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**RESEARCH ARTICLE**

# How Does Green Finance Development Enhance the Stability of Commercial Banks in Uzbekistan?

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## Abstract

Climate change is becoming an increasingly material source of risk for the global financial system, and banks are turning to green finance to manage this risk. This article analyses how the development of green finance enhances the stability of commercial banks in Uzbekistan. Four banks differing in ownership structure — Hamkorbank, the National Bank of Uzbekistan (NBU), Ipak Yuli Bank and Aloqabank — together with system-wide indicators, are taken as the object of study. The research relies on a qualitative-comparative analysis combined with benchmarking against international empirical evidence; the data are drawn from the official statistics of the Central Bank, banks' audited statements, the project databases of donor institutions (EBRD GEFF) and peer-reviewed international literature. The analysis shows that green lending in Uzbekistan currently flows mainly through a donor-capital — commercial-bank — borrower chain, while the stability indicators of the banking system display a positive dynamic. Empirical evidence from ASEAN countries confirms the positive contribution of green finance to bank stability, and this relationship is stronger in bank-based and climate-vulnerable systems — which applies directly to the case of Uzbekistan. The results indicate that expanding green lending is a promising avenue for strengthening the stability of Uzbek banks.

**KEYWORDS**

Green finance, bank stability, Z-score, financial intermediation, donor capital, Uzbekistan.

## INTRODUCTION

Over the past decade, climate-related challenges have profoundly transformed the global financial system. Climate change has acquired a transboundary character, with spillover effects propagating across markets, supply chains and financial institutions. As a result, global financial governance is becoming increasingly intertwined with environmental considerations. The Bank for International Settlements (BIS) refers to the rare yet potentially catastrophic climate-financial events arising in this process as "green swan" events. In this context, the development of green finance has become an instrument through which countries integrate into international sustainability standards, attract transnational green capital and strengthen resilience to environmental shocks.

A defining feature of Uzbekistan's financial system is its bank-based nature: because the capital market is relatively shallow, infrastructure, energy and environmental projects are financed mainly through commercial banks. At the same time, the economy is markedly vulnerable to climate change — the share of agriculture is high, and water scarcity and energy

intensity are pressing issues. Consequently, the development of green finance in Uzbekistan affects banks' balance sheets, credit policy and overall stability more directly and strongly than in capital-market-based economies.

In recent years, the country has rapidly built the legal and institutional foundations of green finance. At the level of Presidential Decrees, programmatic documents have been adopted on the transition to a green economy (Decree PF-16) and on the development of the green-housing and mortgage market (Decree PF-26); the green taxonomy was approved by Cabinet of Ministers Resolution No. 561; and the country's Nationally Determined Contributions (NDC) commitments were strengthened. These documents have created a robust policy and regulatory foundation for green finance.

At the bank level, green lending is currently carried out mainly through the targeted credit lines of international donor institutions. Institutions such as the European Bank for Reconstruction and Development (EBRD), the Asian Development Bank (ADB), the French Development Agency (AFD) and the World Bank provide local banks with resources and technical assistance to finance green and climate-resilient technologies. This mechanism is gradually building the green-lending capacity and competence of local banks.

Nevertheless, the relationship between the development of green finance and bank stability has not been systematically studied empirically in the Uzbek context. The aim of this article is to analyse this relationship on the basis of available official data and international empirical evidence. The scientific contribution of the study is that it analyses green finance within the context of Uzbekistan's bank-based financial system through the lens of financial-intermediation theory, and benchmarks the results of international experience (ASEAN) against local conditions. The article is organised as follows: Section 2 presents the literature review and hypothesis, Section 3 the methodology, Section 4 the analysis and results, and Section 5 the conclusions and recommendations.

## LITERATURE REVIEW AND HYPOTHESIS

The theoretical basis of the study is the theory of financial intermediation. Diamond (1984) interprets banks as delegated intermediaries that undertake monitoring under conditions of information asymmetry: the bank allocates credit and bears a substantial share of economic and environmental risk [1]. Climate change generates physical and transition risks that affect borrowers' cash flows, asset values and default probabilities. Green finance, including green credit, can reduce banks' exposure to carbon-intensive sectors, improve asset quality and strengthen their risk profile by reallocating credit toward environmentally sustainable and climate-resilient activities.

The empirical literature increasingly confirms a positive relationship between green finance and financial stability. Nguyen (2026), using a panel of 83 commercial banks across six ASEAN countries over 2016–2023, shows that the development of green finance makes a positive and statistically significant contribution to bank stability, and that this effect is stronger in climate-vulnerable countries [2]. Nguyen (2025) emphasises the stabilising role of green finance for the financial system in high-climate-risk countries [3]. Saydaliev and Chin (2023) empirically confirm the contribution of green financing to macroeconomic stability in ASEAN economies [4]. Soundarrajan and Vivek (2016) argue that green finance is a basic necessity for achieving green growth in developing countries [5]. Flammer (2021) links the development of the green-bond market to improved corporate financial quality [6], while Houston and Shan (2022) document a positive association between corporate ESG profiles and banking relationships [7].

The principal transmission mechanism emerging from this literature is as follows: green lending channels capital toward climate-resilient sectors (renewable energy, energy efficiency, sustainable infrastructure), reduces banks' exposure to climate-sensitive and high-carbon sectors, improves asset quality, lowers the non-performing loan (NPL) ratio and stabilises the income stream [2, 8]. On this basis, the following hypothesis is proposed:

H1: The development of green lending is positively associated with bank stability (Z-score) and negatively associated with the non-performing loan (NPL) ratio.

## METHODOLOGY

The study relies on a qualitative-comparative analysis together with benchmarking against international empirical evidence. This approach was chosen because a centralised statistical category for green credit at the bank level has not yet been established in Uzbekistan; therefore, at the first stage a conceptual-empirical analysis is conducted on the basis of available, reliable data, while a full econometric panel estimation is identified as the subsequent research stage. The data sources are: (a) banks' audited annual financial

statements (2016–2024); (b) the statistical bulletin and annual report of the Central Bank; (c) the project databases of EBRD GEFF and other donor institutions; and (d) peer-reviewed international empirical literature.

Four banks with diverse ownership structures were selected as the object of analysis: the state-dominated National Bank of Uzbekistan and Aloqabank, and the privately owned banks with foreign strategic participation — Hamkorbank and Ipak Yuli Bank. This selection allows the role of the ownership factor (state and foreign participation) in green lending and stability to be compared.

The system of indicators used in the study was constructed in accordance with the international methodology (Nguyen, 2026; Beck et al., 2013) and is presented in Table 1. Bank stability is measured by the Z-score: ZS = (ROA + E/TA) ÷ σ(ROA), where a higher value denotes a greater distance from insolvency, i.e. higher stability; σ(ROA) is computed on a three-year rolling window. In the international literature, green finance is often proxied by green-bond issuance; however, since a green-bond market has not developed at the bank level in Uzbekistan, this study adopts the share of green (donor) credit lines in the bank's loan portfolio as the proxy for green finance. This methodological adaptation reflects the bank-based and donor-oriented nature of Uzbekistan's financial system.

**Table 1. System of indicators used in the study and their sources**

| SYMBOL | DEFINITION / METHOD OF CALCULATION | SOURCE |
|---|---|---|
| ZS (Z-SCORE) | (ROA + E/TA) ÷ σ(ROA); main measure of bank stability | Bank statements (computed) |
| NPL | Non-performing loans ÷ total loans | Bank statements / CBU |
| GREEN FINANCE | Share of green (donor) credit lines in the total loan portfolio | EBRD GEFF, ADB, bank statements |
| ROA | Net profit ÷ total assets | Bank statements |
| E/TA | Equity ÷ total assets | Bank statements |
| NIM | Net interest income ÷ average earning assets | Bank statements |
| SIZE | Natural logarithm of total assets | Bank statements |
| ASQ | Loan-loss provisions ÷ total assets | Bank statements |
| FOW / SO | Foreign / state ownership share | Shareholding structure |

Source: author's elaboration (based on Nguyen, 2026; Beck et al., 2013).

The conceptual model of the study reflects the flow of green lending through bank intermediation (Figure 2). To assess the empirical validity of this model, the econometric evidence for ASEAN countries (Nguyen, 2026) is used as a benchmark, while the Uzbek banks are evaluated through a comparative-institutional analysis.

## RESULTS

### 1. Comparative profile of the banks under study

The ownership structure of the four banks and their links to green finance are summarised in Table 2. Hamkorbank is a leading private bank whose capital includes the International Finance Corporation (IFC, World Bank Group) and the Netherlands development finance company FMO; the bank has been assigned a "BB-" (stable) rating by S&P Global Ratings. Ipak Yuli Bank is a large private bank into whose capital Germany's DEG and Triodos Investment Management invested in 2020; the bank is a long-standing partner of the EBRD's green finance programmes. The National Bank of Uzbekistan and Aloqabank are state-dominated banks that serve as pillar institutions of the country's financial system.

**Table 2. Comparative profile of the banks**

| Bank | Ownership type | Foreign / strategic participation | Green finance source |
|---|---|---|---|
| Hamkorbank | Private | IFC + FMO (≈22% combined) | Donor lines, ESG policy |
| Ipak Yuli Bank | Private | DEG + Triodos (minority) | EBRD GEFF credit lines |
| National Bank of Uzbekistan (NBU) | State | State-dominated | State programmes, donor lines |

| | | | |
|---|---|---|---|
| Aloqabank | State | State-dominated | State programmes, donor lines |

Source: author's elaboration based on banks' shareholding structures and official information.

**2. Flow of green lending through bank intermediation**

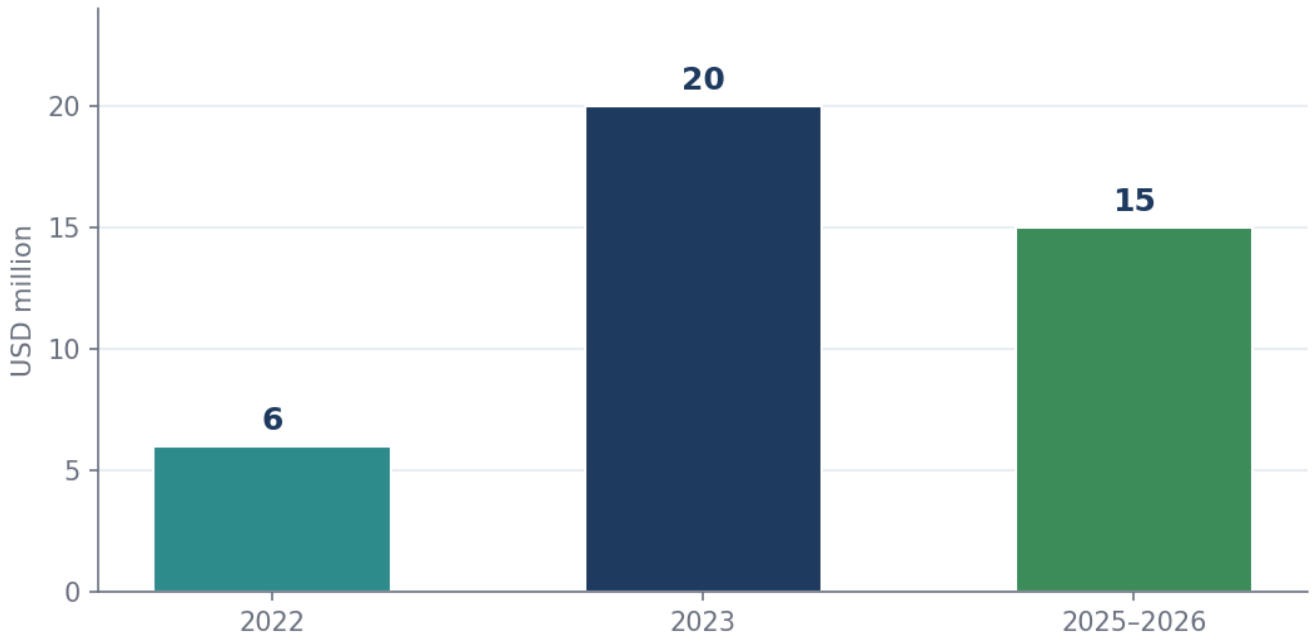
The current mechanism of green lending in Uzbekistan rests on a flow of capital channelled from international donor institutions through commercial banks to final borrowers (Figure 2). In this chain the bank acts as a financial intermediary: it receives the donor's resources and technical assistance and reallocates them to green projects such as energy efficiency and renewable energy.


**Figure 2. Flow of green lending through bank intermediation (conceptual model)**

Source: author's elaboration.

The case of Ipak Yuli Bank illustrates the steady growth of this flow. Under the EBRD's Green Economy Financing Facility (GEFF), the bank was granted green credit lines of USD 6 million in 2022, USD 20 million in 2023 and USD 15 million in 2025–2026 (Figure 1, Table 3). This dynamic shows that green-lending capacity in local banks is gradually expanding.

**Figure 1. EBRD GEFF green credit lines: Ipak Yuli Bank**




Source: author's elaboration based on EBRD project data.

**Table 3. EBRD GEFF green credit lines (Ipak Yuli Bank)**

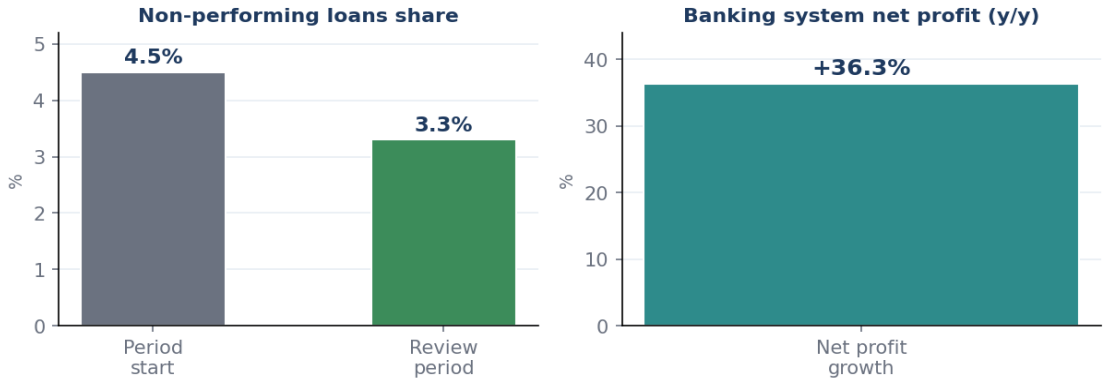
| YEAR | MECHANISM | AMOUNT (USD MILLION) |
|---|---|---|
| 2022 | GEFF credit line (with technical assistance) | 6 |
| 2023 | GEFF II first loan (in local currency) | 20 |
| 2025–2026 | GEFF II loan (within an expanded package) | 15 |

Source: author's elaboration based on official EBRD data.

### 3. Stability indicators of the banking system

The overall stability indicators of Uzbekistan's banking system display a positive dynamic (Figure 3). According to official data, the total assets of the banking system reached 932.3 trillion soum (approximately USD 76.3 billion); the share of non-performing loans declined from 4.5 per cent to 3.3 per cent, indicating an improvement in loan-portfolio quality; the net profit of the banking system grew by 36.3 per cent year-on-year; and the capital-adequacy ratio stood at 1.4–1.5 times the minimum requirement, confirming that the system holds adequate buffers.

**Figure 3. Selected indicators of Uzbekistan's banking system**




Source: author's elaboration based on official banking statistics.

### 4. International empirical benchmark and discussion

The empirical strength of the relationship between green finance and bank stability has been precisely estimated for the ASEAN case (Nguyen, 2026). The main results of that study are presented in Table 4: the development of green finance is positively and significantly associated with the Z-score and negatively with NPL; this effect is amplified in climate-vulnerable countries; the mechanism operates through higher profitability (ROA) and lower earnings volatility; and, in addition, green finance contributes to stability indirectly by reducing climate vulnerability.

**Table 4. Empirical benchmark for ASEAN (Nguyen, 2026)**

| RELATIONSHIP | DIRECTION | NOTE |
|---|---|---|
| GREEN FINANCE → Z-SCORE | positive (+) | stability increases |
| GREEN FINANCE → NPL | negative (–) | credit risk decreases |
| CLIMATE VULNERABILITY × GREEN FINANCE | amplifying | stronger in vulnerable countries |
| MECHANISM: ROA / EARNINGS VOLATILITY | + / – | profitability ↑, volatility ↓ |

Source: author's elaboration based on the results of Nguyen (2026).

This benchmark is directly relevant to the Uzbek context. First, like the ASEAN economies, Uzbekistan's financial system is bank-based — so the effect of green finance on stability is expected to be stronger than in capital-market-based economies. Second, the Uzbek economy is markedly climate-vulnerable; according to the finding of Nguyen (2026), it is precisely under such conditions that the stabilising effect of green finance is greatest. Third, the theoretical mechanism — improved credit quality and reduced earnings volatility through green lending — is logically expected to operate in

Uzbek banks as well. Thus, the theoretical foundation (Diamond, 1984), the international empirical evidence (Nguyen, 2026) and the real institutional characteristics of Uzbek banks jointly support hypothesis H1: expanding green lending is a promising avenue for strengthening the stability of Uzbek banks.

The analysis also identified an important development opportunity: green lending currently relies mainly on donor lines, and a single statistical category for green credit at the bank level has not yet been established. This situation can be interpreted as a clear policy direction for developing local green-lending capacity and statistical infrastructure.

## CONCLUSIONS AND RECOMMENDATIONS

The analysis leads to the following main conclusions. First, green lending in Uzbekistan flows mainly through a donor-capital — commercial-bank — borrower chain, and this mechanism is steadily building green-finance capacity in local banks. Second, the stability indicators of the banking system (a declining NPL ratio, growing net profit and a high capital-adequacy ratio) display a positive dynamic. Third, the international empirical evidence and the theoretical foundation confirm the positive contribution of green finance to bank stability, and this relationship is more pronounced in bank-based and climate-vulnerable systems such as Uzbekistan.

On the basis of the analysis, the following recommendations are proposed:

1) Introduce, through the Central Bank, a separate statistical category for green loans based on the green taxonomy (Resolution No. 561) and establish regular reporting by banks;

2) Gradually integrate climate-risk assessment into the toolkit of banking supervision;

3) Encourage commercial banks to move green lending beyond corporate social responsibility and make it a strategic component of the loan portfolio;

4) Continue cooperation with donor institutions (EBRD, ADB, AFD, World Bank) with a focus on strengthening local capacity;

5) Lay the groundwork, within Decrees PF-16 and PF-26, for developing a domestic green-bond market over the medium term.

As a limitation of the study, one may note the decentralised nature of green-credit data at the bank level and the relatively narrow set of banks analysed. A promising direction for future research is to assemble a broader panel dataset based on banks' audited statements and to estimate the green-finance–bank-stability relationship using full econometric methods (panel regression, FE/GMM).

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