

# Research on the Impact of FinTech on Green Credit of Commercial Banks

Xi Zhang\*

Asia- Australia Business College, Liaoning University, Liaoning, China.

2680546660@qq.com

**Abstract.** The rapid rise of financial technology (FinTech) has injected new momentum into the field of green credit. Based on data from 36 listed commercial banks in China from 2014 to 2023, this paper explores the impact of commercial banks' FinTech level on green credit. The study finds that commercial banks' FinTech level promotes the scale of green credit business. Commercial banks should continuously strengthen the development and application of FinTech to effectively advance China's green finance and contribute to achieving the "dual carbon" goals.

**Keywords:** FinTech; green credit; commercial banks; digital inclusive finance.

## 1. Introduction

Since September 2020, when General Secretary Xi Jinping proposed the "carbon peak and carbon neutrality" goals, the "dual carbon" strategy has been incorporated into the Government Work Report and the "14th Five-Year Plan," becoming a national and international consensus. China's financial system is dominated by banks, making green credit a crucial pathway to serve the sustainable development of the real economy. However, the characteristics of green projects often lead to insufficient willingness and capacity of commercial banks to engage in green credit. By the end of 2023, the green credit balance of 21 major banks reached 27.2 trillion yuan, a year-on-year increase of 31.7%. Therefore, this paper's focus on the impact of bank FinTech on green credit has significant practical implications.

Current research on the relationship between FinTech and green credit remains limited. Liu & Xie (2022) found from a financial functional perspective that FinTech enhances information production through data recording and disclosure. Zhong et al. (2023) argued that FinTech leverages digital technology to improve banks' willingness and capacity for green credit. Huang & Wang (2022) highlighted its role in mitigating information asymmetry between banks and enterprises and adjusting credit allocation. This paper aims to deepen the understanding of how FinTech affects green credit development from the perspective of commercial banks, thereby complementing existing theoretical research.

Using data from 36 Chinese commercial banks from 2014 to 2023, this study extracts FinTech development indicators from the China Research Data Services Platform (CNRDS) based on annual reports to examine the impact of FinTech on green credit.

## 2. Literature Review and Hypothesis Development

### 2.1 Literature Review

In the literature review, we examine the multifaceted effects of banks' development of fintech, the profound impacts of green credit in practice, and the mechanisms through which fintech influences green credit. This comprehensive review provides a solid theoretical foundation and robust empirical evidence for our subsequent research.

#### 2.1.1 Effects of Banks' Development of Fintech

As a technology-driven force for financial innovation, fintech has profoundly influenced the capital structure and business models of traditional commercial banks. Relevant literature categorizes these effects into two main pathways: "intensified competition" and "technology spillover." The

"intensified competition" pathway manifests in how bank fintech exacerbates competition in the banking sector by expanding the distance between banks and enterprises in lending (Feng Yu et al., 2024). The "technology spillover" pathway refers to the positive spillover effects of advanced technologies, concepts, models, and products from internet finance companies on traditional commercial banks. The technological spillover effects of fintech outweigh its market crowding-out effects, thereby enhancing banks' liquidity creation capacity (Sheng Tianxiang et al., 2022).

### 2.1.2 Influencing Factors of Green Credit

The development of green credit in banks is influenced by multiple factors. On the borrower side, Zhang Yong (2024) explores how green interlocking directors significantly improve firms' access to and scale of green credit financing by enhancing environmental information disclosure and environmental performance. On the lender side, Huang Yuanbiao and Li Jinlei (2024) find that business digitization during digital transformation improves the efficiency of monetary policy transmission through credit channels, providing policy insights for banks to better support economic green transformation. Additionally, interest rate liberalization intensifies bank competition, which strengthens the "forcing mechanism" of green credit policies and enhances their implementation effects (Li Bo et al., 2024).

### 2.1.3 The Impact of Fintech on Green Credit

Literature exploring the integration of fintech and green credit primarily focuses on key elements of commercial banks to reveal how these factors synergistically promote green credit operations. Mechanistically, fintech enhances regional data infrastructure and improves banks' talent reserves (Zhong Kai et al., 2023). Furthermore, Huang Lei et al. (2023) find that fintech mitigates information asymmetry between banks and firms and adjusts credit allocation in commercial banks, thereby positively influencing green credit. Regarding credit risk, Wen Xuezhou et al. (2024) and Guo Yawei et al. (2024) find that fintech reduces commercial banks' credit risk levels, thereby promoting green credit. Commercial banks can leverage fintech to establish green credit assessment models, prevent firms from "greenwashing" to fraudulently obtain green credit, and improve risk management capabilities. Wang Qiqi et al. (2024) also find that green credit reduces bank risk, with more pronounced effects in larger, nationwide commercial banks.

## 2.2 Hypothesis Development

According to environmental economics theory, green credit is essentially an institutional arrangement that internalizes environmental externalities through financial instruments (Pigou, 1920). Financial institutions guide capital flows toward low-carbon sectors through differentiated credit policies, aligning with the Coase Theorem's theoretical path of property rights delineation to improve resource allocation efficiency (Coase, 1960) and reflecting the incentive-compatibility mechanism of price signals under the neoclassical economics framework. However, certain characteristics of green credit conflict with the profit-driven nature of banks. Green credit faces significant information asymmetry issues. Currently, information flow between firms and financial institutions remains inefficient, increasing operational costs and complexity. Additionally, green credit projects often feature long cycles, extended capital recovery periods, and unclear boundaries, leading banks to perceive them as high-risk.

Based on this, we propose the following two hypotheses:

Hypothesis 1: The level of fintech in commercial banks is positively correlated with their green credit operations.

Hypothesis 2: The improvement in commercial banks' fintech levels can expand green credit scale by enhancing operational efficiency.

Meanwhile, as regional digital inclusive finance levels rise, the promoting effect of commercial banks on green credit becomes more pronounced. The moderating role of digital inclusive finance manifests in two ways. First, it enhances information transparency, increasing banks' willingness to supply credit. Digital inclusive finance leverages technologies like AI, blockchain, and big data to

enable more accurate assessments of firms' operational status, creditworthiness, and green transformation potential. Second, it strengthens post-loan management, reducing banks' credit risk. Digital inclusive finance not only plays a role during credit issuance but also lowers default risks. Based on this, we propose:

Hypothesis 3: As regional digital inclusive finance levels improve, the promoting effect of commercial banks on green credit becomes more significant under its moderating influence.

### 3. Research Design

#### 3.1 Sample Selection and Data Sources

This study focuses on Chinese commercial banks. After excluding samples with missing green credit data, we obtain 36 commercial banks, with 360 annual observations from 2014 – 2023 as the final sample. Bank operational and financial data are sourced from the CSMAR database and annual reports, while green credit balances and fintech-related indicators are from the China Research Data Service Platform (CNRDS). To mitigate outlier effects, all continuous variables are winsorized at the 1% level on both ends.

#### 3.2 Variable Definitions

##### 3.2.1 Dependent Variable

Green credit is typically measured by scale or ratio metrics. This study uses the ratio of green credit balance to total bank loans (GC) as the primary measure, with the natural logarithm of green credit balance (GTL) as an alternative for robustness checks.

##### 3.2.2 Independent Variable

Existing studies measure fintech development levels using three methods: (1) the Digital Financial Inclusion Index compiled by Peking University's Digital Finance Research Center, (2) the number of regional fintech firms (Song Min et al., 2021), or (3) text mining to count fintech-related keywords. The text mining-based fintech index is more suitable for micro-level bank analysis. Thus, following Li Chuntao et al. (2020), we manually extract 167 fintech keywords from CNRDS covering four dimensions—intelligentization, informatization, internetization, and digitization—and calculate their frequencies by bank and year. The steps are:

(1) Extract keywords from CNRDS.

(2) Calculate keyword frequencies. After manual screening, we aggregate frequencies by bank and year, then take the natural logarithm to measure fintech development levels.

##### 3.2.3 Control Variables

We control for other factors influencing green credit at the bank and regional government levels. Bank-level controls include the top 10 customer loan ratio (BTCstLdRt), return on assets (ROA), liquidity risk (LDR), loan quality (NPLRA), general risk provision (GRKPP), bank size (SIZE), and paid-in capital (PIC). Regional government controls include secondary industry output (IND2), economic development level (GDP), general budget expenditure (GBE), average education years (EDU), inflation (CPI), and capital formation rate (CFR). Table 1 summarizes all variables and definitions.

Table 1: Variable Definitions and Descriptions

| Variable Type        | Variable Name                   | Symbol   | Definition  |
|----------------------|---------------------------------|----------|---|
| Dependent Variable   | Green Credit                    | GC ratio | Ratio of green credit balance to total bank loans                 |
| Independent Variable | Fintech Development Level       | ln_fm    | Natural logarithm of the summed frequency of keywords             |
| Moderating Variable  | Digital Inclusive Finance Index | Index    | Measured by Peking University's Digital Financial Inclusion Index |

|                        |                           |  |  |   |
|------------------------|---------------------------|--|--|---|
|                        |                           | Depth of Digital Finance Usage         | Usage                                  |   |
|                        |                           | Breadth of Digital Finance Coverage    | Coverage                               |   |
|                        |                           | Degree of Digital Finance Digitization | Dig                                    |   |
| Control Variables      | Commercial Bank Level     | Top 10 Customer Loan Ratio             | BTCstLdRt                              | (Total loans to top 10 borrowers / Net capital) × 100%                          |
|                        |                           | Return on Assets                       | ROA                                    | Net profit / Total assets   |
|                        |                           | Bank Liquidity Risk                    | LDR                                    | Current assets / Current liabilities  |
|                        |                           | Bank Loan Quality                      | NPLRA                                  | Non-performing loans / Total loan balance                                       |
|                        |                           | General Risk Provision                 | GRKPP                                  | Net profit × Expected risk coefficient  |
|                        |                           | Bank Size                              | SIZE                                   | Natural logarithm of total shareholders' equity                                 |
|                        |                           | Paid-in Capital                        | PIC                                    | Beginning balance of paid-in capital + Additions - Reductions during the period |
|                        | Regional Government Level | Secondary Industry Output              | IND2                                   | Market value of goods and services produced by secondary industry enterprises   |
|                        |                           | Economic Development Level             | GDP                                    | Natural logarithm of Gross Domestic Product (GDP)                               |
|                        |                           | General Budget Expenditure             | GBE                                    | Local government general public budget expenditure                              |
|                        |                           | Average Years of Education             | EDU                                    | Average years of education  |
|                        |                           | Inflation Level                        | CPI                                    | Consumer Price Index  |
| Capital Formation Rate |                           | CFR                                    | (Total capital formation / GDP) × 100% |   |

### 3.3 Model Construction

To explore the relationship between the FinTech development level and the scale of commercial banks' green credit business, this paper employs the two-way fixed-effects model (1) for empirical testing:

$$GC_{i,t} = \beta_0 + \beta_1 \ln\_fin_{i,t} + \beta_1 Control_{i,t} + \sum YEAR + \varepsilon_{i,t}$$

Here,  $GC_{i,t}$  represents the ratio of the green credit balance to the total loan balance of the  $i$ -th bank in year  $t$ ;  $\ln\_fin_{i,t}$  denotes the FinTech development level of the  $i$ -th bank in year  $t$ ;  $Control_{i,t}$  is the control variable;  $\varepsilon_{i,t}$  is the residual term. This paper primarily focuses on the coefficient  $\beta_1$ . If  $\beta_1$  is significantly greater than 0, it indicates that the bank's FinTech development level promotes the expansion of the green credit business scale, thus verifying Hypothesis 1.

## 4. Empirical Result Analysis

### 4.1 Descriptive Statistics

Table 2 reports the descriptive statistical results of each variable. The mean value of the explained variable  $GC\_ratio$  is 4.49, with a standard deviation of 4.956, indicating a large difference in the scale of green credit business among commercial banks. The explanatory variable  $\ln\_fin$  has a mean of

3.806, a minimum of 0, a maximum of 5.841, and a standard deviation of 1.429. This reveals significant overall fluctuations in commercial banks' FinTech development levels. Some commercial banks have limited FinTech development, leaving substantial room for improvement.

Table 2: Descriptive Statistics

| Variable  | Observation | Mean    | Standard Deviation | Minimum | Maximum |
|-----------|-------------|---------|--------------------|---------|---------|
| gc ratio  | 360         | 4.49    | 4.956              | 0       | 29.374  |
| ln_fin    | 360         | 3.806   | 1.429              | 0       | 5.841   |
| GDP       | 360         | 10.704  | 0.595              | 9.134   | 11.768  |
| IND2      | 360         | 204.155 | 155.112            | 38.574  | 558.887 |
| edu       | 360         | 10.42   | 1.445              | 7.73    | 12.782  |
| CPI       | 360         | 43.093  | 52.867             | 0       | 113.1   |
| CFR       | 360         | 18.345  | 23.157             | 0       | 76.457  |
| BTCstLdRt | 360         | 21.949  | 11.695             | -20.17  | 66.34   |
| ROA       | 360         | 0.01    | 0.003              | -0.001  | 0.019   |
| LDR       | 360         | 0.788   | 0.16               | 0.323   | 1.171   |
| NPLRA     | 360         | 0.015   | 0.015              | 0.006   | 0.284   |
| GRKPP     | 360         | 86.483  | 15.345             | 46.171  | 164.807 |
| SIZE      | 360         | 41.559  | 68.807             | -1.374  | 377.659 |
| PIC       | 360         | 51.829  | 95.392             | 1.246   | 356.407 |

#### 4.2 Main Regression Results

Table 3 reports the regression results of commercial banks' FinTech development level and green credit balance. In column (1), the coefficient obtained using only OLS regression is 1.136, which is significant at the 1% level. To make the results more rigorous, this paper adopts a two-way fixed-effects model, controlling for year and bank individual fixed effects. The results show that in column (2), when control variables are not included, the coefficient is positive but not significant. Further, after this paper controls for bank characteristic factors and macroeconomic factors affecting the scale of green credit, the coefficient of the FinTech development level (ln\_fin) is 0.369, significant at the 1% level. Economically, this result indicates that the FinTech development level of commercial banks plays a positive role in the development of green credit business. Regarding control variables, this paper finds that when general budget expenditure (GBE), average education years (EDU), the ratio of loans to the top ten customers (BTCstLdRt), and paid-in capital (PIC) are included, the results become significant. The above key variables optimize the results.

Table 3: Baseline Regression Results

| Dependent Variable: gc_ratio | (1)<br>OLS          | (2)<br>FE        | (3)                 |
|------------------------------|---------------------|------------------|---------------------|
| ln_fin                       | 1.136***<br>(0.173) | 0.122<br>(0.129) | 0.369***<br>(0.140) |
| GDP                          |                     |                  | 5.419**<br>(2.381)  |
| IND2                         |                     |                  | -0.015*<br>(0.008)  |
| GBE                          |                     |                  | 0.757***<br>(0.266) |

|                               |                  |                     |                     |
|-------------------------------|------------------|---------------------|---------------------|
| EDU                           |                  |                     | -1.822**<br>(0.793) |
| CPI                           |                  |                     | -0.076<br>(0.145)   |
| CFR                           |                  |                     | -0.028<br>(0.037)   |
| BTCstLdRt                     |                  |                     | -0.021<br>(0.026)   |
| ROA                           |                  |                     | 19.154<br>(123.147) |
| LDR                           |                  |                     | 0.871<br>(2.142)    |
| NPLRA                         |                  |                     | 5.988<br>(12.259)   |
| GRKPP                         |                  |                     | 0.014<br>(0.017)    |
| SIZE                          |                  |                     | 0.023***<br>(0.008) |
| PIC                           |                  |                     | 0.019<br>(0.022)    |
| _cons                         | 0.171<br>(0.704) | 2.154***<br>(0.510) | -32.269<br>(29.744) |
| Bank Individual Fixed Effects | NO               | YES                 | YES                 |
| Year Fixed Effects            | NO               | YES                 | YES                 |
| Observations                  | 360              | 360                 | 360                 |
| adj. R2                       | 0.105            | 0.354               | 0.357               |

Standard errors in parentheses

\* p<.1, \*\* p<0.05, \*\*\* p<0.01

### 4.3 Robustness Checks

#### 4.3.1 Alternative Dependent Variable

This paper uses the logarithm of green credit balance (GTL) as an alternative measure of green credit. Table 4, Column (1), shows that the coefficient of FinTech development level ( $\ln\_fin$ ) is 0.290, significant at the 1% level. This indicates that the original conclusion remains unchanged after replacing the measurement of the dependent variable, confirming the robustness of the main regression results.

Table 4: Robustness Checks: FinTech Development Level of Commercial Banks and Green Credit Balance

|                                  | (1)<br>Alternative Dependent<br>Variable:gc | (2)<br>Alternative<br>Independent<br>Variable:gc_ratio | (3)<br>Sample<br>Restriction:gc_ratio |
|----------------------------------|---|--|---------------------------------------|
| $\ln\_fin$                       | 0.290***<br>(0.111)                         |  | 0.003<br>(0.002)                      |
| $fin\_ratio$                     |   | 0.021<br>(0.013)                                       |                                       |
| _cons                            | 18.105**<br>(8.246)                         | 0.023***<br>(0.004)                                    | 0.020***<br>(0.007)                   |
| Control                          | YES   | YES  | YES                                   |
| Bank Individual<br>Fixed Effects | YES   | YES  | YES                                   |

| Year Fixed Effects | YES   | YES   | YES   |
|--------------------|-------|-------|-------|
| N                  | 360   | 360   | 360   |
| adj. R2            | 0.616 | 0.366 | 0.242 |

Standard errors in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

### 4.3.2 Alternative Independent Variable

Drawing on Li et al. (2020), this paper uses the proportion of FinTech-related keywords in annual reports (*fin\_ratio*) as an alternative independent variable. Table 4, Column (2), shows that the coefficient of *fin\_ratio* is 0.021, significant at the 5% level. This indicates that the original conclusion remains unchanged after replacing the measurement of the independent variable, confirming the robustness of the main regression results.

### 4.3.3 Sample Restriction

Commercial banks in this paper are classified into four categories: state-owned large banks, urban commercial banks, rural commercial banks, and joint-stock commercial banks. Table 4, Column (3), reveals that after excluding state-owned large banks and rural commercial banks, the coefficient of FinTech development level (*ln\_fin*) is 0.003, significant at the 5% level. This suggests that higher FinTech levels in general commercial banks still positively promote green credit development, confirming the universal applicability of the conclusion.

## 5. Further Research

### 5.1 Mechanism Tests

#### 5.1.1 Bank FinTech Promotes Green Credit Scale via Operational Efficiency

To test the mechanism of operational efficiency improvement, this paper uses the cost-income ratio (CTI) to measure efficiency, where a higher CTI indicates lower efficiency. Table 5, Column (1), presents the regression results of FinTech level and CTI. The coefficient of *ln\_fin* is significantly negative (-0.389,  $p < 0.05$ ), confirming that FinTech enhances operational efficiency, thereby influencing green credit development.

#### 5.1.2 Moderating Role of Regional Digital Inclusive Finance

This paper employs the Peking University Digital Inclusive Finance Index, including coverage breadth, usage depth, and digitization degree. Table 5, Columns 2–5, shows that all four dimensions positively moderate the FinTech-green credit relationship ( $p < 0.05$ ). Specifically, the digitization degree has the highest coefficient (1.153), indicating its superior moderating effect across regions with varying digital development levels.

Table 5: Mechanism Test Results

|                                   | (1)                 | (2)                | (3)                | (4)                 | (5)                 |
|-----------------------------------|---------------------|--------------------|--------------------|---------------------|---------------------|
|                                   | CsIncRt             | gc_ratio           | gc_ratio           | gc_ratio            | gc_ratio            |
| <i>ln_fin</i>                     | -0.389**<br>(0.162) | -4.214*<br>(2.199) | -3.909*<br>(2.050) | -3.745**<br>(1.685) | -6.596**<br>(2.851) |
| <i>ln_fin</i> × <i>lnindex</i>    |                     | 0.768**<br>(0.383) |                    |                     |                     |
| <i>ln_fin</i> × <i>lncoverage</i> |                     |                    | 0.723**<br>(0.361) |                     |                     |
| <i>ln_fin</i> × <i>lnusage</i>    |                     |                    |                    | 0.683**<br>(0.293)  |                     |
| <i>ln_fin</i> × <i>lndig</i>      |                     |                    |                    |                     | 1.153**<br>(0.484)  |
| <i>lnindex</i>                    |                     | -30.004***         |                    |                     |                     |

|                               |           |            |          |            |          |
|-------------------------------|-----------|------------|----------|------------|----------|
|                               |           | (8.371)    |          |            |          |
| Incoverage                    |           |            | -7.999** |            |          |
|                               |           |            | (3.565)  |            |          |
| Inusage                       |           |            |          | -17.556*** |          |
|                               |           |            |          | (3.972)    |          |
| Indig                         |           |            |          |            | -0.071   |
|                               |           |            |          |            | (4.126)  |
| _cons                         | 32.207*** | 179.993*** | 44.926** | 95.210***  | 3.277    |
|                               | (1.170)   | (52.994)   | (19.005) | (21.100)   | (22.950) |
| Control                       | YES       | YES        | YES      | YES        | YES      |
| Bank Individual Fixed Effects | YES       | YES        | YES      | YES        | YES      |
| Year Fixed Effects            | YES       | YES        | YES      | YES        | YES      |
| N                             | 360       | 360        | 360      | 360        | 360      |
| adj. R <sup>2</sup>           | 0.160     | 0.502      | 0.488    | 0.508      | 0.484    |

Standard errors in parentheses  
\* p<.1, \*\* p<0.05, \*\*\* p<0.01

## 5.2 Heterogeneity Analysis

This paper further examines the heterogeneity of FinTech’s effects under different bank sizes and types, providing comprehensive empirical evidence for FinTech’s role in promoting green credit development.

### 5.2.1 Impact of Bank Size

In recent years, banks with a higher proportion of small and micro enterprise loans have been more significantly affected by economic uncertainty due to economic growth pressures and market competition (Shi & Chen, 2021). This paper divides the sample into large and small commercial banks based on annual total assets (median split) for grouped regression. Table 6, Columns (1)–(2), shows that the regression coefficient for small banks is 0.898, larger and more significant than that for large banks. This indicates a stronger positive effect of FinTech on green credit in small-scale commercial banks.

### 5.2.2 Impact of Bank Type

The sample is divided into national and regional banks for regression. Table 6, Columns (3)–(4), reveals a significant coefficient of 0.506 (p<0.05) for regional banks, while national banks show a positive but insignificant coefficient. This suggests that FinTech’s promotional effect on green credit is more pronounced in regional banks.

Table 6: Further Analysis: Grouped Tests Based on Bank Size and Bank Characteristics

|                               | (1)<br>Large-Scale<br>Banks | (2)<br>Small-Scale<br>Banks | (3)<br>National Banks | (4)<br>Regional Banks |
|-------------------------------|-----------------------------|-----------------------------|-----------------------|-----------------------|
| ln_fin                        | 0.763**                     | 0.898***                    | 0.327                 | 0.506**               |
|                               | (0.330)                     | (0.169)                     | (0.228)               | (0.195)               |
| _cons                         | 2.815*                      | -0.092                      | -2.383                | -16.612               |
|                               | (1.482)                     | (0.605)                     | (48.830)              | (22.524)              |
| Control                       | YES                         | YES                         | YES                   | YES                   |
| Bank Individual Fixed Effects | YES                         | YES                         | YES                   | YES                   |
| Year Fixed Effects            | YES                         | YES                         | YES                   | YES                   |
| N                             | 180                         | 180                         | 180                   | 180                   |
| adj. R <sup>2</sup>           | 0.024                       | 0.132                       | 0.294                 | 0.356                 |

Standard errors in parentheses

\*  $p < .1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## 6. Conclusions and Implications

### 6.1 Research Conclusions

Using commercial banks in China from 2014 to 2023 as the research sample, this paper explores the relationship between FinTech and banks' green credit. The study finds that the higher the FinTech level of commercial banks, the larger the scale of green credit business. Mechanism tests show that the improvement of banks' FinTech can leverage the advantages of digital technology. Meanwhile, regional digital finance serves as an important moderating and supporting factor in the process of banks' financial development. Regions with a higher level of digital inclusive finance provide superior financial infrastructure conditions for banks' FinTech to drive green credit business. Additionally, this paper finds that the moderating effect of the improvement in the digitization degree of regional inclusive finance is more optimal. Further, heterogeneity tests reveal that FinTech has a more significant promoting effect on the green credit business scale of small-scale banks and regional banks.

### 6.2 Policy Implications

Based on the above research conclusions, the following policy recommendations are put forward: First, banks should vigorously develop FinTech and accelerate the all-round integration of traditional businesses with FinTech. Firstly, banks should strengthen the application of FinTech, using advanced technologies such as big data and artificial intelligence to enhance the digital capability of green credit business, and improve business processing efficiency and risk management levels (Lin, 2024). Secondly, banks should develop differentiated business models based on their own characteristic advantages. Finally, to ensure the stable development of green credit business, banks also need to continuously improve the risk management system, establishing a comprehensive risk management system including environmental risks, providing stronger risk protection for green credit.

Second, the government should strengthen top-level design and policy guidance. On March 2, 2025, the General Office of the State Council issued Guiding Opinions on Doing a Good Job in the "Five Major Articles" of Finance. Green finance adheres to the principle of "establishing first and then breaking", coordinating support for green development and low-carbon transformation. Sci-tech finance should strengthen financial support for major national scientific and technological tasks and technology-based small and medium-sized enterprises.

## References

- [1] Akhisar, İ., Tunay, K. B., & Tunay, N. The Effects of Innovations on Bank Performance: The Case of Electronic Banking Services [J]. *Procedia-Social and Behavioral Sciences*, 2015, 195(7): 369–375.
- [2] Coase, R. H. The Problem of Social Cost [J]. *Journal of Law and Economics*, 1960: 1–44.
- [3] Pigou, A. C. Co-operative Societies and Income Tax [J]. *The Economic Journal*, 1920, 30(118): 156–162.
- [4] Zhao, J., Li, X., Yu, C. H., Chen, S., & Lee, C. C. Riding the Fintech Innovation Wave: Fintech, Patents and Bank Performance [J]. *Journal of International Money and Finance*, 2021.
- [5] Feng, J., Wang, Y. D., & Chen, M. J. Bank FinTech, Lending Distance and Banking Competition: Based on the Perspective of Credit Diversification [J]. *Contemporary Finance & Economics*, 2024, (05): 73–85.
- [6] Guo, Y. W., Guo, B. Q., Lin, W. L., et al. How Does Undertaking Environmental Responsibility Affect Bank Credit Risk?—From the Perspective of Green Credit [J/OL]. *Journal of the University of Electronic Science and Technology of China (Social Sciences Edition)*, 2025: 1–18.
- [7] Huang, Y. B., & Li, J. L. Digital Transformation of Commercial Banks and Green Credit Supply: Empowerment or Crowding Out? [J]. *Modern Economic Research*, 2024, (12): 62–72.

- [8] Huang, Z., & Wang, P. P. FinTech Empowers the Development of Green Finance: Mechanism, Challenges and Countermeasure Suggestions [J]. *Social Science Journal*, 2022, (05): 101–108.
- [9] Li, B., Li, B. B., Zhu, T. H., et al. How Does Bank Competition Affect the Policy Effect of Green Credit?—Based on the Test of Enterprise Green Transformation [J]. *Studies of International Finance*, 2024, (10): 62–73.
- [10] Li, C. T., Yan, X. W., Song, M., et al. FinTech and Enterprise Innovation—Evidence from Listed Companies on the New Third Board [J]. *China Industrial Economy*, 2020, (1): 81–98.
- [11] Lin, B. H. Development Strategies of Green Credit in Commercial Banks [J]. *China Finance*, 2024, (15): 50–51.
- [12] Liu, Z. Y., & Xie, Y. S. Analysis of the Mechanism of FinTech Serving the Development of Green Finance from the Perspective of Financial Function Theory [J]. *Study and Practice*, 2022, (07): 107–114.
- [13] Sheng, T. X., Tai, X. F., Zhou, G., et al. FinTech and Liquidity Creation of Commercial Banks: Inhibition or Promotion [J]. *Studies of International Finance*, 2022, (02): 65–74.
- [14] Shi, X. K., & Chen, W. Can Monetary Policy Promote Banks' Credit Lending to Small and Micro Enterprises?—Research Based on the Perspective of Macroeconomic Uncertainty [J]. *Economic Theory and Business Management*, 2021, 41(07): 81–95.
- [15] Song, M., Zhou, P., & Si, H. T. FinTech and Total Factor Productivity of Enterprises—From the Perspectives of "Empowerment" and Credit Rationing [J]. *China Industrial Economy*, 2021, (04).
- [16] Wang, Q. Q., Qi, C. Y., & Chen, Q. The Impact of Green Credit on the Risk of Commercial Banks—Based on the Moderating Effect of FinTech [J]. *Heilongjiang Finance*, 2024, (05): 21–27.
- [17] Wen, X. Z., Fan, X. T., & Yu, Y. Y. FinTech, Credit Risk of Commercial Banks and Green Credit [J]. *Frontiers of Science and Technology in Engineering Management*, 2024, 43(06): 68–74.
- [18] Zhang, Y. Do Green Interlocking Directors Help Enterprises Obtain Green Credit?—Evidence of Green Credit Measured Based on Text Analysis Method [J/OL]. *Acta Economica*, 2025: 1–40.
- [19] Zhong, K., Liu, Y. H., & Wang, Y. Y. Research on the Impact of FinTech on Green Credit—Empirical Evidence from Commercial Banks [J]. *Foreign Economics & Management*, 2023, 45(11): 3–18.