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Article

The effect of green credit on the performance of commercial banks

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Abstract: The banking sector is a pillar of the world's economic fabric and is today facing a major revolution due to the demands of sustainable development objectives and the evolution of sustainable finance tools. This article analyses the impact of green credit on commercial banks' performance based on data from 10 commercial banks in China between 2012 and 2022. The study found that in the short term, the implementation of green credit has a positive effect on the income level of commercial banks' intermediate activities and a moderating effect on their return on total assets and non-performing loan ratio.

Keywords: green credit; commercial banks; performance; China; panel data, sustainable finance

1. Introduction

Since the 21st century, as the economies of the various countries have progressively reached a higher level, the living conditions of the population have also improved (Feng et al., 2024). However, as the economy has developed, our ecological environment has been seriously damaged, and natural disasters have frequently occurred (Galàn et al., 2022; Li et al., 2023). People have gradually become aware of the drawbacks of the traditional development model of trading the ecological environment for economic development. So, it is necessary to embark on a green and sustainable development path (Shen et al., 2023).

The Paris climate agreements aim to limit global warming to 1.5 °C by 2050 in order to facilitate the transition to a sustainable economy. Achieving this goal requires innovative green financing policies and the development of new financing mechanisms. Traditional finance typically directs savings toward the most profitable projects, often neglecting environmental considerations. In contrast, green finance focuses on supporting projects that do not harm the environment and foster the development of a circular, efficient, inclusive, and clean economy. The objective is to encourage, or even compel, nearly all companies to adopt practices that are compatible with climate-related issues (Chenguel and Mansour, 2024).

To help the green economy grow, the relevant departments have also put in place a number of policies and measures, such as laws and rules that are closely linked to green credit (Chaaben et al., 2022).

Green credit, a popular green finance product among the public, has also received the attention of many financial institutions and investors (Ahamed et al., 2021; Li et al., 2023; Rohit et al., 2024; Wang and Wang, 2021).

As a new type of financial product, green credit is made possible when different financial institutions, such as commercial banks, work together to protect the environment and give out credit. This is done by investing social funds in

environmentally friendly businesses and projects and giving them a wide range of benefits (Li et al., 2023; Sumei et al., 2021).

As an essential entity that reasonably allocates social funds, commercial banks are indispensable in developing green credit and have an even greater social responsibility. In this new economic environment, using data, it is essential to empirically analyze the impact of green credit on the operational performance of commercial banks (Al Qudah et al., 2023; Sumei et al., 2021; Lian et al., 2022).

In China, the emphasis on sustainable development has reached a very high level in the economic and social sectors. Indeed, the Nineteenth National Congress of the Chinese Communist Party in 2017 presented a report with a comprehensive plan based on 'pollution prevention and control' as the target by 2020. As a result, the Chinese government has issued a series of policies and regulations to encourage commercial banks to develop green credit. "For example, the former China Banking Regulatory Commission (CBRC) issued the Guidelines on Green Credit and the Guidelines on Energy Efficiency Credits in 2012 and 2015, respectively" (Lian et al., 2022).

Today, China has undergone an evolution in green credit. Statistics show that the value of green credit issued by Chinese banks rose from 5.2 trillion yuan at the end of 2013 to 15.900 trillion yuan at the end of 2021 (Statista, June, 2024). However, the overall level needs to be higher and cannot meet the growing demand for green financing (Lai et al., 2022). While policy guidance on green credit is essential, it is even more crucial that it is profitable so that commercial banks are incentivized to issue green credit. So, the question is: what is the impact of green credit on improving banking performance?

In this study, we will first define the different types of green credit and then, based on a panel method of banking data between 2012 and 2022, attempt to assess banking performance. The data used in this paper for the empirical analysis are panel data from the annual reports of 10 commercial banks in China and published social responsibility reports.

In this work, we have based ourselves on a ratio of green bank credit, unlike the majority of studies, which are based on a dummy variable. Based on the operational performance literature, this paper uses return on assets (ROA) to show how profitable commercial banks are, the non-performing loan (NPL) ratio to show how risky operations are for commercial banks, and the proportion of business intermediate income (INC) to show how well operations are going for commercial banks (Oleg et al., 2021).

The results show that in the short term, commercial banks' performance gradually decreases with the increase in the level of green credit because banks will have to bear higher costs, undermining their operating profits. However, from a long-term perspective, when the domestic financial environment and related policies can support the development and promotion of green credit activity, the improvement in the level of green credit activity will have a more positive effect on the performance of commercial banks (Tian et al., 2023).

On the other hand, commercial banks' promotion of green credit is conducive to optimizing the social environment and the sustainable use of environmental resources and creates social benefits (Gao and Guo, 2022). At the same time, promoting green

credit will foster the sustainable development of commercial banks and create a positive social reputation for them (Liu et al., 2021).

This study makes the following novel contributions to the literature regarding the relation between green credit and banks' performance. First, China is still in the early stages of developing green finance, and the various policy measures and market environment still need to mature (Wang et al., 2022). This article's discussion and analysis reveal ongoing issues and gaps, prompting a series of recommendations. Secondly, commercial banks are still profit-making enterprises, and green credit as a new financial product for them will directly affect their business performance. Therefore, improving the green credit system will greatly encourage commercial banks to provide green credit services.

In the first section, we present research on green credit and the relationship between commercial banks' performance and green credit. In the second section, we present theoretical and empirical results. Finally, we present conclusions and recommendations.

2. Literature review

Green finance (Mansour, 2023) and credit development on the international scene began as long ago as the last century. In 1947, Germany was the first country to establish a system for recognizing green credit and to create the world's first environmental bank, 'Ecobank.' Since then, the international financial industry has gradually started to recognize green credit as a significant industry trend, and countries have responded by establishing their own green banks. The Equator Principles have been accepted around the world as the standards for recognizing green credit. They set a strict and uniform standard for how international green finance should be used and help create a set of scientific ways to measure the risk of green credit.

In recent years, banks in many countries have actively pioneered the recognition of green credit, taking environmental protection and low carbon emissions as the starting point for business and product innovation and expansion and embracing their social and environmental responsibilities (Rahman et al., 2023; Udeagha and Ngepah, 2023), such as Japan's Mizuho Corporate Bank and the UK's Barclays Bank. For example, Mizuho Corporate Bank in Japan and Barclays Bank in the UK have launched many conventional green credit products according to national conditions and real needs (see **Table 1**).

Table 1. Types of traditional green credit products worldwide.

Type of loan	Form of credit	Banks	Definition
Project financing	Financing of waste-to-energy projects	Bank of Ireland	Loan of up to 25 years, subject to the signing of a waste disposal contract with the local government and a commitment to support waste disposal outside the scope of the contract
Green credit card	Climate credit card	Europe Rabobank	Donate a certain amount each year based on the quantity of energy-intensive products or services purchased by credit card. Proportion to World Wildlife Fund
	credit cards	Barclays Bank, United Kingdom	Card users can receive discounts and lower borrowing rates on green products and services, and 50% of card profits are donated to the World Bank.

Mortgage loan	Practical financing	Citigroup Inc.	Joint marketing agreement with Sharp Electric Corporation for residential solar technologies + Offering convenient financing to our customers
	Donations in the form of loans	Bank of America	Depending on the amounts of purchases made by the Eco-Home Equity Loan applicant with the Visa card, a certain amount of money will be spent. Proportion of donations made to environmental NGOs
Home mortgage	Structured guarantee for energy savings	Fannie Mae Company	Integrate energy-saving indicators, such as electricity savings, into the credit assessment system for loan applicants.
	Get a loan	United Kingdom Financial Services Company	Providing free home energy assessments and offering Carbon Offset Services
Car loan	Gogreen car loan	MECU Bank Australia	
	clean air car loan	Van City, City Bank Canada	
Transport loans	Quick loans for small business management	Bank of America	Unsecured, non-concessional terms for trucking companies, with a fast approval process to support the project.
Commercial construction loans	First Mortgage	Wells Fargo Bank	By providing first mortgages and refinances for LEED-certified and energy-efficient commercial buildings, developers do not have to pay for 'green' commercial properties.
	Concessional loan	U.S. Bank	Providing compliant commercial and residential units, is a source of Loan Discount Offer at 0.125%.

On the academic side, several studies have focused on this financial tool. Cao et al. (2024) dared to break with convention and chose a new line of thinking based on previous studies. He analyzed the implementation of green credit: A series of impacts caused by the implementation of green credit and the improvement of green credit-related policies. However, he faced the dilemma of a need for more support for empirical studies and an insufficient sample of research subjects.

According to Feng et al. (2024), the environmental protection industry should actively join commercial banks and take the lead in fulfilling its social responsibilities in the construction sector of society as a whole. At the same time, commercial banks should decide how much green credit everyone can enjoy based on the contributions made by different green energy-saving industries.

Based on a sample of loan announcements from listed Chinese banks, Tian et al. (2023) find that when loans are announced, the markets value banks with better green credit performance much higher. Cross-sectional analyses show that the positive effect of banks' green credit performance is more pronounced when they are less exposed to political pressures.

Galàn and Tan (2022) conducted the first analysis of green credit's impact on bank efficiency. Green credit negatively impacts bank efficiency. Small and low-capitalized banks are more affected than those with greater risk levels. Highly capitalized banks can counteract the negative consequences of green financing.

Yan et al. (2019) took a system technological, and institutional viewpoint. It is believed that the short-term effect of green credit on commercial banks' financial performance is weak, but the long-term effect is more obvious. The status quo of low income and high cost of green credit in the short term is difficult to improve quickly, affecting their operating profits, but in the long run, it helps to improve their profitability.

Gao and Guo (2022) proposed that commercial banks' business performance and the protection of the ecological environment can lead to a win-win situation, and they attempted to study commercial banks and green credit jointly. The findings of this work showed that implementing the green credit policy increases commercial banks' profits by increasing their non-interest income and reducing their non-performing loan ratios. The results also provided strong support for his theory.

Lian et al. (2022) used a fixed-effects model to look at data from 34 Chinese commercial banks from 2007 to 2018 to see how green credit issued by commercial banks affected their financial performance.

Song et al. and others believe that the implementation of green credit will affect the economic interests of commercial banks, mainly for several reasons: at the beginning of implementing green credit policies, the marginal cost of commercial banks will increase. Suppose the bank's marginal return remains unchanged. In that case, the economic return of commercial banks will also decrease, which will seriously affect their enthusiasm for promoting green credit services. However, in the long term, with the support of a healthy institutional environment and the gradual improvement of technological standards, the social influence of commercial banks will increase, and to some extent, green credit services will be more effective. Secondly, the vigorous development of green credit activity will promote economic growth. Economic development and optimizing the structure of the banking sector are of significant importance.

Simona et al. (2024) say that commercial banks should check ahead of time to see if there is a chance of environmental protection violations before giving loans to certain businesses and projects. This way, they say, commercial banks can keep their social status, social reputation, and influence.

Li (2023) argues that banks' responsibility for environmental protection can vary from region to region. In relatively mature regions or in regions where the environmental protection industry is more developed and abundant, the green environmental responsibility assumed by commercial banks has a more positive effect on commercial banks' business performance.

However, research in the banking sector has demonstrated that applying sustainable practices is difficult. Indeed, when moving incentives toward sustainability, banks in all countries have little influence on sustainable behavior in other economic sectors. Narrative discovery around motivator 'B (A and B Cluster Solution for Motive Taxonomy)', in which global banks assist, invest in, and finance other businesses, organizations, and governments pursuing sustainable projects through green products/solutions, is uncommon.

Several causes exist, including a lack of governance oversight over the long-term behavior of other businesses and banks' economic incentives. Global banks' strategic decisions and activities can have far-reaching effects on industry sustainability and future growth. Lessons from the pandemic will assist in prioritizing sustainable development and confronting future problems with resilience. We anticipate the banking industry and other industries worldwide will grab sustainability possibilities, adopt strategies, and drive action, transformation, innovation, restoration, and resilience in the coming decade.

3. Empirical analysis of Chinese commercial banks' green credit performance

3.1. Research hypothesis

As the trend of economic development stabilizes and the concept of green development becomes increasingly popular, industries with high pollution and energy consumption face difficulties in maintaining quality production and operation (Moshood et al.,2024).

At the same time, they face various pressures and penalties from government and society, both at a political and public level. To keep companies that are bad for the environment from affecting their ability to pay back loans, commercial banks need to speed up the full implementation of strict lending policies for companies that pollute, use a lot of energy, and make a lot of emissions. At the same time, they need to give strong political support to new industries and environmental protection projects. This will effectively reduce and avoid various credit crises (Zhou et al., 2022).

Commercial banks' support for environmental protection industries is conducive to improving their operational performance, expanding their business scope, and continuously developing product areas, thereby improving the economic interests of commercial banks (Niangjijia, 2022). At the same time, it can also increase the influence and reputation of commercial banks in society, establish a favorable reputation with customers, and thus help banks achieve favorable social returns (Yao et al., 2023).

Based on the above analysis, the following assumptions are made for the model:

Hypothesis 1: Commercial banks' return on total assets positively correlates with the proportion of green credit services.

Hypothesis 2: When the proportion of green credit increases, the bank's non-performing loan ratio decreases.

Hypothesis 3: The income level from intermediary services continues to rise as the proportion of green credit increases.

3.2. Data sources and selection of indicators

The data used in this paper for the empirical analysis are panel data from the annual reports of 10 commercial banks in China from 2012 to 2022 and published social responsibility reports We selected 10 large commercial banks as samples for this study.

They are among the most prominent Chinese commercial banks and the first to launch green credit lines. Hence, it is important to study the impact of green credit management on their performance.

3.2.1. Variable selection and definition

(1) Explanatory variables

This paper does not adopt the practice of some researchers using dummy variables as indicators of green credit. Instead, it uses the ratio of green credit to total credit at the end of the year, as the asset size of each bank differs, which will inevitably lead to different green credit scales across banks.

Therefore, the proportion of green credit can more reasonably reflect the strength of commercial banks in promoting green credit (Xie, 2020).

(2) Dependent variables

By combing the literature on operational performance, this paper studies commercial banks' profitability and operational risks.

This paper chooses return on assets (ROA) as a measure of profitability for commercial banks. Banks use the interest rate spread between loans and deposits to make profits, and ROA is ideally suited to this particular sector. The higher the ROA, the more profitable the commercial bank. ROA refers specifically to the ratio of net profit to a company's average total assets (Lian et al., 2022).

This paper chooses the non-performing loan (NPL) ratio as the measure of operational risk for commercial banks. Lending to businesses is an important activity for banks in order to maintain sustainable development (Lepetit and Strobel, 2015; Ozili, 2019, 2022, 2024).

The ability of businesses to repay loans on time influences the NPL ratio of businesses. If banks take appropriate action, they can reduce risk. The NPL ratio measures the quality of funds lent by commercial banks (Salas et al., 2024).

An ever-increasing non-performing loan ratio and an ever-expanding scale of non-performing loans both mean that commercial banks are facing significant risks.

This paper chooses the proportion of intermediate business income (INC) as a measure of commercial banks' operating conditions (Oleg et al., 2021).

The amount of commission income and management fees that commercial banks make can really show how many different types of activities they do as middle-men, as well as their customer service skills and willingness to try new things.

(3) Control variables

This paper refers to the relevant literature and selects the following control variables as the main factors affecting the operational performance of listed commercial banks. See **Table 2**:

Table 2. Definitions of the main variables.

	Variables	**Definitions**
Explanatory variables	Percentage of green credit (GRD)	Green credit/total bank loans at the end of the year
Dependent variables	Return on Assets (ROA)	Net profit/average total assets
	Non-Performing Loan (NPL)	Non-performing loans/total loans
	Intermediary Business Income (INC)	Fees and commission income/operating income
Control variable	Asset size (LNSIZE)	Total liabilities and owner's equity
	Asset-liability ratio (ZF)	Average total liabilities/average total asset
	Loan-to-deposit ratio (LDR)	Loan amount/total deposits
	Cost-income ratio (CIR)	Total income/total costs
	Capital adequacy ratio (CAR)	The capital adequacy ratio of each bank at the end of the year
	Economic growth rate (GDP)	The annual economic growth rate

3.2.2. Descriptive statistical analysis of variables

Table 2 shows that in 2022, after collecting and statistically collating the relevant variables from 10 domestic commercial banks (Industrial and Commercial Bank of China, China Construction Bank, Agricultural Bank of China, Bank of Communications, China Merchants Bank, Bank of China, Minsheng Bank, Industrial Bank, Bank of Ningbo, and China CITIC Bank) the following conclusions can be drawn:

First, the studied non-performing loan ratio is within the range the relevant policies require. The maximum NPL ratio of commercial banks is 2.53%, the minimum is 0.41%, and the average is 1.31%.

Secondly, commercial banks are profitable in the normal course of business. The maximum overall cost/income ratio is 1.48%, the minimum is 0.77%, and the average is 1.11%.

Thirdly, the income level from intermediary services in the ten commercial banks studied is relatively high. The proportion of income from intermediary services ranges from a high of 57.70% to a low of 12.19%, with an average of around 24%, which indicates that commercial banks have a relatively high level of income from intermediation services.

3.2.3. Empirical model

We use the Husman test. The test's null hypothesis is that the individual influence in the random effects model is unrelated to the explanatory variables. The final test results show that the samples can reject the null hypothesis. Therefore, when establishing the static panel model, the random effects model is abandoned, and the fixed effects model is selected.

This paper constructs the following regression model and conducts empirical testing and analysis:

$$ROA_{i,t} = \alpha_{i,t} + \beta_1 GRD_{i,t} + \beta_2 ZF_{i,t} + \beta_3 CIR_{i,t} + \beta_4 LNSIZE_{i,t} + \beta_5 LDR_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$NPL_{i,t} = \alpha_{i,t} + \beta_1 GRD_{i,t} + \beta_2 LNSIZE_{i,t} + \beta_3 CIR_{i,t} + \beta_4 CAR_{i,t} + \beta_5 GDP_{i,t} + \varepsilon_{i,t} \quad (2)$$

$$INC_{i,t} = \alpha_{i,t} + \beta_1 GRD_{i,t} + \beta_2 LNSIZE_{i,t} + \beta_3 CAR_{i,t} + \beta_4 GDP_{i,t} + \varepsilon_{i,t} \quad (3)$$

Among them, *i* and *t* represent each bank and year, respectively. The variance inflation factor (VIF) tests for multicollinearity in these regression models. The results showed no problem with multicollinearity between the variables.

3.3. Analysis of empirical results

This paper uses STATA.16 software to process and analyze the data, and the F-test shows that the fixed-effects regression model is the most appropriate panel data regression model. The regression results using STATA. 16 are presented in **Table 3** below.

Table 3. Descriptive statistics for the main variables.

	Indicator	Maximum value	Minimum value	Mean	Standard deviation
explain variables	Percentage of green credit	13.73	0.6	4.40	3.63
dependent variable	Return On Assets	1.48	0.77	1.11	0.24
	Non-Performing Loan	2.53	0.41	1.31	0.38
	Intermediary Business Income	57.70	12.19	24	5.81
control variable	Asset size	30.8925	23.3835	28.3302	1.3223
	Asset-liability ratio	97.22	85.58	93.10	0.02
	Loan-to-deposit ratio	85.62	58.37	72.55	6.36
	Cost-income ratio	46.24	20.86	36.22	5.63
	Capital adequacy ratio	15.87	10.37	12.57	1.35
	Economic growth rate	10.49	6.69	7.94	1.25

Data source: China banking industry social responsibility report.

Firstly, in the short term, green credit activity does not favorably impact the profitability of commercial banks. The empirical analysis results presented in the table above show that in the short term, for every 1% increase in green credit, commercial bank profitability decreases by 0.087%. This indicates a negative correlation between the two variables, contradicting the previously proposed hypothesis 1.

The main reason for this is that green credit, as a new type of business, has yet to develop and mature fully in China. In the initial stage of implementing green credit, commercial banks have to spend more financial and human capital, which will increase their operating costs to some extent and is, therefore, not conducive to a significant increase in profitability (Caselli et al., 2021; Li et al., 2024). Same for Galàn and Tan (2022), green credit negatively impacts bank efficiency. Small and low-capitalized banks are more affected than those with greater risk levels. Highly capitalized banks can counteract the negative consequences of green financing.

The findings indicate that participation in green credit may negatively impact bank efficiency. However, in the long term, large banks might find green credit to be advantageous. These banks can leverage their larger scale of operations and diversification to counteract the negative effects of green credit on cost efficiency. Additionally, they can enhance their reputation and image by increasing the proportion of green credit in their portfolios, which could lead to a rise in overall production volume.

Secondly, the complete and comprehensive implementation of green lending activities in commercial banks will decrease the banks' non-performing loan ratio. A higher non-performing loan rate indicates that banks are more vulnerable to bad debt risks and must devote more resources to managing non-performing loans. This will directly impact both the conversion efficiency of green credit deposits and the utilization efficiency of bank funds. The outcome is consistent with Wenna et al. (2024) empirical findings. Furthermore, a high non-performing loan rate can harm the bank's credit and reputation, reducing investor trust and hindering the growth of the bank's green credit division.

The data in the **Table 4** show that the coefficient on the proportion of green lending is 0.027 and is significant at the 10% significance level. When the proportion

of green credit increases by one percentage point, the non-performing loan ratio of commercial banks decreases by 0.027 percentage points.

This conclusion is fundamentally consistent with hypothesis 2 of the previous section.

Table 4. Regression results of models.

Variables	Return on Assets (ROA)	Non-Performing Loan (NPL)	Intermediary Business Income (INC)
Percentage of green credit (GRD)	−0.087*** (−4.014)	−0.027* (−2.770)	0.348* (4.848)
Asset size (LNSIZE)	0.0434*** (0.0003)	0.020 (0.738)	−1.065* (−1.676)
Asset-liability ratio (ZF)	0.016 (1.134)		
Cost-income ratio (CIR)	0.008* (1.957)	−1.737*** (−3.47)	
Capital adequacy ratio (CAR)		−0.032* (−1.314)	0.681 (1.207)
Loan-to-deposit ratio (LDR)	−0.007*** (−4.695)		
Economic growth rate (GDP)		−0.015*** (−4.635)	−0.401*** (−6.646)
Fixed effects	Y	Y	Y
R^2	0.646	0.73	0.595

Note: *, **, and *** represent significance at the 1%, 5%, and 10% levels, respectively.

Finally, implementing green lending by commercial banks is conducive to increasing the revenues of intermediate enterprises. These results confirm Gao and Guo (2022) conclusions. Green credit demonstrates the social responsibility of commercial banks, which can help reduce information asymmetry with stakeholders, earn community respect, and lower public relations costs. Moreover, employees tend to prefer working for companies that prioritize social responsibility. Consequently, building a positive reputation for social responsibility and implementing green credit can lead to lower operational expenses. The green credit policy has the potential to increase the profits of commercial banks by reducing their costs.

As shown in **Table 3**, the regression coefficient for the proportion of green credit is 0.348, and the corresponding test is completed at the 5% significance level. When the proportion of green credit increases by one percentage point, the bank's income from intermediate activities increases accordingly by 0.348 percentage points. This empirical result is generally consistent with the hypothesis 3.

4. Conclusions and recommendations

This paper analyses and summarises Chinese banks' current implementation of green credit through empirical research using panel data.

It investigates and analyses the factors affecting their operational performance. The following conclusions were drawn:

In the short term, as commercial banks increase their green credit offerings, their performance may experience a gradual decline. This is primarily due to the higher

operational costs associated with implementing and managing these environmentally-focused financial products, which can undermine the banks' profit margins. On the other hand, looking at the long term, there's a more optimistic outlook. If the domestic financial landscape becomes increasingly favorable, along with supportive policies that encourage the growth and adoption of green credit initiatives, banks are likely to see significant benefits. In this scenario, as green credit levels rise, they could positively enhance the overall performance and sustainability of commercial banks, aligning profit generation with environmental responsibility.

Secondly, commercial banks' promotion of green credit is conducive to optimising the social environment and the sustainable use of environmental resources and creates social benefits.

At the same time, the promotion of green credit by commercial banks will also generate greater benefits for the banks themselves. It will not only be conducive to the sustainable development of commercial banks, but it will also create a good social reputation for them and establish a positive social image.

So we can make the following recommendations: First, banks must disclose information through the relevant regulatory documents However, there is still room for improvement in some of the current regulatory documents.

To make sure that banks fully disclose green credit information, we need a policy system with detailed rules on all aspects. We also need similar steps taken outside of China to make sure that banks disclose information in the same way everywhere (He and Wei, 2023).

Second, the government should introduce a more proactive and effective incentive mechanism. For example, it can reward banks that are more proactive and standardized in their green credit activities through tax incentives, risk compensation, or financial incentives to motivate large banks to actively and effectively promote green credit activities.

Finally, commercial banks, fundamentally driven by the goal of maximizing their profits, tend to shy away from taking on the risks and potential financial setbacks that come with innovating green credit products. To address this challenge, it is essential for both banks and the broader financial ecosystem to facilitate ongoing innovation in green products. To foster a more vibrant landscape for these innovations, the government plays a crucial role; it must implement supportive policies and create an inviting regulatory environment that encourages commercial banks to explore and develop a wider array of green credit solutions. This collaborative effort could ultimately lead to beneficial outcomes for both the economy and the environment.

However, this study has certain limitations, such as a single Chinese market. It will be very important to study other developed markets, such as the European markets (Mansour, 2025), to establish in-depth comparisons of the impact of green credit management on banking performance. On the other hand, the number of banks in this study is somewhat limited. Although we have taken data from the major Chinese commercial banks, which allows us to generalize the results, we are working on a larger database in our future studies.

Conflict of interest: The author declares no conflict of interest.

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