Research on the Mechanism of Supply Chain Finance Improving Enterprise Financing Efficiency Based on Intermediary Utility Model

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Abstract. Through the empirical analysis of the data of listed companies, the role of supply chain finance in improving the financing efficiency of enterprises is studied, and it is found that supply chain finance can effectively alleviate the financing constraints of small and medium-sized enterprises, reduce the financing cost, shorten the capital turnover time, so as to improve the financing efficiency. However, information asymmetry, such as high risk, legal regulatory restrictions, technical infrastructure limitations, insufficient cooperation among market participants, supply chain complexity and vulnerability, and insufficient financing products and services hinder the development of supply chain finance. The paper puts forward the countermeasures to improve supply chain finance.

Keywords: supply chain finance, enterprise financing efficiency, intermediary utility model

1 Introduction

In the context of China's rapid economic development and transformation, the traditional financing methods have been difficult to meet the diversified and complex needs of enterprises, especially many small and medium-sized enterprises. Since supply chain finance can realize earlier payment and lower financing costs based on the supply chain assets backed by the strong credit of the core enterprises, supply chain finance has become an effective method to bridge the financing gap of various enterprises in the supply chain. However, the market environment of different regions and industries in China varies significantly, which leads to the diversity of demand and application modes of supply chain finance, and requires services to be highly adaptable and flexible. Therefore, on the basis of in-depth study of these background factors, discussing the influence of supply chain finance on the financing efficiency of enterprises is not only of great significance for optimizing enterprise capital management and promoting high-quality economic development, but also provides a valuable reference for relevant policy formulation and enterprise strategy.

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2 The mechanism of supply chain finance to improve enterprise financing efficiency

2.1 Supply chain finance alleviating corporate financing constraints

In the traditional financing model, SMEs often struggle to obtain bank loans due to their low credit ratings, or they can only obtain funds at a higher cost. Supply chain finance, by introducing the credit endorsement of core enterprises, makes financial institutions are more willing to provide funds to small enterprises in the entire supply chain. The transfer effect of this credit greatly reduces the financing threshold and cost of small enterprises.

2.2 Supply chain finance reducing enterprise financing costs

In supply chain finance, the core enterprises usually have a high credit rating and a strong negotiation ability. Through the intervention of core companies, small suppliers can indirectly use their credit ratings to obtain financing at lower interest rates. This indirect financing based on the core enterprise credit is usually lower than the direct financing cost, thus reducing the financing cost of the entire supply chain.

2.3 Supply chain finance shortens the capital turnover time of enterprises

Supply chain finance allows the buyer to extend the payment period while enabling the supplier to receive an early income. For example, through reverse factoring, a supplier can get payments from a financial institution immediately after delivery, while the buyer can make payments within a longer payment period. This method actually shortens the capital turnover time of suppliers, but also provides the buyer with more flexible payment options.Supply chain finance encourages enterprises to optimize inventory management by means of inventory financing.

3 The obstructing factors of supply chain finance in improving the financing efficiency of enterprises

3.1 Information asymmetry and insufficient transparency

Supply chain finance faces the problems of information asymmetry and low transparency. Enterprises excessively protect information, resulting in insufficient data sharing and difficult to guarantee information quality. The lack of unified information standards and format increases the complexity of information integration, and then affects the decision-making efficiency and risk control.

3.2 High risk and credit assessment problems

In supply chain finance, credit evaluation is a complex task. The participation of many enterprises and the large difference in credit status makes it challenging to accurately assess the credit of each enterprise[1,2]. At the same time, the risk transmission effect in the supply chain is obvious. Once a problem occurs in a link, it may quickly affect the whole chain. Existing risk management tools may be inadequate to cope with these characteristics.

3.3 Limitations of the technical infrastructure

The limitations of technology infrastructure are another major obstacle to the development of supply chain finance. Old systems, compatibility and integration issues, the lack of unified technical standards, and data security issues all restrict the efficiency of supply chain finance. At the same time, some enterprises fail to carry out the necessary technology upgrades due to resource and cost restrictions.

3.4 Lack of financing products and services

The shortage of financing products and services is another challenge for supply chain finance. Insufficient product diversity, poor service accessibility and insufficient support for small and medium-sized enterprises all limit the application scope and effect of supply chain finance. At the same time, the imperfect risk management tools also affect the willingness and innovation ability of financial institutions to provide services[3,4]. In addition, enterprises and financial institutions have different levels of understanding and application of supply chain finance, which requires further strengthening of training and knowledge popularization.

3.5 Complexity and vulnerability of supply chain

Modern supply chain often involves multiple levels and links, this multi-level structure makes the management of the entire supply chain complicated, difficult to monitor and control. For transnational supply chains, differences in laws, cultures, currencies and logistics systems in different countries increase the complexity of management, as well as the difficulty and cost of financing. Natural disasters, political turmoil, economic crisis and other factors may lead to supply chain disruption, and this vulnerability makes supply chain finance face higher risks. Due to the complexity of the supply chain, information often flows poorly in the chain, resulting in asymmetric and opaque information, which increases the difficulty and cost of credit evaluation for financial institutions[5,6,7]. If some key links in the supply chain are too dependent on a single supplier or market, there will be concentrated risks, and once these key links are faulty, the entire supply chain will be affected.

4 An empirical study on the development level of supply chain finance on improving enterprise financing efficiency

4.1 Research hypothesis and model construction

4.1.1 Study assumptions

Hypothesis 1: The development of supply chain finance can significantly reduce the interest rate of small and medium-sized enterprises and improve the financing efficiency of enterprises(formula 1) ;

Hypothesis 2: The development of supply chain finance can significantly increase the supply chain financing income(formula 2);

Hypothesis 3: The non-performing loan ratio has a significant impact on the corporate financing efficiency(formula 3);

Hypothesis 4: The scale of supply chain finance has a significant impact on the financing efficiency of enterprises(formula 4).

4.1.2 Model building

Combined with the above theoretical assumptions, this paper sets a panel model to empirically test the impact of the development level of supply chain finance on the financing efficiency of enterprises. The specific formula is as follows:

$$EFE_t = \gamma\ LSCF_t + \eta_1 NPLR_t + \theta SSCF_t + \phi_{1t} + \varepsilon_{1t} \quad (1)$$

$$SCFOI_t = \alpha\ LSCF_t + \eta_2 NPLR_t + \phi_{2t} + \varepsilon_{2t} \quad (2)$$

$$EFE_t = \delta\ LSCF_t + \beta\ SCFOI_t + \eta_3 NPLR_t + \phi_{3t} + \varepsilon_{3t} \quad (3)$$

$$EFE_t = \delta\ LSCF_t + \beta\ SCFOI_t + \theta SSCF_t + \phi_{3t} + \varepsilon_{3t} \quad (4)$$

In the above formula, in year t, EFE is the enterprise financing efficiency and DLSCF supply chain finance development level; φ represents fixed effect; NPLR is the non-performing loan ratio, SSCF is the scale of supply chain financing; ε represents error terms; α, β, θ,γ, δ, η coefficient to be estimated.

4.2 Variable selection and explanation

Explanatory variables: Development level of supply chain finance (LSCF)：The main purpose of thare paper is to study the improvement of supply chain finance on the financing efficiency of enterprises, and the development level of supply chain finance is the explanatory variable.

Interpretation variable: enterprise financing efficiency (EFE)：From the perspective of cost and benefit, EFE refers to the ratio of enterprise financing amount and financing cost, which is the reciprocal of the interest rate of supply chain finance.

Intermediary variable: Supply chain financing income (SCFOI)：The higher the development level of supply chain, the higher the income of supply chain financing.

Control variable: non-performing loan ratio (NPLR)：NPLR has a significant impact on the EFE and SCFOI.

Control variable: scale of supply chain financing (SSCF)：SSCF has a significant impact on EFE and SCFOI.

4.3 Data source processing method

Table 1. Development level of supply chain finance and enterprise financing efficiency of Chinese listed companies from 2013 to 2022

year	interest rate of SCF /%	EFE	DLSCF	SSCF/10 billion yuan	NPLR/%	SCFOI/10 billion yuan
2013	13.39	7.47	0.09	12.22	0.99	38.40
2014	13.09	7.64	0.10	12.68	1.13	38.61
2015	11.77	8.50	0.13	11.85	1.54	41.33
2016	10.48	9.55	0.13	13.53	1.75	44.78
2017	10.09	9.91	0.15	17.41	1.74	49.92
2018	10.11	9.89	0.16	12.74	1.83	55.16

2019	9.91	10.09	0.18	15.12	1.83	59.19
2020	9.46	10.57	0.17	18.71	1.91	60.81
2021	9.28	10.78	0.29	17.27	1.76	66.94
2022	9.10	10.99	0.25	20.33	1.71	72.61

Data source: using wind database, data of Bank of China, using the method described in the paper.

Referring to the practice of Zhou Lan and Wu Huijun (2022), this paper uses Python to conduct a textual analysis on the annual reports of Chinese listed companies from 2013 to 2022, and measures the level of enterprise supply chain finance by measuring the total frequency of keywords of receivables, prepayment, inventory and comprehensive four types of supply chain finance. According to the method of Li Xinghong (2023) to calculate the supply chain finance interest rate in 2013-2022. The specific data are shown in Table 1.

4.4 Analysis of the empirical results

4.4.1 Results of regression analysis analysis

Table 2. Results of mediation effect analysis (n =10)

	Corporate Financing Efficiency (EFE)					Supply Chain Finance Operating Income (SCFOI)					Corporate Financing Efficiency (EFE)				
	β □	standard error □	t □	p □	β □	β □	standard error □	t □	p □	β □	β □	standard error □	t □	p □	β □
constant	3.96**	0.56	7.02	0.000	-	13.54	8.37	1.61	0.15	-	3.27**	0.46	7.06	0.000	-
NPLR	2.46**	0.42	5.83	0.001	0.61	8.85	6.26	1.41	0.20	0.22	2.00**	0.33	5.98	0.001	0.49
SSCF	2.02**	0.31	4.21	0.001	0.50	9.36	5.32	1.25	0.16	0.12	2.01**	0.41	6.53	0.001	0.09
DLSCF	9.60**	2.09	4.58	0.003	0.48	150.91**	31.04	4.86	0.00	0.78	1.86	3.06	0.60	0.566	0.09
SCFOI											0.05*	0.01	2.87	0.028	0.49
R^2	0.950					0.881					0.97				
adjust R^2	0.936					0.847					0.96				
F Value	F (2,7)=66.495,p =0.000					F (2,7)=25.886,p =0.001					F (3,6)=93.043,p =0.000				

* p <0.05 ** p <0.01

As shown in Table 2, the three models of mediation effect analysis is as follows:

(1) EFE=3.96+9.60 * DL SCF+ 2.463* NPLR+ 2.02 * SSCF

(2)SCFOI=13.54+150.91 *DL SCF+ 8.85 *NPLR

(3)EFE=3.27+1.86*DLSCF+0.051*SCFOI+ 2.00 * NPLR

(4)EFE=2.02+2.01*DLSCF+0.21*SCFOI+1.32* SSCF

4.4.2 Analysis of the test results

Table 3 shows that the development level of supply chain finance plays a significant role in the financing efficiency of enterprises through the influence of the operating income of supply chain finance through the intermediary variable.

Table 3. Test of the mediation effect

Item	symbol	meaning	The effect value is the Effect	95% Ci		Z-value / t-value	p Value	conclusion
				lower limit	superior limit			
DLSCF=> SCFOI) =>EFE	α*β	indigo effect	7.742	-0.733	1.208	4.188	0.000	
DLSCF=> SCFOI	α	X=>M	150.916	90.063	211.769	4.861	0.002	
SCFOI=> EFE	β	M=>Y	0.051	0.016	0.086	2.874	0.028	Completely intermediary
SSCF=> EFE	θ	M=>Y	0.060	0.021	0.074	3.247	0.036	
DLSCF=> EFE	γ'	direct effect	1.861	-4.150	7.873	0.607	0.566	
DLSCF=> EFE	γ	gross effect	9.603	5.501	13.705	4.589	0.003	

5 Conclusion and countermeasures

As an innovative financial service model, supply chain finance has significant advantages in improving the financing efficiency of enterprises. In the face of challenges in development, we need to take effective measures to promote its healthy development in order to better serve the development of the real economy and small and medium-sized enterprises.

Based on the conclusions above, the following countermeasures and suggestions are proposed:

Government should increase investment in technical infrastructure, improve the technical level and service capability of supply chain finance, and ensure the efficient, safe and convenient operation of supply chain finance[7].

Market participants should strengthen communication and cooperation in all links of the supply chain, establish long-term and stable cooperative relations, and jointly promote the development of supply chain finance.

Government should develop and maintain an information platform shared by supply chain participants, allowing for real-time data exchange and transparency[8,9]. This can be achieved through block-chain technology to ensure the accuracy and immutability of the data.

Financial institutions should establish and improve the supply chain risk management framework, including risk identification, assessment, monitoring and mitigation measures[10]. And financial institutions should Use big data analysis, artificial intelligence, machine learning and other technologies to improve the accuracy and efficiency of enterprise credit evaluation on the chain.

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References

[1] Zheng Xiaxuan & Chen Yueyan.(2024). Does supply-chain-finance help to improve the efficiency of outward foreign direct investment?. Finance Research Letters104703-.

[2] Leuschner Rudolf,Choi Thomas Y.,Rogers Dale S.,Hofmann Erik&Templar Simon. (2023).‘To fund’ as a new purpose of supply chain management: Making a case for supply chain financing. Journal of Purchasing and Supply Management(5).

[3] Kaur Jaspreet,Kumar Satish & Joshi Rohit.(2023).Is supply chain finance an antidote to SMEs in the economic crisis?-A qualitative inquiry.The International Journal of Logistics Management(6), 1890-1910.

[4] Sahoo P.S. Biswa Bhusan & Thakur Vikas.(2023).Blockchainembedded supply chain finance solutions for Indian MSMEs:a TISM and MICMAC approach.Journal of Business & Industrial Marketing (11),2390-2402.

[5] Yunlong Ma.(2023).Research on the Progress of Blockchain Technology Application in Supply Chain Finance.Financial Engineering and Risk Management(10).

[6] Zhou, L., Zhong, X. Y., Liu, J., & Xia, M. (2021). Game analysis of "blockchain+supply chain finance" mode in empowering small and micro enterprises’ financing.

[7] Li, L., Wang, Z., & Zhao, X. (2022). Configurations of financing instruments for supply chain cost reduction: Evidence from Chinese manufacturing companies.

[8] Rao, Q., & Li, W. (2022). Risk evaluation and forecast behavior analysis of supply chain financing based on blockchain. WIRELESS COMMUNICATIONS AND MOBILE COMPUTING.

[9] Piao, G., & Xiao, B. (2022). Analyzing the effectiveness of finance in supply chain in solving the financing difficulties of SMEs based on grey theory model. COMPUTATIONAL INTELLIGENCE AND NEUROSCIENCE.

[10] Wang, P., Chen, R., & Huang, Q. (2023). Does supply chain finance business model innovation improve capital allocation efficiency?Evidence from the cost of capital.MATHEMATICAL BIOSCIENCES AND ENGINEERING: MBE.