A Study on the Mitigating Effect of Big Data Credit Reporting on Financing Constraints of Small and Micro Enterprises Enterprises

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Abstract. Small and micro enterprises (SMEs) have long faced challenges including insufficient credit supply, unbalanced financing structure and high financing costs. Information asymmetry and structural flaws in the traditional credit reporting system are the core causes. Traditional credit reporting features limited coverage, a single evaluation dimension and delayed information updates. It fails to adapt to SMEs' operational traits and perpetuates credit rationing. Based on information asymmetry and credit rationing theories, this paper systematically analyzes the internal mechanism of big data credit reporting for alleviating SMEs' financing constraints. The results show that big data credit reporting addresses the drawbacks of traditional credit reporting via four paths: incremental information supplementation, improved risk identification accuracy, dynamic monitoring and reputation constraints, thereby boosting SMEs' credit availability. Currently, big data credit reporting still faces practical challenges including data islands, flawed authorization mechanisms, algorithmic discrimination and data security risks. Accordingly, this paper proposes optimization paths covering data sharing, credit business transformation, algorithm supervision and credit cultivation, providing practical references for the digital transformation of credit reporting systems and the development of small and micro inclusive finance.

Keywords: Big data credit reporting, Small and micro enterprises, Financing constraints.

1 Introduction

SMEs are a cornerstone of national economic development and play an irreplaceable role in stabilizing economic growth, driving industrial innovation and creating jobs. At this stage, narrow financing channels and high financing costs have always restricted the development of small and micro enterprises[1]. The World Bank's 2025 global SME financing report shows that there is a significant credit gap in China's small and micro enterprises, and nearly 40% of the subjects with financing needs are difficult to obtain formal financial credit support. From the perspective of financing status, although the

© The Author(s) 2026
A. Bhattacharjya et al. (eds.), *Proceedings of the 2026 4th International Conference on Management Innovation and Economy Development (MIED 2026)*, Advances in Economics, Business and Management Research 405,
https://doi.org/10.2991/978-94-6239-787-3_65

scale of domestic inclusive small and micro loans continues to expand, the overall proportion of credit is still low. The source of funds for small and micro enterprises is highly dependent on internal accumulation, with endogenous financing accounting for more than 60% and formal bank credit accounting for less than 30%. Most enterprises can only rely on high-cost private lending to maintain their operations. At the same time, the credit cost of small and micro enterprises is significantly higher than that of large and medium-sized enterprises, further increasing their operating burden[2] [3].

It is not difficult to find that the main reasons for the obstruction of small and micro enterprises' loans are the lack of mortgages and pledges and the lack of credit record. The combined proportion of the two factors is nearly 70%, which is enough to show that the lack of credit is the core inducement of small and micro enterprises' financing difficulties. Information asymmetry is a common problem in the credit market. It is difficult for financial institutions to identify the real operation status and performance ability of small and micro enterprises at low cost. They can only control risks through mortgage guarantee and credit rationing. A large number of small and micro enterprises with light assets and no credit record have been excluded from the formal financial system for a long time[4].

However, the problem of information mismatch in the credit market is difficult to cure for a long time, because the traditional credit reporting system has structural defects. By the end of 2025, only 35% of small and micro enterprises in the central bank's credit reporting system have effective credit records, and most of them were in a credit blank state. Traditional credit reporting relies on hard financial data such as financial lending and public payment to carry out credit evaluation, ignoring soft information related to business operations and supply chain cooperation. In addition, data updates suffer from monthly or quarterly time lags, which can not dynamically match the flexible business characteristics of small and micro enterprises, forming a large-scale credit reporting service blind spot and continuously solidifying the financing constraints of small and micro enterprises[5].

The rapid iteration of digital technology provides a new way to solve the financing problems of small and micro enterprises, and big data credit reporting has gradually developed into a new credit evaluation model. This model integrates multi-source alternative data such as tax, electricity, logistics, social security, online transactions, etc., and relies on digital technology to mine multidimensional credit information to build a comprehensive corporate credit portrait. Market practices such as e-commerce loans and micro industry loans have fully confirmed that big data credit reporting can effectively identify the risk characteristics of credit blank subjects, significantly improve the credit availability of small and micro enterprises, and effectively alleviate the financing problems of small and micro enterprises in practice[6].

At present, the academic community focuses more on the macro inclusive effect of digital finance, less on big data credit reporting as an independent research variable, and lacks a systematic review of its micro transmission path and internal mechanism to ease financing constraints. Based on this, this paper takes big data credit reporting as the research object, and systematically explores its internal logic and mechanism to alleviate the financing constraints of small and micro enterprises, in order to provide

feasible practical reference for the digital transformation of China's credit reporting system and the optimization of small and micro financial services.

2 Theoretical Foundations and Literature Review

Information asymmetry in the credit market is the underlying cause of the long-term financing difficulties faced by small and micro enterprises (SMEs), and there is a wealth of relevant theoretical and research findings. Akerlof first conducted research on market information imbalances, confirming that information biases can lead to adverse selection and impair market efficiency. Stiglitz and Weiss extended this logic to the credit field, proposing the credit rationing theory, which fully demonstrates that when financial institutions cannot accurately assess the risk levels of different borrowers, simply raising interest rates is difficult to achieve a balance between market supply and demand, and may even amplify operational risks. Therefore, institutions generally adopt credit rationing as a means to mitigate risks, and SMEs with low operational transparency are often the primary targets of credit rationing. The financing constraints theory proposed by relevant scholars further supplements this research direction. This theory suggests that the external financing costs of enterprises are generally higher than their internal financing costs. For SMEs with limited internal capital reserves, the obstruction of external credit channels can significantly exacerbate overall financing pressure. Under this theoretical framework, scholars at home and abroad have conducted extensive research on traditional credit reporting systems in recent years, generally acknowledging that credit reporting systems can rely on standardized financial records to mitigate information differences between borrowers and lenders. However, numerous empirical studies have also simultaneously confirmed that the data sources and update models of traditional credit reporting have inherent shortcomings, making it difficult to adapt to the operational characteristics of SMEs. A large number of market entities are unable to form effective credit records, resulting in a large blind spot in credit reporting services. This also prevents the fundamental resolution of information asymmetry issues, perpetuating the financing difficulties faced by SMEs.

With the continuous development of digital technology in the financial sector, academia has begun to pay attention to the optimization effect of new credit evaluation models such as big data credit reporting on the financing environment. Many domestic scholars have proposed that technologies such as big data and cloud computing can broaden the scope of information collection, reduce transaction costs in financial services, and effectively reach long-tail market entities that were previously difficult to cover. Other studies focus on the application value of digital credit, arguing that integrating diverse business data can uncover operational information that traditional models cannot capture, helping market entities lacking credit records establish effective credit identifiers. This view has also been supported by the practical achievements of various digital credit products. Most existing research analyzes from the perspective of the overall development level of digital finance or the operational effectiveness of internet credit platforms, affirming the improvement effect of new technologies on small and micro financing. However, most studies have not conducted special analysis on big

data credit reporting as an independent technical and institutional element. The academic community still lacks systematic analysis and argumentation on the specific pathways through which big data credit reporting plays its role, as well as the linkage relationships between different operational links. Considering current market practices, big data credit reporting has demonstrated practical effects in alleviating financing constraints. Clarifying its internal operational logic and mechanism of action has also become a research direction with practical value at this stage.

3 Mechanism Behind Big Data Credit Reporting for Alleviating Financing Constraints

Big data credit reporting is not a mere digitization of traditional credit reporting. Instead, it fundamentally alters the information structure of the interactive dynamics between banks and SMEs by reshaping the production, processing, and application of credit information. Its inherent mechanism for alleviating financing constraints can be summarized into four interrelated and synergistic transmission paths. There are essential differences between traditional credit reporting and big data credit reporting in terms of core logic and operational characteristics.

3.1 Incremental Information Path

The blind spot of traditional credit reporting is the inability to quantify and transmit soft information of small and micro enterprises. And big data credit reporting involves incorporating alternative data such as taxation, electricity, logistics, and social security into the credit evaluation system, achieving the converts unstructured soft information into standardized quantitative data. Tax data reflects the authenticity and growth of a company's operating income, electricity data characterizes production activity, logistics data verifies order fulfillment capabilities, and social security data reveals employment norms. These scattered soft information, after being collected and cleaned, can be input into machine learning models to generate credit scores that surpass traditional financial records. This process is equivalent to creating credit capital for credit white households out of nothing, giving them the first admission ticket to credit access. From the perspective of credit allocation theory, information increment significantly shifts the credit supply curve of banks outward, directly expanding the effective boundary of the credit market.

3.2 Information Accuracy Path

The value of information lies not only in quantity, but also in accuracy. The traditional scorecard model is limited by linear and low dimensional assumptions, making it difficult to accurately distinguish the risk level of small and micro enterprises, leading banks to adopt a one size fits all refusal strategy. And big data credit reporting introduces ensemble learning algorithms such as gradient boosting trees and deep neural networks, which can mine complex nonlinear relationships from thousands of weakly correlated

variables, and increase default prediction values to above 0.85, significantly improving the accuracy of risk identification. Accurate risk ranking enables banks to finely stratify and differentiate pricing for small and micro enterprises. Under the traditional credit model, banks are unable to distinguish between medium risk and high-risk customers, and can only cover overall risk by raising interest rates, leading to low-risk customers exiting the market and ultimately triggering adverse selection. In the big data credit reporting model, banks can accurately predict the probability of expected loss rates to within one percent. For small and micro enterprises with controllable risks but lacking collateral, they can cover the risk by moderately increasing interest rates, rather than simply refusing loans. This shifts credit decision-making from a binary choice of lending or not lending to a continuous choice of what price to lend at, effectively alleviating credit rationing.

3.3 Dynamic Monitoring Path

Traditional post loan management relies on regular reporting by enterprises and on-site visits by account managers, which leads to high costs and delays, making it difficult to detect signals of deteriorating business operations in a timely manner. And big data credit reporting builds a post loan risk early warning system by continuously accessing real-time data streams such as tax invoicing, electricity payment, etc. of enterprises, which can set thresholds for abnormal indicators such as tax reduction, sudden decrease in electricity consumption, and litigation information, achieving instant perception and automatic warning of risks. The improvement of dynamic monitoring capabilities has completely changed the risk management logic of banks. When a bank is confident that it can detect risks and take protective measures in a timely manner, its dependence on the initial collateral will significantly decrease. This is equivalent to reducing the risk premium and collateral discount required by banks for pre asymmetric information by enhancing the execution power of post loan contracts, thus daring to issue credit loans to small and micro enterprises with light assets but transparent operations.

3.4 Reputation Signaling Path

Big data credit reporting has also established a digital reputation mechanism that can accumulate and overflow. In traditional credit reporting, a single default may result in a company's credit history being reset to zero. In big data credit reporting, a company's credit profile is depicted by thousands of data points, and an accidental mistake will not completely erase its long-term good credit record. More importantly, digital credit has a cumulative nature, and a good tax payment performance record of enterprises will continuously improve their credit score, thereby obtaining lower financing costs and higher credit limits. From the perspective of game theory, this is equivalent to extending the period of the bank enterprise game. When enterprises realize that good digital credit can bring long-term financing benefits, they will actively restrain short-term speculative behavior, repay on time and operate in a standardized manner, creating a virtuous cycle where credible operations facilitate access to finance. This reputation constraint mechanism fundamentally reduces the moral hazard of small and micro enterprises,

reduces the credit losses of banks, and further enhances the willingness of banks to lend.

4 Realistic Obstacles and Potential Risks

Although big data credit reporting can effectively alleviate the financing constraints of small and micro enterprises, there are still many shortcomings and potential risks in the actual operation, which restrict the full play of its enabling effect, which can be summarized into four aspects.

First, the problem of data barriers is prominent. Tax, power, logistics, social security and other alternative data are scattered between different government departments and market entities, with serious segmentation and institutional barriers to cross sectoral data sharing. The data collection scope of local credit reporting platforms is limited, and the national data interconnection has not yet been realized. At the same time, the data standards and format of various industries are not unified, and the data integration is difficult, so it is difficult to form a standardized credit evaluation data system.

Second, the data authorization mechanism is not perfect. According to relevant regulations on data security and privacy protection, the use of credit reporting data must be explicitly authorized by the subject. At present, the authorization process is cumbersome, and there are widespread concerns about data leakage in enterprises. A large number of business data cannot be collected in compliance, forming a data authorization blank. At the same time, some credit reporting institutions have excessive authorization, induced authorization and other non-standard behaviors, which have disrupted the development order of the industry.

Third, there are hidden dangers in data security and privacy protection. Big data credit reporting has gathered a large amount of sensitive information from enterprises and business owners. Some institutions have problems such as excessive collection and illegal use of data, and even data trafficking. Frequent data security incidents not only damage the legitimate rights and interests of market participants, but also significantly reduce the trust of small and micro enterprises in the big data credit reporting system.

Fourth, the algorithm defects and the risk of data monopoly are prominent. The machine learning model has the problem of the black-box problem of algorithms and the lack of transparency of scoring logic, which is easy to cause algorithm discrimination and aggravate financing injustice. In addition, head technology enterprises rely on core data resources to form monopoly advantages, raise the industry access threshold through data barriers, distort the allocation of credit resources, and bury potential systemic financial risks.

5 Conclusions and Policy Recommendations

Based on the theory of information asymmetry and credit rationing, this paper explores the mitigation mechanism of big data credit reporting on the financing constraints of small and micro enterprises. The study found that the traditional credit reporting has structural problems such as limited coverage, single evaluation dimension and lagging

information update, which solidified the financing difficulties of small and micro enterprises. By virtue of multi-source alternative data and intelligent algorithms, big data credit reporting effectively breaks the credit blank barriers of small and micro enterprises, weakens the credit rationing effect, and significantly improves the credit availability of small and micro enterprises through four paths: information supplement, accuracy improvement, dynamic monitoring, and reputation constraint. It is an effective digital path to solve the financing problems of small and micro enterprises.

At present, there are still some problems in the implementation of big data credit reporting, such as data island, imperfect authorization mechanism, hidden dangers of data security, algorithm and data monopoly, which limit its inclusive enabling effect. In this regard, it is necessary to build a data sharing system of government enterprise collaboration, promote the transformation of digital credit of financial institutions, improve the algorithm and data security supervision mechanism, carry out the cultivation of digital credit of small and micro enterprises, and comprehensively optimize the development environment of big data credit reporting. With the continuous upgrading of the digital credit reporting system, big data credit reporting will continue to optimize the ecosystem of small and micro financial services and help the high-quality development of Inclusive Finance.

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