

Theoretical Analysis of Information Asymmetry and Credit Constraints in Supply Chain Finance

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Abstract

In the era of rapid digital economic development, supply chain finance has become a crucial pathway for addressing the financing challenges faced by small and medium-sized enterprises (SMEs). However, persistent information asymmetry prevents financial institutions from accurately assessing enterprise risks, thereby creating credit constraints. This paper applies information asymmetry and credit constraint theories to examine the relationships among information structure, credit transmission, and financing constraints within the supply chain finance system. Through case study analysis of JD.com's supply chain finance and Haier's COSMOPlat platform, this paper find that information sharing and core enterprise credit endorsement can enhance information transparency and improve financing efficiency. Finally, this paper proposes policy recommendations in areas such as promoting the development of information-sharing platforms, enhancing the credit transmission capabilities of core enterprises, improving credit evaluation systems, and strengthening regulation and risk control. These recommendations provide practical guidance for the healthy and stable development of supply chain finance.

Keywords

Supply chain finance, information asymmetry, credit constraints, information sharing, core enterprise credit.

1. Introduction

Against the backdrop of the digital economy and industrial chain integration, supply chain finance has become an important mechanism for solving the long-term financing problems of SMEs. The traditional credit system relies heavily on financial statements and collateral, which most SMEs lack, resulting in limited access to external capital. Supply chain finance utilizes the credit and information sharing of core enterprises to enhance financial institutions' understanding of SME operations, thereby alleviating financing constraints. However, information asymmetry remains a persistent obstacle: SMEs possess private operational data that is difficult to disclose, while core enterprises have a large amount of transaction information but may not fully share it, forcing financial institutions to make cautious lending decisions based on incomplete information. The theory of information asymmetry provides a theoretical basis for understanding these financing constraints [1]. Therefore, understanding how information asymmetry distorts credit transmission and how information sharing mechanisms (such as digital supply chain finance platforms) alleviate these distortions provides a theoretical and practical basis for this study.

This study employs theoretical analysis and case studies to explore the underlying mechanisms by which information asymmetry leads to credit constraints in supply chain finance. It analyzes the impact of trust and information transmission mechanisms among core enterprises, financial institutions, and SMEs on financing efficiency, and further examines the roles of information

sharing and institutional design in alleviating financing constraints. The findings contribute to optimizing financing mechanisms for the real economy and promoting the coordinated development of the industrial chain and efficient resource allocation.

2. Literature Review

2.1. Information Asymmetry Theory Foundation

Information asymmetry theory is the theoretical foundation for studying supply chain finance credit constraint problems. Akerlof in “The Market for Lemons” theory proposed that when transaction parties possess asymmetric information, buyers cannot judge true product quality, resulting in “bad money drives out good money” phenomena and reduced market efficiency [1]. In finance, this situation means financial institutions cannot distinguish between high-risk and low-risk borrowers, leading to either refusing loans entirely or raising interest rates for all borrowers, thus excluding some good enterprises from the lending market. Stiglitz and Weiss further proposed the “credit rationing theory,” arguing that when banks face information asymmetry, they reduce the loan supply or limit the amount rather than simply raising interest rates [2]. While this controls risk, it causes some creditworthy companies to lack sufficient development funds, creating credit constraints [2]. Additionally, principal-agent theory reflects moral hazard problems caused by information asymmetry. After receiving loans, enterprises may use funds for non-productive purposes or avoid repayment responsibilities, exposing financial institutions to greater risks.

2.2. Current State of Supply Chain Finance Research

With the emergence of supply chain finance, domestic and international scholars have conducted extensive research on operational mechanisms, risk control, and credit management. Recent research emphasizes the role of digital technologies and core enterprise credit transmission in addressing information asymmetry challenges. Mou et al. analyzed core enterprise credit risks in supply chain finance using a fuzzy analytical hierarchy process (FAHP), constructing a credit risk evaluation system that enables quantitative measurement of core enterprise credit risk [3]. Their research demonstrated that core enterprises play a critical role in credit enhancement within supply chain finance systems. Xu et al. conducted a study on the credit transmission mechanism in the transportation capacity supply chain finance [2]. The results showed that increasing the business volume between the financing enterprises and the core enterprises or reducing the default probability could effectively enhance financial institutions’ credit lines [4]. The transformative impact of digital platforms has gained substantial attention in recent literature. Tanveer et al. demonstrated how digital supply chain finance platforms address traditional limitations such as asymmetric power dynamics and lack of transparency by introducing innovative financing approaches like dynamic discounting and real-time transaction tracking [5]. These platforms empower suppliers with quicker access to liquidity while buyers benefit from improved working capital optimization. Wang et al. examined how supply chain finance platforms create competitive advantage through evolving value disciplines, from product leadership to operational excellence and customer intimacy [6]. Blockchain technology’s role in reducing information asymmetry has emerged as a critical research area. Wang et al. developed a theoretical model. This model shows that blockchain-enabled credit systems allow SMEs to display credibility through decentralized information distribution, thereby alleviating both information asymmetry and credit rationing problems [7]. Ning and Yuan analyzed how blockchain technology reconfigures supply chain finance platform business models [8]. It enhances information processing capabilities and helps firms assess supply chain partners’ behaviors more effectively [8]. Recent studies by Shu et al. proposed blockchain-based transitive trust models that ensure seamless trust transfer from core

enterprises to bottom suppliers during credit evaluation, using multi-layer metrics to calculate comprehensive trust values [9]. Empirical research has provided strong evidence for the effectiveness of information-sharing mechanisms. Wang et al. conducted an empirical investigation in China demonstrating that supply chain finance adoption significantly improves operational and financial performance of participating enterprises, particularly through enhanced information sharing mechanisms [10]. Lou et al. provided further evidence showing that supply chain finance effectively alleviates funding constraints of SMEs when information transparency is improved [11].

3. Theoretical Analysis Framework

3.1. Research Approach

Supply chain finance's essence is integrating transaction information and credit resources of upstream and downstream enterprises around core enterprises to achieve capital flow within the supply chain. In this system, coordination among information flow, capital flow, and logistics becomes crucial, with low financial resource allocation efficiency caused by information asymmetry being the main obstacle. This paper analyzes how information asymmetry affects credit transmission and financing constraints from the relationship perspective of core enterprises-SMEs-financial institutions. Core enterprises control supply chain transaction and performance information; financial institutions often obtain only partial external data and cannot accurately assess enterprise risk [3]. SMEs know their own operational situations but lack channels to transmit information to financial institutions. Therefore, this paper argues that the supply chain finance system's financing efficiency depends on information transparency and transmission effectiveness among the three parties. When information flows fully, credit can circulate smoothly throughout the supply chain, and financial institutions can make decisions based on real data; when information asymmetry is severe, credit transmission becomes impaired, making financing more difficult.

3.2. Main Assumptions

To analyze supply chain finance mechanisms, this study proposes three assumptions: (1) Information asymmetry exists among participants-SMEs hold private operational data, core enterprises possess transaction information, and financial institutions face informational disadvantages; (2) Credit transmissibility allows the creditworthiness of core enterprises to influence associated SMEs; and (3) Signal-dependent decision-making means financial institutions rely on enterprise signals such as orders and receivables to make lending decisions. Based on these assumptions, the theoretical mechanism is that information asymmetry distorts credit transmission, which intensifies financing constraints on SMEs [2]. However, information sharing and transparency-via digital platforms or blockchain-can enhance credit transmission, reduce risk perceptions, and ease financing constraints.

4. Theoretical Analysis and Results Discussion

4.1. Information Transparency and Financing Outcomes

Information transparency is a key factor affecting supply chain finance efficiency. When information within the supply chain can be transmitted in a timely and accurate manner, financial institutions can comprehensively understand enterprise operations and transaction risks, making rational credit decisions [10]. High-transparency supply chain systems help financial institutions distinguish between high-risk and low-risk enterprises, enabling quality small enterprises to obtain more capital support. Conversely, when information transparency is insufficient, financial institutions facing unknown risks tend toward conservative lending, raising interest rates, reducing amounts, or adding collateral requirements [2]. While this

reduces default risk, it simultaneously causes creditworthy enterprises to fall into financing difficulties, lowering credit resource allocation efficiency. Clearly, improved information transparency reduces financial institutions' information costs, enabling credit to flow smoothly throughout the supply chain, thereby addressing SME financing difficulties [11]. High transparency brings high trust, which is the foundation for supply chain finance sustainable development [5].

4.2. Information Sharing and Credit Transmission

Information sharing mechanisms are key pathways for improving supply chain finance information asymmetry. When core enterprises, financial institutions, and SMEs can establish data interconnection channels, they can achieve mutual sharing of transaction records, contract performance status, accounts receivable, and other information, thereby improving credit transmission speed [5, 8]. Core enterprises serve as "credit intermediaries" in the supply chain [3]; higher credibility and fuller information disclosure benefit upstream and downstream enterprise financing. When financial institutions can directly obtain authentic transaction data within the supply chain through digital platforms, credit assessment becomes more accurate and loan decisions more targeted [6, 10]. Blockchain technology particularly enhances this capability by providing immutable ledgers and smart contracts that reduce fraud risks and ensure transaction authenticity[7-9]. Information sharing both helps identify good enterprises and prevents enterprises from using false transactions to obtain financing fraudulently. Furthermore, information sharing can form an "inter-enterprise trust network," promoting members to maintain their credit reputation and reducing overall risk consciously. Therefore, after information sharing mechanism improvement, it can not only make credit transmission faster and more accurate but also form a good credit ecological environment throughout the supply chain, thereby alleviating trust gaps between financial institutions and SMEs.

4.3. Adverse Selection and Moral Hazard Problems

In supply chain finance systems, information asymmetry easily causes adverse selection and moral hazard problems [1, 2]. Adverse selection occurs more before financing, where financial institutions have difficulty judging an enterprise's true risks, potentially lending to low-credit enterprises while excluding high-credit enterprises. This causes funds to flow to the wrong places, increases financing costs, and reduces overall market efficiency.

Moral hazard mostly occurs after financing, where enterprises may use loans for other purposes or deliberately breach agreements after obtaining them, increasing financial institutions' loss risks. If core enterprises fail to constrain supply chain members, this risk can be transmitted to other companies along the supply chain. For these problems, strict public disclosure systems, complete credit supervision mechanisms, plus technical means like blockchain to achieve transaction traceability are needed to reduce information fraud and breach behaviors fundamentally. Blockchain's immutable ledgers and smart contracts' self-executing protocols significantly reduce fraud and error risks while ensuring timely and accurate transactions. Additionally, core enterprises' credit constraint functions should be fully utilized to implement dynamic management and conduct credit assessments of upstream and downstream enterprises, thereby reducing adverse effects brought by adverse selection and moral hazard.

5. Case Analysis

5.1. JD.com Supply Chain Finance

JD.com's supply chain finance relies on abundant transaction data and credit information accumulated through its e-commerce platform to provide multiple financing services to SMEs. Its main approach is using authentic orders, accounts receivable, and logistics information as a

credit basis, cooperating with banks to provide credit loans to suppliers. In JD.com's model, platform data openness and transparency effectively address information asymmetry problems [5, 10]. Financial institutions can directly verify authentic transactions in JD.com's system, avoiding the traditional lending's difficult information verification problem. Meanwhile, as a core enterprise, JD.com provides credit endorsement for suppliers, thereby increasing financial institutions' trust in SMEs [3]. After JD.com's supply chain finance implementation, SME financing time was reduced, and during its implementation period, enterprise financing costs were also reduced. JD.com's supply chain finance model has significantly improved financing accessibility and efficiency for participating SMEs. When information transparency and credit transmission efficiency increase, financing constraints can decrease, and credit allocation becomes more rational [10, 11]. This operational model provides strong empirical evidence for the effectiveness of information sharing and credit transmission mechanisms in alleviating financing constraints.

5.2. Haier COSMOPlat

Haier COSMOPlat is a typical manufacturing supply chain finance platform, with its core concept being industrial internet "data interconnection, credit co-construction." The platform integrates information from manufacturers, suppliers, distributors, and financial institutions, achieving real-time coordination of production, logistics, and capital flow [5]. In this system, core enterprise Haier both undertakes transaction guarantee responsibilities and timely transmits upstream and downstream enterprise orders, settlements, and performance information to the platform, allowing financial institutions to assess risk based on this information directly. This very high transparency effectively reduces adverse selection problems and enables financial institutions to identify truly quality enterprises [1, 10].

Additionally, the COSMOPlat platform establishes a dynamic credit assessment system, automatically updating credit levels based on enterprise transaction performance and contract fulfillment. This mechanism strengthens enterprises' self-constraint and reduces moral hazard. Practical proof shows that platform enterprises have increased financing success and reduced credit defaults, indicating information sharing and credit transmission can indeed alleviate financing difficulties [11].

5.3. Verification Conclusions

From JD.com and Haier supply chain finance cases, information asymmetry does indeed cause SME financing difficulty problems. Information sharing and credit transmission mechanisms can effectively address this problem [5, 10, 11]. Cases show that when information transparency improves, financial institutions' trust in SMEs increases, thereby expanding financing scale and reducing financing costs. Second, core enterprise credit endorsement plays a crucial role in supply chain finance [3, 4]; the more creditworthy core enterprises are and the fuller their disclosure, the more stable the entire supply chain's credit. Additionally, digitalization platforms and technological innovation have obvious effects on alleviating information asymmetry. JD.com uses e-commerce data to verify transaction authenticity; Haier relies on the industrial internet for dynamic credit management. They prove this paper's proposed ideas—that information sharing enhanced by digital technologies, including blockchain, is the fundamental method for reducing credit constraints and improving financing efficiency [7-9].

6. Conclusion

The paper has examined how information asymmetry causes credit constraints in the supply chain finance and how such issues can be mitigated by sharing information, transmitting trust, and digital innovation. The theoretical discussion and case JD.com and Haier COSMOPlat has

shown that the issue of information asymmetry is the fundamental factor that limits the ability of SMEs to access financing. Credit transmission when the financial institutions are not able to properly evaluate the enterprise risk based on incomplete or concealed information will lead to an increase in financing costs and low capital allocated efficiency. On the other side, digital information-sharing systems made possible with the help of blockchain, big data, and industrial internet systems are capable of enhancing transparency, improving credit transmission, and financing limitations. The credit support position of core businesses is identified to be critical: the more credible and data transparent core businesses are, the more trust and financing ability in the chain of supply. The research however has a number of limitations. It is based more on qualitative theoretical analysis and the case evidence, without quantitative data to empirically confirm the mechanisms offered. The effects of the information transparency on financing efficiency and credit risk are to be measured in future studies by combining the quantitative models with the empirical testing.

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