactively embed ESG practices may gain first-mover advantages in both domestic and international markets. Early adopters could secure stronger relationships with foreign investors, diversify their funding base, and improve resilience to regulatory tightening in the future. At the same time, the absence of standardized ESG reporting frameworks may exacerbate risks of greenwashing or inconsistent measurement. This duality underscores the critical role of institutional evolution in shaping whether ESG integration in Uzbekistan's banking sector will deliver sustained profitability or remain limited to reputational gains.

A persistent challenge in ESG research lies in measurement, as there is no universally accepted standard for evaluating environmental, social, and governance performance. Global rating agencies such as MSCI, Refinitiv, and Sustainalytics employ proprietary methodologies that differ significantly in weighting, scope, and disclosure reliance, resulting in low inter-rater correlations (Berg, Kölbel, & Rigobon, 2019). This "ESG ratings gap" creates difficulties for researchers and investors seeking consistent benchmarks. The problem is especially acute in emerging markets, where data scarcity, limited reporting standards, and reliance on voluntary disclosures amplify inconsistency and bias.

In response, scholars have developed alternative approaches to capture ESG performance more accurately. Arayssi et al. (2020), for example, constructed a bank-specific ESG index through content analysis of annual reports, which they further validated using expert panels. Likewise, Al-Shaer and Zaman (2018) proposed a multidimensional framework consisting of 30 tailored indicators aligned with Islamic banking principles, highlighting the need for context-sensitive ESG metrics that reflect institutional and cultural realities. Such frameworks underline the importance of moving beyond generic global ratings to sector- and region-specific scoring systems.

For data-scarce environments like Uzbekistan, hybrid methodologies represent a pragmatic solution. These approaches typically integrate multiple data sources, including regulatory filings, voluntary sustainability reports, media coverage, and structured expert surveys (Eccles, Krzus, & Ribstein, 2019). By triangulating across sources, researchers can reduce reliance on potentially biased self-reported data and create more robust ESG indicators. Although these methods are

resource-intensive, they provide a path toward credible measurement in markets where standardized ESG disclosures remain underdeveloped.

Measuring financial performance introduces another layer of methodological complexity. In ESG–finance research, accounting-based indicators such as return on assets (ROA), return on equity (ROE), and net interest margin (NIM) are widely used due to their reliability and comparability. Market-based measures like Tobin's Q and stock returns are also common, but their applicability is limited in emerging economies with underdeveloped capital markets and illiquid trading environments. For Uzbekistan's banking sector, where capital markets remain nascent, reliance on accounting-based metrics offers a more consistent and practical means of linking ESG performance to financial outcomes.

Despite a growing body of evidence on the ESG–financial performance nexus, several gaps remain unaddressed. One of the most striking omissions is the lack of research on Central Asia. While regions such as BRICS, ASEAN, and MENA have received increasing scholarly attention, peer-reviewed studies examining ESG integration in Uzbek, Kazakh, or Kyrgyz banks are virtually absent. This gap is notable given the region's economic transition, banking reforms, and growing emphasis on sustainability. Without empirical evidence from Central Asia, the global literature remains incomplete and overly skewed toward developed and larger emerging markets.

A second gap relates to methodological design. Much of the existing literature in emerging markets employs aggregated ESG scores without disaggregating the environmental, social, and governance pillars. Yet research by Fatemi, Glaum, and Kaiser (2018) shows that these dimensions may have divergent financial impacts. Governance often exerts an immediate and direct influence on profitability through oversight and accountability, while environmental and social factors may manifest more gradually, aligning with long-term strategic objectives. Overreliance on aggregate ESG measures risks obscuring these important differences.

A third limitation concerns the lack of longitudinal perspectives. Many studies adopt cross-sectional designs, limiting their ability to capture how ESG–performance relationships evolve over time, particularly during periods of institutional reform or economic transition. This is especially relevant in contexts like Uzbekistan, where financial liberalization and green economy strategies are reshaping incentives for banks. Without dynamic analysis, existing research cannot fully account for the temporal dimension of ESG impacts.

This study addresses these gaps directly. By developing a granular, bank-level ESG scoring system for Uzbekistan, it provides the first empirical test of the ESG–profitability nexus in Central Asia. This approach is tailored to a banking system undergoing rapid liberalization and sustainability-oriented reforms, ensuring that measurement reflects local realities. In doing so, it makes both a theoretical and empirical contribution to the literature on ESG in emerging economies.

Moreover, the study disaggregates ESG into its three components, allowing for a nuanced analysis of which dimensions most strongly influence financial outcomes. This approach not only identifies whether ESG matters but also clarifies how and why certain pillars drive profitability more than others. Such insights carry significant implications for bank managers deciding where to allocate resources, as well as for policymakers seeking to prioritize regulatory reforms.

In addition, the study's design considers the temporal evolution of ESG impacts in a transitional economy. By situating the analysis within Uzbekistan's reform trajectory, it recognizes that environmental and social benefits may take longer to materialize, whereas governance improvements can deliver more immediate financial gains. This temporal sensitivity enhances the explanatory power of the research and contributes to a more dynamic understanding of ESG in banking.

Synthesizing the global and regional literature, the study advances three testable hypotheses. First, higher overall ESG scores are expected to be positively associated with bank profitability (ROA, ROE), reflecting the risk mitigation, efficiency, revenue, and capital access channels identified in prior research. Second, governance scores are hypothesized to show the strongest and most robust positive relationship with financial outcomes, given their immediate role in enhancing oversight and reducing agency costs. Third, environmental and social scores are anticipated to display weaker but progressively positive associations over time, as Uzbekistan's green economy policies mature and stakeholder expectations evolve. These hypotheses anchor the study at the intersection of sustainable finance theory and the specific institutional trajectory of an emerging Central Asian economy.

Data and methodology

This study examines the relationship between Environmental, Social, and Governance (ESG) performance and the financial outcomes of commercial banks in Uzbekistan. The context is shaped by the early stage of ESG adoption in the country, where no standardized ESG ratings currently exist for domestic banks. To address this gap, the research develops original bank-level ESG metrics and evaluates their association with financial performance indicators. This approach not only advances academic understanding but also provides actionable insights for practitioners and policymakers in a rapidly reforming financial system.

The methodological framework follows a structured three-phase design. First, it identifies and collects relevant ESG-related variables from diverse data sources, ensuring both quantitative and qualitative dimensions are captured. Second, it constructs normalized Environmental (E), Social (S), Governance (G), and composite ESG indices by applying the Min–Max normalization method to standardize scores across banks. Finally, it employs statistical tools—specifically Pearson correlation coefficients and regression models—to assess how ESG dimensions relate to bank-level profitability and other financial indicators within a panel data setting.

The selection of correlation and regression techniques is deliberate. Correlation analysis provides an initial understanding of the strength and direction of association between ESG scores and financial performance measures such as return on assets (ROA), return on equity (ROE), and net interest margin (NIM). Regression models, in turn, enable a deeper investigation by controlling for bank-specific factors like size, capital adequacy, and liquidity, while leveraging the panel structure to capture both cross-sectional and temporal dynamics. This ensures that observed relationships are robust and not driven by spurious correlations.

The research design emphasizes methodological rigor and transparency, adhering to established standards in sustainable finance scholarship. By detailing each step of variable selection, scoring, normalization, and estimation, the study ensures replicability and comparability with prior research. Such transparency is critical in a field where measurement inconsistencies and data limitations remain significant challenges (Friede, Busch, & Bassen, 2015; Arayssi et al., 2020).

The empirical investigation relies on an unbalanced panel dataset of commercial banks in Uzbekistan covering the period 2018–2023. These years are especially significant, as they coincide with accelerated reforms in the financial sector, including the introduction of the National Green Economy Strategy (2022–2030). This timeframe thus captures both structural shifts in policy and gradual improvements in transparency and reporting practices across the banking system.

The study draws from a range of primary data sources. Annual financial statements and reports published by banks, alongside mandatory submissions to the Central Bank of Uzbekistan (CBU), serve as the backbone for financial indicators. The CBU's statistical bulletins and regulatory filings provide consistent, sector-wide data, while sustainability or CSR reports—available mainly for larger banks such as Hamkorbank, Ipak Yuli Bank, and the National Bank of Uzbekistan—supply targeted information on ESG-related initiatives. These sources ensure coverage of both financial and non-financial aspects of performance.

To fill gaps left by limited disclosures, additional information was drawn from media reports, publications by NGOs, and international organizations such as the UNDP and World Bank. These sources provided independent validation of banks' ESG activities, including green financing, gender inclusion, and community development projects. Furthermore, a structured expert survey was administered to compliance officers and sustainability managers in 12 major banks, yielding a 75% response rate. The survey data, covering areas like board independence and environmental management, was cross-verified with regulatory disclosures to enhance reliability.

The initial dataset included all 30 commercial banks licensed by the CBU. However, institutions with substantial missing data or those undergoing mergers and liquidations during the study period—such as Asaka Bank's partial restructuring—were excluded to preserve consistency and comparability. The final analytical sample comprises 22 banks, resulting in 118 bank-year observations. This sample strikes a balance between breadth and depth, offering sufficient variation for statistical analysis while maintaining a high level of data quality.

Following the framework of the Global Reporting Initiative (GRI) Financial Services Sector Supplement and the UN Principles for Responsible Banking (UNPRB), this study identifies 22 measurable indicators across the three ESG pillars—Environmental, Social, and Governance—as presented in Table 1. Each indicator was chosen based on three criteria: (a) material relevance to banking operations, (b) feasibility of measurement in the Uzbek institutional and data context, and

(c) theoretical linkage to financial risk or performance outcomes. Together, these indicators provide a balanced view of how banks integrate sustainability into their business models.

Table 1. ESC score formation

Environment	Social	Governance
E1. Green loan portfolio share (%)	S1." Financial inclusion index (e.g.	% of SME loans
E2. Renewable energy financing volume (USD million)	S2. Employee training hours per employee (annual)	G2. Board independence ratio (%)
E3. Bank's operational carbon footprint (tCO2e)	S3. Gender diversity ratio (female employees %)	G3. Presence of dedicated ESG/sustainability committee (dummy: 1/0)
E4. Energy consumption intensity (kWh per employee)	S4. Female representation in senior management (%)	G4. CEO duality (CEO is also Chair: 1/0)
E5. Water consumption intensity (m^3 per employee)	S5. Employee turnover rate (%)	G5. Number of board meetings per year
E6. Waste recycling rate (%)	S6. Occupational health & safety incidents (count)	G6. Transparency of financial & non-financial disclosure (score 0-5)
E7. ESG/sustainability reporting (dummy: 1/0)	S7. Community investment (USD million)	G7. Anti-corruption policy existence (dummy: 1/0)
E8. Adoption of green building standards for branches (dummy: 1/0)	S8. Customer satisfaction score (if available)	G8. Whistleblower mechanism existence (dummy: 1/0)
	S9. Digital financial services penetration (%)	G9. Related-party transaction disclosure quality (score 0-5)
		G10. Regulatory compliance violations (count or dummy)

The Environmental (E) dimension captures both the operational footprint of banks and their financing of sustainable activities. Three indicators play a central role: (i) the share of green loans in the overall portfolio, reflecting exposure to renewable energy, energy efficiency, sustainable agriculture, and infrastructure projects; (ii) the operational carbon footprint, estimated using banks' energy consumption data and national emission factors; and (iii) renewable energy financing, based on project finance disclosures cross-verified with Central Bank of Uzbekistan (CBU) green bond registry records. These metrics highlight banks' role as catalysts of a low-carbon transition while ensuring measurement consistency.

The Social (S) indicators focus on financial inclusion, workforce composition, and employee development. A composite financial inclusion index measures SME lending, rural branch penetration, and microfinance outreach. Gender diversity is assessed at both staff and leadership levels, ensuring attention to equality in employment and decision-making. Employee training, standardized as average training hours per full-time equivalent, reflects investments in human capital. Collectively, these indicators capture banks' contribution to inclusive development and their responsiveness to stakeholder expectations.

The Governance (G) dimension emphasizes transparency, oversight, and ethical safeguards. Three key variables are included: (i) board independence, measured as the share of non-executive and non-affiliated directors; (ii) the presence of an ESG or sustainability committee at the board level, coded as a binary variable; and (iii) disclosure transparency, scored on a 0–5 scale using a rubric adapted from the CBU's Corporate Governance Code (2020), and validated by two independent coders. These measures address the institutional integrity of banks and their ability to manage long-term sustainability risks.

For financial performance, the study relies on five widely accepted accounting-based metrics: Return on Assets (ROA), Return on Equity (ROE), Net Interest Margin (NIM), Cost-to-Income Ratio (CIR), and Non-Performing Loan Ratio (NPL). These variables provide insight into profitability, efficiency, and credit risk. To avoid biased results, the model also controls for bank-specific characteristics, including bank size (log of total assets), capital adequacy (Tier 1 ratio), liquidity (liquid assets to total assets), and ownership structure (state-owned vs. private/foreign-owned). All financial data were obtained from the CBU's official banking statistics and audited financial statements, ensuring reliability and comparability across institutions.

Finally, the ESG scoring methodology applies a Min–Max normalization technique to construct standardized E, S, G, and composite ESG scores. Missing data, a common challenge in voluntary ESG reporting environments like Uzbekistan, were addressed through a two-tiered strategy. For variables with limited gaps (<20%), linear interpolation or forward-filling methods were used. For indicators with systematic missingness—such as carbon footprint reporting, available only for a subset of banks—expert survey responses were employed for imputation, with conservative assumptions applied where uncertainty persisted. Robustness checks confirmed that the findings are not sensitive to alternative imputation strategies, reinforcing the validity of the constructed scores.

To ensure comparability across heterogeneous indicators (e.g., percentages, counts, dummy variables), all raw ESG indicators are normalized to a [0,1] scale using the Min-Max method. This technique preserves the original distribution while enabling aggregation.

For each indicator X across banks in year t, the normalized value X_{norm} is computed as:

$X_{norm}=\frac{(Xmax-Xmin)}{X-Xmin}$

After normalization, pillar-level scores were calculated as the simple arithmetic average of their respective indicators. Equal weighting was applied across all variables within each pillar, reflecting the absence of a widely accepted weighting framework in the Uzbek banking context. This approach is consistent with methodologies adopted in other emerging-market studies, including Arayssi et al. (2020) and Velte (2019), where data constraints necessitated parsimonious and transparent scoring systems.

The formulas for each dimension are as follows:

- Environmental Score (E): Mean of normalized indicators E1–E8
- Social Score (S): Mean of normalized indicators S1–S9
- Governance Score (G): Mean of normalized indicators G1–G10

The composite ESG index is then derived as the equally weighted average of the three dimensions:

$\text{ESG} = \frac{\text{E+S+G}}{3}$

The use of equal weighting is justified both by methodological transparency and by the need for comparability across banks at different stages of ESG adoption. To validate the robustness of this choice, alternative weighting schemes were tested, including weights derived from principal component analysis (PCA). Results confirmed that while the magnitude of scores varied slightly, the directional relationships between ESG and financial performance remained consistent. This reinforces confidence in the adopted approach.

As a first stage of empirical analysis, Pearson correlation coefficients are computed to explore the linear associations between each ESG dimension—Environmental (E), Social (S), Governance (G), and the composite ESG score—and the set of financial performance variables: Return on Assets (ROA), Return on Equity (ROE), Net Interest Margin (NIM), Cost-to-Income Ratio (CIR), and Non-Performing Loan Ratio (NPL). This step provides an initial diagnostic of whether banks with stronger ESG profiles also demonstrate superior profitability, efficiency, or risk outcomes.

The Pearson correlation coefficient is particularly suitable in this context because both the ESG scores and the financial indicators are continuous variables. The measure captures the direction (positive or negative) and strength of linear association, producing values between –1 and +1. A coefficient close to +1 indicates a strong positive relationship, while a value near –1 signals a strong negative relationship. Values around zero suggest little or no linear correlation.

Formally, the Pearson correlation coefficient between two variables, (X) and (Y), is calculated as:

$$r_{XY} = \frac{\sum_{i=1}^{n}(X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum_{i=1}^{n}(X_i - \bar{X})^2}\sqrt{\sum_{i=1}^{n}(Y_i - \bar{Y})^2}}$$

where (X_i) and (Y_i) are the observed values, X-bar and Y-bar are their respective means, and (n) is the number of observations.

To ensure statistical rigor, the significance of each correlation coefficient is tested at conventional confidence levels: 1%, 5%, and 10%. Significant results suggest that the observed relationships are unlikely to be due to chance, thereby strengthening the case for further econometric testing through regression models. This correlation analysis thus serves as both a descriptive and confirmatory step in linking ESG scores to bank-level financial outcomes.

To rigorously examine the relationship between ESG performance and financial outcomes while accounting for potential confounding influences, this study employs a fixed-effects panel regression model. This approach allows us to isolate the marginal effect of ESG on bank performance by controlling for both time-invariant bank-specific characteristics and common macroeconomic shocks affecting all banks in a given year. The baseline regression specification is as follows:

$$FP_{it}=\alpha+\beta_1 ESG_{it}+\beta_2 Controls_{it}+\gamma_i+\delta_t+\varepsilon_{it}$$

In this equation, FP_{it} represents a financial performance indicator—such as return on assets (ROA), return on equity (ROE), net interest margin (NIM), cost-to-income ratio (CIR), or non-performing loan (NPL) ratio—for bank i in year t. The core explanatory variable, ESG_{it} , is either the composite ESG score or, in alternative model specifications, one of its individual pillars (Environmental, Social, or Governance) to assess their differential impacts. The vector $Controls_{it}$ includes key bank-level determinants of performance: the natural logarithm of total assets (as a proxy for bank size), Tier 1 capital ratio (measuring capital adequacy), liquid assets to total assets ratio (capturing liquidity), and a dummy variable indicating state ownership.

The term γ_i denotes bank fixed effects, which absorb all time-invariant unobserved heterogeneity across institutions—such as differences in corporate culture, historical risk appetite, or entrenched governance structures—that could otherwise bias the estimated relationship between ESG and performance. Similarly, δ_t represents year fixed effects, controlling for aggregate time-varying factors such as macroeconomic volatility, regulatory changes, exchange rate fluctuations, or external shocks like the global pandemic. The error term εit is clustered at the bank level to account for potential heteroskedasticity and within-bank serial correlation, ensuring robust standard errors and valid inference.

To provide a comprehensive assessment, we estimate separate regression models for each financial performance metric and for each ESG dimension (E, S, G, and composite ESG). This enables us to identify which aspects of sustainability are most strongly associated with profitability, efficiency, or risk outcomes in the Uzbek banking context. All empirical analyses are conducted using Stata 17, leveraging its robust panel data estimation capabilities and post-estimation diagnostic tools.

Results and discussion

This section presents the empirical results of the study, drawing on evidence from the correlation analysis, the Hausman specification test, and fixed-effects regression models. The analysis aims to uncover how Environmental, Social, and Governance (ESG) performance interacts with financial outcomes in Uzbekistan's commercial banking sector over the period 2018–2023. By blending descriptive insights from correlation patterns with rigorous econometric estimates, the section provides a comprehensive interpretation of whether ESG serves as a driver of profitability, efficiency, and risk mitigation in an emerging market characterized by institutional reforms and evolving sustainability standards.

The Pearson correlation matrix presented in Table 2 offers several important insights into the relationships among ESG pillars and financial outcomes. The first notable finding is the strong internal consistency across the three ESG dimensions. Correlations between Environmental (E) and Governance (G) stand at 0.689, Social (S) and Governance at 0.724, and Environmental and Social at 0.641. These high correlations suggest that banks performing well in one aspect of sustainability—such as adopting environmentally conscious lending practices—are also likely to demonstrate robust governance and social performance. This pattern reflects an integrated approach to ESG implementation, where improvements in one dimension often reinforce progress in others.

Table 2. Pearson Correlation Matrix of ESG Scores and Financial Performance Indicators (2018–2023, Uzbek Commercial Banks)

Variable	ESG	E	S	G	ROA	ROE	NIM	CIR	NPL	SIZE	CAR	LIQ
ESG	1											
E	0.872***	1										
S	0.815***	0.641***	1									
G	0.903***	0.689***	0.724***	1								
ROA	0.328***	0.215*	0.254**	0.361***	1							
ROE	0.297***	0.182*	0.231**	0.335***	0.892***	1						
NIM	0.184*	0.112	0.143	0.207**	0.415***	0.387***	1					
CIR	–0.276***	–0.163*	–0.198**	–0.312***	–0.521***	–0.489***	–0.302***	1				
NPL	–0.304***	–0.191**	–0.225**	–0.341***	–0.618***	–0.583***	–0.284***	0.437***	1			
SIZE	0.142	0.089	0.117	0.165*	0.210**	0.195**	0.128	–0.183*	–0.201**	1		
CAR	0.218**	0.134	0.162*	0.245***	0.332***	0.307***	0.195**	–0.264***	–0.291***	0.176*	1	
LIQ	0.097	0.062	0.084	0.112	0.153*	0.138	0.092	–0.124	–0.141	0.212**	0.189**	1

A second insight concerns the relationship between ESG and profitability. The composite ESG score exhibits significant positive correlations with both Return on Assets (ROA, $r = 0.328$, $p < 0.01$) and Return on Equity (ROE, $r = 0.297$, $p < 0.01$). Among the three pillars, governance emerges as the most influential, with correlations of 0.361 with ROA and 0.335 with ROE. This underscores the role of governance structures such as board independence, audit committee presence, and transparent disclosure in driving profitability outcomes. In the Uzbek context, where governance reforms are relatively recent, these results highlight how institutional quality directly supports financial returns.

Third, ESG shows a negative relationship with measures of inefficiency and credit risk, reinforcing its role as a stabilizing factor. The composite ESG score is negatively correlated with the Cost-to-Income Ratio (CIR, $r = –0.276$, $p < 0.01$) and the Non-Performing Loan Ratio (NPL, $r = –0.304$, $p < 0.01$). The governance pillar again demonstrates the strongest influence, with correlations of –0.312 with CIR and –0.341 with NPL. This implies that well-governed banks not only manage costs more effectively but also maintain healthier loan portfolios by exercising prudent risk management. These findings resonate with international evidence showing that ESG can reduce downside risks and strengthen resilience.

A fourth observation is that ESG's relationship with Net Interest Margin (NIM) is positive but comparatively weaker ($r = 0.184$, $p < 0.10$). Unlike ROA and ROE, which reflect overall profitability, NIM focuses narrowly on interest income efficiency. The modest association suggests that while ESG improves bank performance broadly, its direct effect on interest spreads may be limited in Uzbekistan due to regulated lending practices and state-directed credit policies. This nuance points to the sector's structural characteristics as a moderating factor in how ESG affects financial performance.

Fifth, the correlations of control variables with financial outcomes further contextualize the ESG–performance relationship. Bank size (SIZE) shows a modest positive correlation with profitability (ROA: r = 0.210, ROE: r = 0.195), suggesting that larger banks may benefit from scale economies and broader customer reach. Capital adequacy ratio (CAR) is also positively related to profitability (ROA: r = 0.332, ROE: r = 0.307), underscoring the importance of financial stability for sustained earnings. Liquidity (LIQ), however, exhibits weaker and largely insignificant associations, likely reflecting strict regulatory limits that minimize cross-bank variation.

Sixth, the combined interpretation of ESG and control variables indicates complementarity rather than substitution. Banks that are both financially sound (with strong CAR and adequate size) and committed to ESG principles tend to demonstrate superior performance across profitability, efficiency, and risk measures. This finding suggests that ESG effectiveness is enhanced when it operates alongside strong financial fundamentals, rather than being pursued in isolation.

Seventh, the correlations highlight governance as the anchor dimension of ESG in Uzbekistan's banking sector. Its consistently strong associations with profitability, risk, and efficiency point to governance reforms as a central mechanism through which sustainability is translated into financial outcomes. Environmental and social dimensions, while important, appear to derive much of their strength from alignment with governance quality. This insight is particularly relevant for regulators seeking to prioritize policy interventions.

Finally, the correlation results provide preliminary support for the hypothesis that ESG contributes positively to financial performance in Uzbekistan's commercial banking sector. However, correlations cannot fully capture causality or control for confounding effects. Thus, while the patterns are suggestive, regression analysis is required to isolate the marginal impact of ESG dimensions after accounting for bank-specific and macroeconomic heterogeneity. The next subsection therefore builds on these descriptive insights by employing fixed-effects panel regression models.

The Hausman specification test is applied to determine whether the fixed-effects (FE) or random-effects (RE) model provides the more consistent and efficient estimates in panel data analysis. The test compares the difference between the two estimators, with the null hypothesis stating that the RE model is appropriate (i.e., no systematic difference between RE and FE). In Table 3, the reported chi-squared statistic is 8.74 with 4 degrees of freedom, and the corresponding p-value is 0.033. Because the p-value is below the conventional 5% significance threshold, the null hypothesis is rejected, indicating that the random-effects estimator would be inconsistent due to correlation between unobserved heterogeneity and the regressors.

Table 3. Hausman Specification Test Results

Test Statistic	Value
Chi-squared (χ^2)	8.74
Degrees of freedom	4
p-value	0.033

This result implies that the fixed-effects model is the more suitable estimation technique for analyzing the relationship between ESG performance and financial outcomes in Uzbekistan's banks. By controlling for unobserved, time-invariant bank-specific characteristics, the fixed-effects approach ensures that the estimated coefficients capture the true within-bank variation over the study period. Consequently, the study relies on fixed-effects regressions for robust empirical inference, aligning with the conclusion of the Hausman test that random-effects models may yield biased results in this context.

The fixed-effects regression results in Table 4 provide clear evidence of a significant relationship between ESG performance and multiple dimensions of bank financial performance in Uzbekistan. The coefficients for ESG are consistently significant across all five models, highlighting the robustness of the findings. Specifically, ESG scores are positively associated with profitability indicators such as Return on Assets (ROA: 0.042, $p < 0.01$) and Return on Equity (ROE: 0.051, $p < 0.01$). This implies that banks that integrate stronger sustainability practices tend to generate higher profits relative to their assets and equity, underscoring ESG's role in driving financial resilience. The impact on Net Interest Margin (NIM: 0.018, $p < 0.10$) is smaller but still statistically significant, suggesting that ESG adoption provides incremental efficiency gains in interest-related earnings.

Table 4. Fixed-Effects Regression Results – Impact of ESG Scores on Bank Financial Performance

Variable	(1) ROA	(2) ROE	(3) NIM	(4) CIR	(5) NPL
ESG	0.042***	0.051***	0.018*	–2.31***	–0.87***
	-0.012	-0.015	-0.01	-0.62	-0.24
SIZE	–0.008	–0.010	–0.003	1.24*	0.31
	-0.006	-0.008	-0.005	-0.68	-0.27
CAR	0.002*	0.003**	0.001	–0.42	–0.15*
	-0.001	-0.001	-0.001	-0.31	-0.09
LIQ	0.001	0.001	0	–0.08	–0.03
	-0.001	-0.001	-0.001	-0.12	-0.05
State-owned	–0.006	–0.008	–0.004	1.87**	0.42
	-0.007	-0.009	-0.006	-0.84	-0.33
Constant	0.051	0.063	0.022	58.34***	8.92***
	-0.042	-0.053	-0.035	-5.21	-2.1
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	118	118	118	118	118
R-squared (Within)	0.284	0.261	0.152	0.317	0.342
F-test (all coeffs = 0)	6.83***	5.92***	3.41**	7.24***	8.05***

In terms of cost and risk management, ESG has a striking effect. The negative coefficients for Cost-to-Income Ratio (CIR: –2.31, $p < 0.01$) and Non-Performing Loans (NPL: –0.87, $p < 0.01$) reveal that banks with stronger ESG scores operate more efficiently and maintain better loan portfolio quality. A reduction of over two percentage points in CIR indicates tangible operational improvements linked to sustainability, such as reduced waste, better governance structures, or enhanced digital adoption. Similarly, the significant decline in NPL ratios suggests that ESG-oriented banks exercise stronger credit risk management and borrower screening, reducing the incidence of defaults. These findings align with international evidence that ESG integration reduces downside risks and improves financial stability.

Among the control variables, bank size (SIZE) displays negative but statistically insignificant effects on profitability (ROA, ROE, NIM), while showing a modest positive association with inefficiency (CIR: 1.24, $p < 0.10$). This pattern implies that larger banks in Uzbekistan may not necessarily translate their scale into superior profitability; instead, they may face challenges of bureaucratic inefficiency or diseconomies of scale. The capital adequacy ratio (CAR) demonstrates a modest but significant positive relationship with profitability (ROA: 0.002, ROE: 0.003), while reducing NPLs (–0.15, $p < 0.10$). This finding emphasizes the importance of strong capitalization in reinforcing both profitability and stability, particularly in emerging banking systems.

Liquidity (LIQ), by contrast, shows no statistically significant effects across the models. This suggests that liquidity holdings in Uzbek banks during the study period neither directly enhanced profitability nor contributed meaningfully to cost and risk outcomes. One possible explanation is

that excess liquidity may have been held passively rather than deployed into productive lending or investment activities. Additionally, the "State-owned" dummy variable shows a significant positive association with CIR (1.87, $p < 0.05$), suggesting that state-owned banks operate less efficiently compared to private banks. This inefficiency may stem from weaker governance incentives, legacy structures, or policy-driven mandates that prioritize social objectives over strict profitability.

The overall fit of the models, as indicated by within R-squared values ranging from 0.152 to 0.342, demonstrates a reasonable explanatory power given the complexity of bank performance dynamics. The F-tests for joint significance across all specifications are statistically significant at the 1% level, confirming that the explanatory variables collectively contribute to the variation in financial performance. These results reinforce the conclusion that ESG performance is not merely a symbolic or reputational factor but a substantive determinant of financial outcomes in Uzbekistan's banking sector. By integrating ESG into their core operations, banks can simultaneously enhance profitability, reduce costs, and mitigate risks, thereby achieving a balance between financial and sustainability objectives.

Policy implications and conclusion

The findings of this research underscore the growing importance of ESG integration in shaping the financial performance of commercial banks in Uzbekistan. The evidence demonstrates that banks with stronger ESG practices achieve superior profitability, improved efficiency, and lower credit risks. These insights suggest that ESG should not be viewed as a peripheral or voluntary consideration but as a central pillar of financial sector development in the country.

A critical implication is the need for enhanced disclosure standards. At present, sustainability reporting within Uzbekistan's banking industry is limited and inconsistent, making it difficult to benchmark practices or hold institutions accountable. Establishing mandatory ESG disclosure frameworks would address these gaps. Regulators can draw on international standards, such as the Global Reporting Initiative or the EU taxonomy, while tailoring them to the realities of the domestic market. Such initiatives would create transparency, facilitate investor confidence, and encourage banks to take sustainability commitments more seriously.

Financial and fiscal incentives also have a vital role to play. Evidence from this study shows that ESG adoption produces measurable financial benefits, yet initial implementation costs and perceived uncertainties may discourage some banks from acting. Incentives such as preferential refinancing rates, tax relief, or eligibility for green credit lines could motivate wider adoption. Experiences from other emerging markets, particularly China and South Korea, illustrate that targeted incentives can accelerate sustainable finance uptake, a lesson that Uzbekistan could adapt to its own institutional framework.

The governance dimension stands out as particularly significant in the analysis, highlighting the need for structural reforms within banks. Strong governance practices—ranging from independent boards and clear risk management procedures to robust disclosure mechanisms—emerge as central to both profitability and risk mitigation. Strengthening governance capabilities will require investment in capacity building, including training programs for executives, risk managers, and board members. Such efforts would improve accountability and decision-making, thereby amplifying the financial and societal value of ESG integration.

The analysis also reveals that inefficiency remains a challenge, especially among state-owned banks. Higher cost-to-income ratios associated with state ownership suggest weaker operational discipline and a lack of competitive pressure. Addressing these inefficiencies requires careful policy attention. Reforms could involve partial privatization, greater managerial autonomy, or the adoption of performance-based incentives that align management objectives with operational efficiency. These measures would enhance competitiveness while allowing state-owned institutions to continue fulfilling broader developmental roles.

Another key implication is the role of ESG in strengthening credit quality. The evidence clearly indicates that banks with higher ESG scores exhibit lower levels of non-performing loans, confirming that ESG practices contribute to prudent lending and portfolio resilience. Regulators could formalize this relationship by requiring banks to integrate ESG risk assessments into their credit evaluation processes. Such a move would ensure that lending decisions incorporate environmental and social considerations, thereby safeguarding both financial stability and sustainable development goals.

The positive relationship between ESG and profitability suggests that sustainability should be reframed as a strategic opportunity rather than a regulatory burden. Banks that invest in ESG are likely to enjoy stronger reputations, increased customer loyalty, and enhanced access to international capital markets. Policymakers and industry associations can support this narrative shift by

promoting case studies and best practices that illustrate ESG's potential as a driver of competitive advantage.

International partnerships offer another pathway to strengthening ESG integration. Uzbekistan can benefit from the expertise and financial resources of multilateral organizations such as the World Bank, International Finance Corporation, or the Asian Development Bank. Collaborating with these institutions would facilitate access to technical assistance, training, and ESG-focused funding mechanisms, accelerating the transition to sustainable banking practices in Uzbekistan.

A further policy implication is the potential development of a national ESG rating system for banks. Such a system would provide standardized benchmarks for sustainability performance, guiding investment flows toward more responsible institutions. Over time, ESG ratings could also underpin the growth of green financial products, such as sustainable bonds or ESG-linked loans, thereby expanding Uzbekistan's financial markets and diversifying funding sources.

Alignment with national development strategies is equally critical. Uzbekistan's broader policy agenda, including the "Uzbekistan 2030" program, emphasizes modernization, environmental protection, and inclusive growth. Positioning ESG finance as a tool to advance these objectives would create synergies between financial sector reform and broader economic transformation. By embedding ESG within national strategies, the government can ensure that the banking sector serves as a catalyst for sustainable growth.

The results also highlight the importance of monitoring and evaluation. ESG adoption is an evolving process, and its impacts may shift over time as markets, regulations, and technologies change. Regulators should establish mechanisms to regularly assess ESG integration, monitor outcomes, and adjust policies as necessary. Such an adaptive approach would allow the financial sector to remain responsive to emerging risks, such as climate change or digital disruptions, while capitalizing on new opportunities.

From a research perspective, this study paves the way for more granular investigations into ESG dynamics. While the current analysis focused on composite ESG scores and broad financial outcomes, future work could examine the effects of specific initiatives, such as renewable energy financing, financial inclusion programs, or community investment strategies. This would provide a clearer understanding of which sustainability practices deliver the greatest financial and societal value.

Longitudinal research would also add value by examining ESG effects over longer horizons. While the 2018–2023 period offers useful insights, many ESG benefits—particularly those related to risk management and reputational capital—may only materialize over extended timeframes. Longer-term studies could capture these dynamics more effectively, offering a more comprehensive view of ESG's impact on banking stability and growth.

Comparative research across countries and regions is another promising avenue. Examining ESG-finance relationships in other Central Asian nations or emerging markets more broadly could shed light on how institutional contexts shape outcomes. Such studies would allow policymakers in Uzbekistan to learn from international experiences while tailoring strategies to local conditions.

In conclusion, the results of this study confirm that ESG adoption strengthens both financial and operational outcomes for commercial banks in Uzbekistan. Profitability gains, reduced inefficiencies, and improved credit quality demonstrate that sustainability and financial success are closely intertwined. Governance emerges as a particularly influential driver, underscoring the need for structural and institutional reforms that prioritize accountability and transparency.

For policymakers, the message is clear: ESG integration should be embedded in regulatory frameworks, supported with targeted incentives, and aligned with national development goals. For practitioners, the evidence shows that ESG adoption is not only compatible with profitability but also a pathway to long-term competitiveness and stability. For researchers, the findings point to new opportunities to deepen and broaden the analysis of ESG in emerging markets, where sustainable finance is likely to play a transformative role in shaping future growth trajectories.

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