How Green Credit Policy Affects Commercial Banks' Credit Risk?

Evidence and Federated Learning-Based Modeling From 26 Listed Commercial Banks in China

Tongyue Feng, School of International Trade and Economics, Anhui University of Finance and Economics, China

Jiexiang Xu, School of International Trade and Economics, Anhui University of Finance and Economics, China*

Zehan Zhou, School of Management Science and Engineering, Anhui University of Finance and Economics, China

Yilang Luo, School of Finance, Anhui University of Finance and Economics, China

ABSTRACT

The green credit policy has significantly influenced the growth of green industries in China. This study evaluates its impact on reducing bank credit risk using data from 26 Chinese banks from 2015 to 2021. The authors discovered that the policy's primary effect is linked to banks' financial leverage. Notably, green credit's influence on insolvency risk is most evident in leverage risk. However, despite governmental support for green credit collaboration, prevalent information gaps between banks and green enterprises lead to misjudgments and subsequent credit losses. To address the balance between credit risk mitigation and privacy, the authors investigated vertical joint learning for a precise risk control model grounded in commercial banks' practices. Experiments revealed that this joint model outperforms the sole "bank internal model" in presenting green credit data, underscoring the potential of machine learning to refine green credit systems and bolster banks' credit risk management.

KEYWORDS

Dynamic Characteristics, Federated Learning, Green Credit Policy, Green Innovation, Risk Management, Risk of Commercial Banks

1. INTRODUCTION

Under the guidance of the "five-in-one" system for building ecological civilization and the "innovation, coordination, green, openness, and sharing" development concept for environmental protection, the Chinese government has issued a series of policy guidelines to protect the environment (Xue et al., 2020; Wang et al., 2019). In 2007, the State Environmental Protection Administration, the People's Bank of China, and the China Banking Regulatory Commission jointly adopted the "Proposal on the Implementation of Environmental Protection Measures and Regulations to Prevent Credit Risks,"

*Corresponding Author

marking the beginning of China's comprehensive implementation of the "green credit" policy (Sun et al., 2019). Since then, the green loan balance of China's commercial banks (five large state-owned banks, 12 joint-stock banks, and some municipal banks) has increased year after year. As Figure 1 shows, the total value of green loans issued by Chinese commercial banks increased from 3042.8195 billion yuan in 2015 to 8315.291 billion yuan in 2021. The green credit policy requires financial institutions, when making loans to consider not only the credit status of enterprises, but also their environmental impact (Chai et al., 2022). Financial institutions are expected to actively support companies that adopt environmentally friendly practices and penalize those that violate national environmental protection policies. In recent years, the state has established the green credit cooperation mechanism and encouraged banks at all levels to cooperate with several commercial banks (Jou et al., 2015; Eisner, 2004). However, there is a serious problem of information asymmetry between banks and companies, which can lead to greenfield companies' deliberately concealing their true situation when applying for loans. This makes it difficult for banks to effectively assess their credit situation, resulting in credit losses and high credit risk (He et al., 2022; Yang et al., 2020; Sattler et al., 2020). The lack of a unified mechanism for risk identification in the financial system has further weakened the enthusiasm of some banks to make green loans, thus hindering the development of green credit. Therefore, there is an urgent need to address how to reduce corporate default rates, improve information transparency between banks and companies, and avoid bank credit risk. These issues need further research and discussion in the Chinese banking sector (Pillulta et al., 2022; Zhang et al., 2023).

Moreover, the impact of green loans on banks' credit risk is complex, with different outcomes such as positive, negative, and nonlinear effects. Therefore, commercial banks need to adjust their risk management models to account for these different effects.

At present, however, there are still many debates among scholars about the meaning of green credit, green credit for commercial banks' credit risk, and the mechanism for developing green credit. On the positive side, the implementation of green credit policies by commercial banks can effectively

Figure 1. Change in total green credit balances of 26 commercial banks, 2015–2021 (in billions)
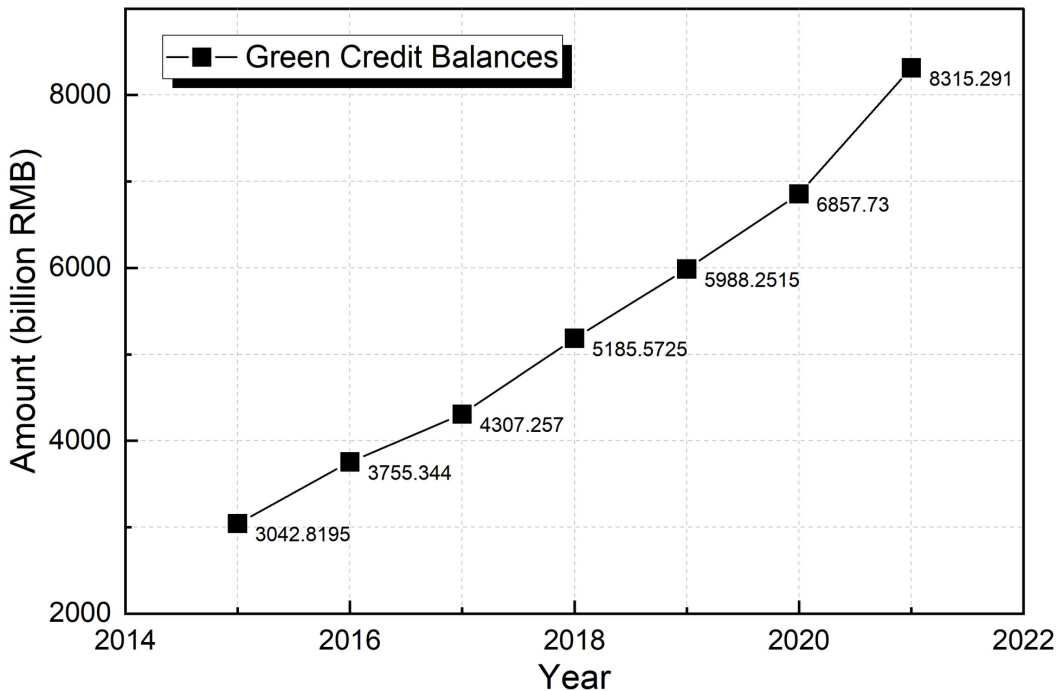
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