



Application of Fintech in Supply Chain Financial Risk Control

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Abstract. Supply chain finance has played an important role in solving the problems of difficult and expensive financing for small and medium-sized enterprises. The biggest risk point of supply chain finance is credit risk under incomplete information and moral hazard under asymmetric information. To prevent and defuse supply chain financial risks, it is necessary to actively use financial technology means such as big data, Internet of Things, blockchain, and artificial intelligence to improve the risk management capabilities of supply chain finance. By analyzing the risks faced by supply chain finance, this paper takes the supply chain finance model based on B2B platform as an example, uses the Logistic regression method to build a credit evaluation model for small and medium enterprises, conducts an empirical study on the construction of supply chain finance risk control system, and constructs a possible A trust, low-risk, high-efficiency intelligent supply chain financial service framework.

Keywords: fintech; supply chain financial; credit risk

1 Introduction

Compared with traditional banking business, the current supply chain finance based on platform transactions is more frequent, small in scale, and has a relatively long operation chain ^[1]. Therefore, online, digital and intelligent are the development direction and inevitable path of supply chain finance. Supply chain finance business involves core enterprises, upstream and downstream enterprises, B2B platforms, third-party logistics companies and other enterprises. There are many participants, diverse business models, complex structures, and complex operational processes. In order to study the role of financial technology in supply chain financial risk control, this paper comprehensively analyzes the risks faced by supply chain finance, establishes a B2B platform supply chain financial enterprise credit evaluation model, and analyzes the supply chain financial risk control system from the perspective of financial technology. Through the research of this paper, it is beneficial to use financial technology to promote the development of supply chain finance, and help commercial banks to improve the intelligent risk control system of supply chain finance. Although this paper expounds the future

service framework of supply chain finance, it does not conduct an in-depth analysis of the specific implementation plan of Fintech technology. Subsequent research still needs to further implement the specific application method of financial technology in supply chain finance.

2 Main risks faced by supply chain finance

In traditional credit business, commercial banks usually focus on risk assessment on the rating and financial status of enterprises. In supply chain finance business, credit extension exists due to transactions, and capital flow, information flow and logistics are the basis for judging the feasibility of the business. The biggest risk point of business lies in the credit risk under incomplete information and the moral hazard under asymmetric information. Using Internet technology to obtain real, effective, timely and low-cost information on the upstream and downstream of the supply chain is the key to preventing risks. At the same time, based on the characteristics of the supply chain business, it is embodied in the following aspects.

First, the investigation risk of the overall industrial closed loop of the supply chain. Supply chain finance is based on the supply chain industry. The upstream and downstream demand supply, transaction mode, profit model, transaction process, and settlement method will all affect the arrangement of risk control. If the industry closed-loop investigation is deviated, it will affect the safety of supply chain. The logistic model is generally used to evaluate the credit risk of supply chain finance. Assuming that there are i factors that affect the value of y , expressed as $x_1, x_2 \dots x_i$, then the logistic model can be expressed as:

$$\ln \frac{P_i}{1-P_i} = g(x_1, x_2 \dots x_i) \quad (1)$$

These i factors $x_1, x_2 \dots x_i$ are the independent variables of the logistic model, so the logistic model regression model can be expressed as:

$$\ln \frac{P_i}{1-P_i} = \beta_0 + \beta_1 x_1 + \dots + \beta_i x_i \quad (2)$$

$\beta_0, \beta_1 \dots \beta_i$ is an unknown parameter with estimation, and after arranging the above formula, we can get:

$$\frac{P}{1-P} = e^{\beta_0 + \beta_1 x_1 + \dots + \beta_i x_i} \quad (3)$$

After sorting out the above formula, the calculation formula of the compliance probability p of the enterprise can be obtained as:

$$P = \frac{1}{1 + e^{-(\beta_0 + \beta_1 x_1 + \dots + \beta_i x_i)}} \quad (4)$$

P_i is the probability of credit risk of the borrowing enterprise, β_i is the regression coefficient, and x_i is the independent variable.

The second is the credit risk of core enterprises. In supply chain finance, the production and operation status and development prospects of core enterprises determine the survival, development and transaction quality of upstream and downstream enterprises. Once there is a problem with the credit of the core enterprise, it will inevitably spread to the upstream and downstream enterprises along with the supply chain.

The third is the risk of authenticity of trade background. If some enterprises use supply chain financial channels to obtain financing loans by providing false business documents and cargo certificates, and use the funds for other speculative or investment businesses, the financing business will face the risk of misappropriation of funds and uncertain sources of repayment.

The fourth is the risk of logistics supervision. In the inventory financing supply chain financial model, due to the high transaction frequency and the large changes in the pledge, the bank will entrust the supervision and management of the cargo rights to the warehousing and logistics enterprises. lead to bank losses.

3 Application of fintech in supply chain finance

As digital technology continues to accelerate the penetration of the industry, the business model of supply chain finance has also been transformed and upgraded. Digital supply chain finance is a combination of Internet of Things, big data, artificial intelligence, blockchain and other technologies to penetrate the entire supply chain management, further improve work efficiency and information transparency, reduce financing costs, and realize the informatization, intelligence and integration of the supply chain. and automated technology and management of an integrated financial services model [2]. The application of financial technology in supply chain finance is embodied in the following aspects:

The first is to use the big data risk control system to reduce the credit risk under incomplete information. Comprehensively sort out the supply chain business process, decompose the key control links of the platform, and use the template information collection method to systematize and digitize the supply chain financial risk control model. Comprehensive analysis and mining of order quantity, employee compensation level, transaction data, cash flow, product cycle, safety stock, sales distribution, technology level, R&D investment. Reflect the authenticity of enterprise status and transactions, and realize real-time risk the multi-level risk control effect of early warning reduces the credit risk under incomplete information objectively.

The second is to use the Internet of Things to reduce moral hazard under asymmetric information. With the advent of the 5G commercialization era, the Internet of Things can use sensing technology, positioning technology and navigation technology to digitize and visualize transaction links (especially warehousing and freight links), and upload IoT data in real time through communication technology. Reduce the error rate and moral hazard when manually registering information, improve the accuracy, security and operational efficiency of transactions, and reduce the bank's post-loan management costs.

The third is to use blockchain technology to promote supply chain finance and improve information transparency. Blockchain has five most critical properties, namely distributed data storage, point-to-point transmission, consensus mechanism, asymmetric encryption, and smart contracts. These five properties make it highly reliable, decentralized mechanism, democratic decision-making mechanism, Confidential transmission, transaction contract execution automation and other social significance; it can realize end-to-end information and data transparency, real-time decision-making, equal participation, data sharing, and large-scale collaboration, which will form a complete and smooth, real-time traceable information flow, allowing various financial institutions. Organizations share information about upstream and downstream companies in the supply chain.

4 A new service framework for supply chain finance based on “blockchain + IOT (internet of things) + big data”

There are many participants in supply chain finance, which are mainly divided into 4 categories according to their roles and functions: First, supply chain alliances, including all node enterprises participating in supply chain production, mainly upstream suppliers, core enterprises, downstream enterprises Dealers, distributors ^[3]. There are real trade exchanges between alliance members; the second is financial institutions, mainly commercial banks that provide financial assistance for financing companies in supply chain finance or insurance companies that provide insurance services; the third is third parties Logistics enterprises refer to logistics enterprises introduced or built by enterprises to meet supply chain financial services, mainly providing storage and transportation of goods and other services for movable property pledge, inventory financing and other businesses.

Relying on core enterprises or third-party blockchain service providers to build a blockchain-based supply chain financial alliance chain management platform, each business participant accesses the alliance chain through the Internet or a proprietary network and becomes a chain node. In the network system formed by relying on the blockchain, the member companies within the alliance chain can conduct network transactions and broadcast on the whole network. Whether the transaction is real and effective needs to be recognized by all participants, and then the transaction block is compared with the previous block ^[4]. The tail chain extends the blockchain and ensures the electronic transactions and blockchain authentication of enterprises in the alliance chain.

After the construction of the alliance chain is completed, the data of each enterprise in the supply chain alliance needs to be put on the chain first, and the technical characteristics of the blockchain are used to ensure the non-tampering and traceability of the data. The second is asset digitization. Accounts receivable and prepaid accounts are both digitized assets. Both parties can register their respective accounts receivable and prepaid accounts on the blockchain and confirm each other to form an effective chain. On the contract, such assets can flow freely on the chain in the future. For movable asset financing, because movable assets are physical objects, its value and authenticity are difficult to be completely and accurately evaluated, and it is difficult to transfer to the

blockchain. At present, many solutions try to solve the binding problem between physical objects and on-chain assets, but the effect is very limited. Therefore, only when the Internet of Things technology matures and realizes the real-time collection, evaluation and monitoring of physical information, can the digitization of movable property value be effectively realized.

After the supply chain financial blockchain system is built, the supply chain will focus on supply chain financial alliance chain management platform, the operation mode of the new service framework will be as shown in Figure 1.

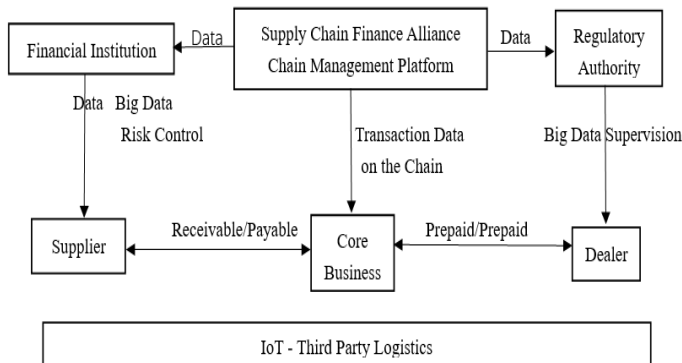


Fig. 1. Operational mode of supply chain finance service framework

Enterprises in the supply chain alliance take real trade as the background, and generate creditor's rights such as receivables and payables. The blockchain system records and uploads the real transaction information to the alliance chain management platform. Among them, the logistics change information based on the entire business process will also be collected and monitored by the IoT system in real time and uploaded to the alliance chain management platform. Based on real transaction information, financial institutions issue corresponding digital certificates to core enterprises through the blockchain system, and relevant enterprises can split the digital certificates for circulation payment or use them to finance financial institutions. Financial institutions verify the authenticity of transaction information by connecting with the alliance chain management platform, collect enterprise data information, and provide financing support to supply chain enterprises based on big data risk control [5]. Through the integrated use of blockchain, Internet of Things and big data, the new service framework of supply chain finance will realize intelligent operation. The accounts receivable financing model under the new service framework is shown in Figure 2. The accounts receivable financing mode mainly refers to the upstream enterprise to obtain funds, based on the accounts receivable generated by the real contract signed with the downstream enterprise, and apply to the supply chain enterprise for financing with accounts receivable as the source of repayment.

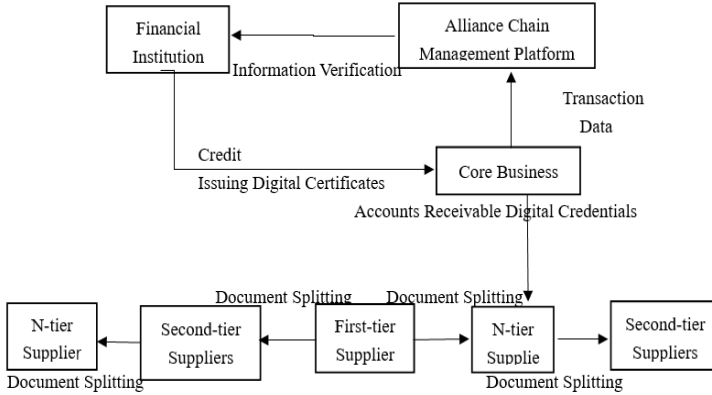


Fig. 2. Accounts receivable financing model under the new service framework

Supply chain finance based on the service framework of "blockchain + Internet of things + big data" will break through the bottleneck problems encountered by traditional supply chain finance and greatly improve the service capabilities of supply chain finance. Taking accounts receivable as an example. The first-tier suppliers and core enterprises have accounts receivable business, and the transaction information is authenticated and saved by the blockchain and the corresponding digital certificates are generated. First-tier suppliers can split and circulate digital certificates or directly conduct financing operations. When the first-tier supplier and the second-tier supplier have accounts receivable business, the first-tier supplier can split the digital voucher, and use the split digital voucher as a secured digital account receivable to circulate at the lower end. Finally, data flow is carried out with financial institutions, so that the entire supply chain can enjoy financial services. The accounts receivable financing service under the new framework not only enables the credit of core enterprises to be transferred and circulated in the supply chain system to the maximum extent, allows multi-level suppliers to enjoy financing services, and solves the problem of capital shortage, but also minimizes supply. The financing cost of small and medium-sized enterprises on the chain solves the problem of expensive financing for small and medium-sized enterprises.

5 Design of supply chain financial risk control system based on financial technology

This paper takes the supply chain financial model based on the B2B platform as an example to further explore the intelligent risk control system of supply chain finance. On the basis of comprehensive data collection, through the support of new technologies such as big data, artificial intelligence, cloud computing, etc., realize the interconnection and information sharing of information among the participating entities in the B2B platform supply chain ecosystem. A big data platform for transportation, transaction

and other information. This model can solve the problem of financing difficulties for small and medium-sized enterprises, and can also increase the bank's customers.

Based on the company's basic information, loan transaction information, platform transactions and other information, select platform transaction scale (size), corporate liabilities (debt), operating history (history1), platform transaction growth (growth), credit transaction history (history2), credit demand (demand) Build a big data risk control evaluation system for B2B platform supply chain finance, and use Logistic model to test the regression results to evaluate the supply chain finance credit risk status of small and medium-sized enterprises. The model parameter estimation test results are shown in TABLE 1.

According to the results of the Wald Chi-Square test in TABLE 1., the statistical rationality indicates that variables such as platform transaction scale, corporate debt, corporate operating history, platform transaction growth, loan transaction history, and loan demand should be included in the In the credit risk assessment model of SMEs, at the same time, the variable coefficients should also conform to business logic. In addition, the population stability (PSI) test was also carried out. The results are shown in TABLE 2. The PSI of this modeling result is 0.042, indicating that the stability is strong.

Table 1. MODEL PARAMETER ESTIMATION TEST RESULTS

Parameter	Degrees of freedom	Estimated value	Standard deviation	Wald Chi-square	Pr>Chi-square	Standardized estimates
size	1	0.771	0.307	6.299	0.012	0.165
debt	1	0.816	0.498	2.692	0.101	0.151
history1	1	0.506	0.182	7.736	0.005	0.063
growth	1	0.796	0.364	4.783	0.029	0.149
history2	1	0.521	0.182	8.179	0.004	0.122
demand	1	0.479	0.199	5.755	0.016	0.133

Table 2. POPULATION STABILITY TEST RESULT

Scoring interval (A)	Proportion of development benchmark value (B)	Proportion of verification samples (D)	Change percentage $E=(D)-(B)$	Ratio Difference $(F)=(D)/(B)$	Information proportion (G) = LN (F)	Contribution Index $(H)=(G) * (E)$
F:531-583	19.792%	19.781%	-0.011%	0.999	-0.001	0.000
E:584-595	18.141%	24.543%	6.402%	1.353	0.302	0.019
D:596-611	21.374%	15.711%	-5.663%	0.735	-0.308	0.017
C:612-623	16.875%	18.722%	1.847%	1.109	0.103	0.002
B:624-676	23.818%	21.243%	-2.575%	0.892	-0.114	0.003
	100 %	100%				0.042

6 Conclusions

Fintech is the product of the deep integration and development of finance and science and technology. Its application in the financial field provides new solutions for the reform and development of supply chain finance. This paper analyzes the current problems in the development of supply chain finance, and further analyzes the role of financial technology in transforming supply chain finance. application solution. The main contribution of this paper is to build a supply chain financial risk control system, and build a B2B platform supply chain financial big data risk control evaluation index system based on basic corporate information, loan transaction information, platform transactions and other information; using Logistic the regression model establishes a B2B platform supply chain finance enterprise credit evaluation model and measures the credit risk status of SMEs, and further proves that the supply chain finance model is feasible, which is conducive to responding to policy requirements to promote the development of supply chain finance and help solve the financing difficulties of SMEs. The research significance of this paper is that it is beneficial to use financial technology to promote the development of supply chain finance, and to help commercial banks improve the intelligent risk control system of supply chain finance. Although this paper expounds the future service framework of supply chain finance, it does not conduct an in-depth analysis of the specific implementation plan of Fintech technology. Follow-up research still needs to further implement the specific application method of financial technology in supply chain finance.

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