Research on Risk Management of Supply Chain Finance Services based on Double Principal-agent Theory

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Keywords: supply chain finance; double principal-agent; risk management

Abstract: This paper defines the double principal-agent relationship between financial institutions and logistics enterprise, logistics enterprise and financing corporations in supply chain finance services, and analyzes risks existing in its implementation based on double principal-agent theory, such as ethical risk, adverse selection and collusion. Further, it combs the formation and influencing factors of risk, and proposes the overcome of potential risk caused by information asymmetry in double principal-agent relationship through interests bound mechanism and risk control mechanism.

1. Introduction

Supply chain activities involve a large number of small and medium-sized enterprises, which have greater risk and high costs in financial activities because of their small scale, high operational risk, high default risk, lack of perfect financial system and inability to provide transparent information (Xu Lingling, 2011; Li Dawu, 2001). Whereas, supply chain finance is beneficial to solving the difficult financing for small and medium-sized enterprises and enhancing the operational efficiency of logistics enterprises (Sheng Xin, 2017). Traditional financial institutions directly provide financial services to financial enterprises, however, supply chain finance services is different. Traditional financing mode is double principal-agent relationship between both sides. Due to asymmetric information, “ethical risk” and “adverse selection” always appear in principal-agent relationship (Myerson, 1991), and principal-agent relationship in supply chain finance services is more complicated.

Financing enterprises, with the most obvious information advantages, grasp all real information of enterprise operation, which probably bring a series of problems and business risk. Zhang Weiying (1996) proposes that the principal shall reward and punish the agent according to observed information to encourage them to select behaviors which are favorable to the principal. Before constructing the relationship, because of asymmetric information, the agent does not know the realistic capability of the agent, so the agent gives compensation according to average capability of market, which “extrudes” the agent who has capability high than average level out from the market. After that, the principal will further decrease compensation, and more agents will be “extruded” from the market, which is called “adverse selection” in principal-agent theory. There is obvious “adverse selection” in the implementation of supply chain finance services. On the one hand, in order to overcome risks caused by information asymmetry, when financial institutions cannot effectively grasp and judge real information of financing enterprises, to avoid risks, they select enterprises with higher level of credibility to provide services, thus, many small and medium-sized enterprises cannot receive capital support, having difficulty in operation. On the other hand, after building principal-agent relationship, the principal cannot conduct comprehensive supervision on the agent due to information disadvantages, and cannot measure the relevance between performance level and the efforts of the agent; whereas, the agent has information advantages and probably adopts some behaviors to damage interests of the principal, causing “ethical risk”. In terms of tradition credit mode, financial institutions cannot know the real operation of financing enterprises, and after receiving capital, financial institutions may make decisions that damage the profits of the lender due to the lack of effective supervision, which finally affects the repayment. To solve

  DOI: 10.25236/icemeet.2019.476

“adverse selection” and “ethical risk”, how to promote the agent to adopt behaviors favorable to the principal by the design and incentive mechanism is a crucial problem. Since the 1980s, scholars have studied extensively, involving the multi-stage game ethical risk mode (Meyer and Vickers, 1997), multi-principal mode (Martimort, 1996), and multi-agent mode (Malcomson, 1984). Zhang Weiying (1996) expands traditional principal-agent theory from static model to multiple game mode, and verifies reputation effect strengthening incentive mechanism and ratchet effect weakening incentive mechanism; in order to solve “adverse selection”, signaling model and screening model are widely applied in information economics to promote the agent to convey information by building the incentive.

To effectively solve various problems caused by information asymmetry between financing enterprises and financial institutions in traditional credit mode, it is necessary to introduce logistics enterprises into business process as the third party. The credit enhancement by logistics enterprises between financial institutions and financing enterprises provides a new path for many small and medium-sized enterprises to solve the problem of difficult and expensive financing. In supply chain finance, there exists multi-level principal-agent relationship in these three sides, which are different in different supply chain finance mode, causing “ethical risk” and “adverse selection”. This paper, on the basis of defining double principal-agent relationship in supply chain finance, analyzes risks caused and correspondingly proposes countermeasures and suggestions, to provide reference for risk management of logistics enterprises in supply chain finance.

2. Double Principal-agent Relationship in Supply Chain Finance

2.1 Double principal-agent theory

Developed from traditional one, it is mainly to solve corporate governance with extreme concentration of shares among listed companies. In the process of studying listed companies, scholars at home and abroad find out that larger shareholder expropriate small shareholders’ profits (Sun Yongxiang, 2002), which was not focused in traditional principal-agent relationship. Feng Genfu (2004) proposes double principal-agent theory on the basis of previous studies. In double principal-agent relationship, the principal and the agent are in the same interest relationship (business process). Due to the different position and reciprocal role, they may play two or more than two roles and form double or multiple principal-agent relationship. In addition to traditional “ethical risk” and “adverse selection”, there probably be “collusion” and “coordination”. “Collusion” may bring extra costs to the principal (Tirole, 1984), whereas, due to the different decision-making objectives of multiple principals, the lack of coordination will reduce the overall efficiency (Bernheim and Whinston, 1986). With the lack of sufficient effective information and inadequate analysis and processing ability of enterprise business information, financial institutions are disadvantageous in information, causing asymmetric information. Since the introduction of logistics enterprises, in providing supply chain services, they master well logistics, information flow and capital flow, professional ability of analysis and judgment, so information asymmetry is solved to a certain extent. Besides, they have more information than financial institutions, can play a role of credit enhancement in supply chain finance services, and further provide the services as the agent of financial institutions. In this mode, there is multiple principal-agent relationship among financial institutions, logistics enterprises and financing enterprises, and there are a series of business risks caused by “adverse selection”, “ethical risk” and “collusion”, which requires identification and management.

2.2 Double principal-agent relationship in supply chain finance services

When logistics enterprises implement supply chain finance services, there is double or multiple principal-agent relationship in business system consisting by the benefits related in supply chain finance services, which is one of main causes for business risks. Different traditional financial business between financial institutions and enterprises, this relationship develops based on credit system. In traditional financing mode, financial institutions provide credit services based on the credibility of loan enterprises. With the innovation on business mode of financial institutions, supply chain finance services require them to provide financial services on the basis of understanding business process of enterprises. There is information asymmetry between financial institutions and financing enterprises, and the introduction of logistics enterprises can alleviate it to a certain extent. Compared with financing enterprises, logistics enterprises, as the agent, provide supply chain business information to financial institutions by the cooperation with them, which can reduce business risk in supply chain finances and information asymmetry. At the same time, logistics enterprises control the process of supply chain, based on their creditability, provide guarantee for financing enterprises by playing a role of credit enhancement, and build principal-agent relationship with them. The relationship of logistics enterprises, financial institutions and financing enterprises is shown in Figure 1.

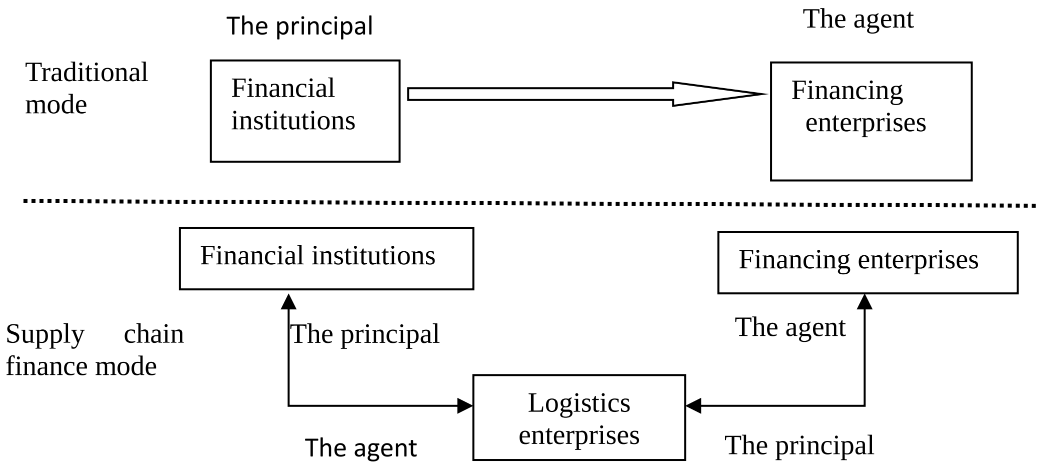

Figure 1 The principal-agent relationship of financial business in different modes

With the innovation on supply chain finance services and the appearance of new business mode, supply chain finance services is expanding continuously. Logistics enterprises and financial institutions focus on financial service demand of core enterprises or financing enterprises, on the basis of upstream purchase, "pallet trade" in production, and inventory financing, deeply intervene in the distribution, and provide order financing, inventory financing, receivable and payable accounts financing for upstream and downstream enterprises in supply chain. This mode includes core enterprises into business relationship, involving financial institutions, logistics enterprises, core enterprises and financing enterprises, so the principal-agent relationship between each other and various potential risks caused are more complicated.

3. Risks and Influencing Factors of Supply Chain Finance Services

3.1 Risks of supply chain finance based on double principal-agent relationship

In this mode, the double principal-agent relationship causes potential risks in three aspects.

First of all, the business risks caused by "ethical risk" of financing enterprises. In terms of principal-agent relationship between logistics enterprises and financing enterprises, the former lacks the comprehensive understanding of operation information of financing enterprises and probably makes wrong judgment, thereby causing business risks. For instance, when China Railway Materials Group Corporation helps customers to carry out "pallet" business, it has asymmetric information with financing enterprises, causing great business risks. Compared to traditional financing, supply chain finance pays attention to the operational process of supply chain, transforms traditional single "credit" financing by managing the operation of supply chain, however, logistics enterprises are inferior to financing enterprises in the mastering of supply chain, facing potential "credit" risks.

Secondly, the business risks caused by “ethical risk” and “adverse selection” of logistics enterprises. Through the cooperation with financing institutions, logistics enterprises can enhance the credibility of financing enterprises in supply chain finance, so that the latter can receive business support of financing institutions more easily. Part of logistics enterprises conduct in-depth cooperation with financing institutions to obtain the unified credit and provide financial services to financial enterprises as the agent. In this mode, based on credibility obtained earlier, logistics enterprises probably provide supply chain finance to financing enterprises with flaws in credit or business to obtain greater profits, causing “ethical risk” and damaging profits of financial institutions. Besides, when expanding the business scope, financing enterprises cannot provide sufficient pledge and operational information support, thus, logistics enterprises can just judge the business and determines services fee according to general industrial situation, causing “adverse selection”, and part of financing enterprises with good credit will be deported from the market, accumulating business risks. At the same time, inside logistics enterprises, the evaluation of enterprises, business risk and business operation all depends on employees. There is the principal-agent relationship between logistics enterprises and employees. If employees lack effective mechanism as the agent, it will become an important source of risk.

Thirdly, the risk of “collusion” between logistics enterprises and financing enterprises. To expand business scale or satisfy the demand of the latter, or obtain high returns, some logistics enterprises will “collude” with financing enterprises to damage the profits of financial institutions. The heavy pledge, the pledge loss frequently appeared in these years all belong to business risks caused by “collusion” between the two. It causes risks of bad debt and unfavorable impact on the reputation and performance of logistics enterprises, further its competence in supply chain finance. In practice, logistics enterprises make efforts to control this risk. However, due to the principal-agent relationship between it with subordinate company, corporate and businessmen, and “ethical risk” caused by asymmetric information, enterprises cannot avoid this risk fundamentally. CMST Development Co., LTD is always faced with this risk.

3.2 The formation of business risk and influencing factors of supply chain finance

There are multiple business risks in double principal-agent of supply chain finance, which are based on logistics services, therefore, the analysis of risk points in supply chain finance and targeted design of mechanism are beneficial for logistics enterprises to better manage business risks. Risks in supply chain finance include potential losses caused by individual morality or enterprises’ control and management in customer development in earlier days, credit investigation, impawning supervision in business operation, credit adjustment and follow-up management. The supply chain finance implemented by logistics enterprises takes logistics activities as the carrier, and integrates financial services and logistics service. If control is inappropriate in the process, financial services will be faced with risks. Thus, the management of operational risks in supply chain finance becomes one of important points of risk management of supply chain finance.

3.3 The procedures and risk points of supply chain finance

The common supply chain finance services include inventory financing, advance payment financing and receivable accounts financing, the objects of which form complicated supply chain finance products after combination. The inventory financing is the main service, and its risks also basically cover that of other businesses. From the perspective of logistics enterprises, risk points and influencing factors are analyzed based on analyzing the supply chain finance services.

3.3.1 The business process of inventory supply chain finance

When logistics enterprises carry out inventory financing service, in general, they construct cooperation with financial institutions like bank. Then, financing enterprises give loan application to bank by virtue of warehouse receipt, deposit contract and policy of insurance issued by logistics enterprises, and carry out financing service after the approval of financial institutions. The procedures are presented.

Firstly, financing enterprises sign warehousing contract with logistics enterprises, and transport pledge to specified warehouse (warehouse of logistics enterprises or financing enterprises), then logistics enterprises receive, approve and issue non-standard warehouse receipt; if transported to warehouse of financing enterprises, based on inspecting warehouse, logistics enterprises are required to purchase corresponding insurance for pledge.

Secondly, financing enterprises give loan application to bank by virtue of warehouse receipt issued by logistics enterprises, and provide warehousing contract and policy of insurance.

Thirdly, the bank verifies items on non-standard warehouse receipt with logistics enterprises, reaches cooperation intention with logistics and financing enterprises, sign cooperation agreement of three sides, and submits the pledge endorsement register of non-standard to bank.

Fourthly, logistics enterprises sign impawning supervision agreement with credit bank and determine their own rights and obligations.

Fifthly, after the approval of warehouse receipt, the bank issues the loan to financing enterprises according to the stipulated ratio of cargo value.

Sixthly, logistics enterprises implement supervision procedures and perform the rights and liabilities according to agreement and contract, entrusted by the bank.

Seventhly, according to supervision agreement, financing enterprises can take delivery of goods and exchange goods to meet the demand of production and sales while guaranteeing that the value of pledge is not less than the lowest limit of pledge. If it equals or is lower than pledge amount, and enterprises have the demand of taking delivery of goods, financing enterprises are required to apply to credit bank and take delivery of goods based on relevant certifications.

Eighthly, when it equals to pledge amount in normal supervision, it will be transformed to static pledge, and the pledge can be transferred or processed under the authorization of bank.

Ninthly, when it is lower, it will be in blasting warehouse, and the bank has the lien of pledge to deal with it after a certain period.

Tenthly, in normal supervision, enterprises repay the loan to the bank, apply for the ending of warehouse financing service this time, after the inspection from three sides, and perform relevant procedures. In this way, the service ends.

3.3.2 Risk points of business

It can be seen that logistics enterprises play a role of credit guarantee in service. For financial institutions, the business risks can be avoided and transferred to logistics enterprises by signing supervision agreement. The risk points of logistics enterprises are presented.

Firstly, the credit risk of financing enterprises. The starting point of supply chain finance is the selection of financing enterprises, and the credit of financing enterprises directly affects the realization of creditor’s rights. If inappropriate, creditors will be dragged to long-term and complicated judicial proceedings. And, logistics enterprises, as joint guarantee, will be faced with asset impairment and reputation impairment. Credit risks are not business risk, but the starting point of business risk.

Secondly, the risk of pledge. Pledge is the core object of inventory financing. The selection and risk control of pledge is an important part of the entire pledge financing supervision. Therefore, in mnay studies, pledge is considered as one of important indicators of credit risk assessment of financing enterprises. It mainly comes from the selection of pledge, the value evaluation of pledge, especially risk of rights and supervision from business.

Thirdly, the risk of personnel. It refers to business risks caused by the problems of personnel in logistics enterprises, including moral risk, quality and ability of supervisor. During supervision, especially long-distance supervision, they contact with personnel for a long time, so they probably have behaviors disobeying the supervision requirement of logistics enterprises, because of personal relationship or the like, even benefiting themselves at the expense of public interests and harming others to benefit themselves. Moral risks commonly include slack working, committing illegalities for personal gains, failing to report the facts, guilt of corruption and accepting bribes, colluding and fraud, collaborative crime and so on. It exists in each and every logistics enterprise. The larger the business, the more supervisors, and the higher potential risks.

As for the risk of personnel quality, due to the insufficient ability, quality and professional level of supervisors, there are loopholes and hidden dangers in normal supervision and they fail to reasonably supervise the pledge and effectively supervise credited enterprises, causing potential risks in logistics enterprises. It mainly include distorted evaluation, inaccurate inventory, cargo damage caused by improper operation, inappropriate analysis of supervision environment, ineffective acquisition of enterprise dynamics, the ignorance of risk signal and so on. Logistics enterprises expand the financing service rapidly and have a large demand for personnel. However, impacted by salary and work environment, the employee turnover is high and a large number of the workers at the production line lack sufficient experience, which causes great risks and hidden dangers to financing service.

Fourthly, the risk of enterprise internal control and information risk. It mainly include the potential risks caused by imperfect management system and the degree of informatization. For logistics enterprises, the reasonability and effectiveness of organization setting directly affect its efficiency and performance, especially that related to business. The design of internal organization structure and business system and control of business management have an unconscious influence on business risks.

At the same time, the informatization of logistics enterprises is lower, and their acquisition, processing and application of information shall be improved. The imperfect and backward management information system probably affects the accurate, timely, reliable and diversified supply chain finance provided by logistics enterprises, further its business security. Thus, on the one hand, supply chain finance shall be based on the control of logistics service by logistics enterprises, and the control of business process is the control of information flow. On the other hand, logistics enterprises, as the supervisor and joint guarantee of financing enterprises, are required to grasp the real-time information, such as the quality, price, business scope, sales region and upstream and downstream customers of the pledge. In operation, the acceptance of cargo rights and cargo all require the support of a large quantity of information to distinguish the true from the false. Thus, when carrying out supply chain finance, logistics enterprises shall increase the investment in information technology and system to reduce business risks and improve internal management.

4. Countermeasures for Risk Management of Supply Chain Service

4.1 Procedures of risk management in supply chain service

In supply chain finance between logistics enterprises and financial institutions, influenced by internal and external environment and factors, there are probably many risks, affecting the normal operation and causing great economic loss to the subject. The risk identification, prevention and remedial measures shall be emphasized by all sides involved in supply chain finance.

According to risk management theory, in general, risk management is divided into four steps.

Firstly, risk identification. The identification of various potential risks faced by supply chain finance is the premise and basis of follow-up risk management. Through analysis, credit risk and business risks are identified as the main source of risks in supply chain finance.

Secondly, risk evaluation. The selection and adoption of appropriate evaluation method can evaluate and measure the probability and potential loss caused by identified risks of supply chain finance, providing guidance for follow-up risk control.

Thirdly, risk control. Based on the result of risk evaluation, according to the objective of risk control in supply chain finance, it is necessary to choose proper risk management instrument, adopt risk avoidance, risk transfer, risk retention and risk compensation to optimize and realize the objectives of risk control.

Fourthly, risk supervision and assessment. It is to track, assess and feedback various risks in supply chain finance to lay a foundation for further risk management.

4.2 The mechanism design of risk management in supply chain service

4.2.1 Interest binding mechanism

The main mechanisms designed between financial institutions and logistics enterprises, logistics enterprises and business operator mainly include four mechanisms.

Firstly, reputation mechanism. It is necessary to form stable cooperation relationship in supply chain finance to remain long-term business competence. Especially logistics enterprises and financial institutions, they shall pay high attention to the commercial credit, and consider reputation as an important explicit signal to reduce “ethical risk” and “collusion” risk.

Secondly, long-term cooperation mechanism. By means of contract, the long-term cooperation among the subjects of supply chain finance shall be built, which is conductive for partners to fully share information and build trust. Besides, based on information asymmetry, they can avoid ethical risk and adventurism that may occur to reduce the transaction costs in business cooperation and risks.

Thirdly, incentive mechanism of interest allocation. According to different modes, it is necessary to build incentive mechanism based on sharing interest among financial institutions and logistics enterprises, logistics and personnel, taking excess expected benefits and risk prevention as the core, share interest and shoulder business risks, but not transfer all business risks to the agent.

Fourthly, project screening mechanism. The involved parties shall explore and build project screening mechanism, refer to risk management theory mode, establish risk indicator system, perform background survey, project recommendation and approval of financing enterprises and establish control mechanism of risk management in business.

The interest binding mechanism between logistics enterprises and financing enterprises include long-term cooperation mechanism and information sharing mechanism. On the one hand, the two sides shall establish long-term cooperation based on logistics services and supply chain finance services, and remain cooperation based on resource, information and profits sharing to realize the profit maximization of two sides. On the other hand, when logistics enterprises provide various services to financing enterprises, they can actively obtain commercial information and share it to financial institutions. At the same time, it is required to establish information sharing mechanism between logistics enterprises and financing enterprises to avoid potential ethical risks.

4.2.2 Risk control mechanism

The main risk control mechanisms between financial institutions and logistics enterprises, logistics enterprises and financing enterprises mainly include three mechanisms.

Firstly, phased credit granting. The traditional one-time credit granting can be divided into phased credit according to the real business of financing enterprises, and one-time static risk control can be adjusted to multi-time and multi-phase risk control. In this way, the information acquisition and feedback nodes in supply chain finance can be enhanced, conductive to the risk identification and risk prevention in earlier time.

Secondly, proactive disclosure of important information. It is necessary to regularly and irregularly disclose important information of financing enterprises within the scope of system, such as operational data and financial data. Logistics enterprises shall proactively disclose the market change of pledge, quantity and quality of pledge to financial institutions, so that the management of the involved parties is normalized.

Thirdly, tracking system of important items. When financing, financing enterprises shall report their major items to logistics enterprises and financial institutions, such as matters involved with corporate reorganization, merger and acquisition. It may affects the stability of supply chain finance, it is necessary to continuously track and focus on major items to avoid potential risks.

5. Conclusion

In supply chain finance, there is double principal-agent relationship among financial institutions, logistics enterprises and financing enterprises. How to respond to risks in supply chain finance caused by ethical risk, adverse selection and collusion becomes the core point limiting business development. This paper, based on defining the double principal-agent relationship in supply chain finance, identifies and analyzes business risks, and proposes that the three parties overcome potential risks caused by information asymmetry in double principal-agent relationship by interest binding mechanism and risk control mechanism, to provide feasible reference for logistics enterprises to carry out business and control business risks.

Acknowledgment

Fund project: “Guangzhou Youth Scholar” funded research project of Guangzhou Association of Social Science Societies in 2017, Project No.: 17QNXR12; Funded research project by Guangzhou philosophy and social science, Project No.: 2018GZGJ194; Social science fund project of Guangzhou Panyu Polytechnic, Project No.: 2016SK007.

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