

Research on Financial Risk Management and Control of Supply Chain Based on Financial Engineering

Jiace Li, Tao Wu, Zhiyang Xu and Yu Fang

Anhui University of Finance and Economics, Bengbu, 233030, China

Abstract: Under the background of the new era, enterprises play an important role in the development of market economy, and also undertake arduous tasks. The scale of supply chain of enterprises is also expanding, and the operation structure and management difficulty of supply chain finance of enterprises have become more complicated. Doing a good job in financial risk control management of enterprise supply chain, promoting its benign operation and sustainable development, can avoid financial risks of supply chain for enterprises. Based on this, this paper makes a brief analysis of financial engineering and supply chain financial risks, lists several common supply chain financial risks, and on the basis of analyzing the characteristics of supply chain financial risks, puts forward some control strategies of supply chain financial risks in financial engineering.

Keywords: Financial engineering, Supply chain finance, Financial risks, Industrial transformation, Strategic development.

1. Introduction

In recent years, China's market economy has shown a high-level, high-quality and high-efficiency development trend, and the overall development of supply chain finance has shown a trend of "digitalization", "online" and "ecology", which has really promoted the close connection between the upstream and downstream of the enterprise industrial chain, and also provided a broader space for the development of upstream and downstream financial business in the industrial chain. Financial risk in supply chain is an objective problem. As an important means to prevent and manage financial risk in supply chain, financial engineering has shown excellent energy efficiency of financial risk management in supply chain. However, it should be noted that since supply chain finance has obvious dynamic development characteristics, it is necessary for financial engineering to show sufficient adaptability and matching to supply chain financial risks, so as to ensure that financial engineering can really play a positive and effective role in preventing and controlling supply chain financial risks.

2. Brief Introduction of Financial Risks in Financial Engineering and Supply Chain

2.1. Financial engineering

Engineering is an advanced innovation and design method of financial instruments in the field of modern economic management. It can solve related problems in the financial field and innovate and develop new financial products and businesses through modern and scientific means[1]. On the whole, the emergence and wide application of financial engineering have significantly improved the financial efficiency, and the innovation degree, innovation quality and operational risk of financial products have been effectively improved. In addition, financial engineering also greatly improves the energy efficiency of financial risk management, which helps to improve the standardization, reliability and completeness of financial business[2].

2.2. Supply chain financial risks

From the macro point of view, the financial risk of supply chain exists objectively and cannot be completely eliminated. Supply chain financial risk mainly refers to the financial risks in the supply chain of enterprises. Due to a series of uncontrollable factors, the actual financial income of the supply chain financial business is far lower than the target income, which leads to large economic losses for the upstream and downstream enterprises in the supply chain.

In order to reduce the occurrence probability of supply chain financial risks as much as possible, and control the losses caused by supply chain financial risks to the minimum range, it is necessary to formulate corresponding supply chain financial risk prevention and control measures according to different risks, so as to improve the financial efficiency of enterprises[3]. There are many types of supply chain financial risks, mainly involving exogenous risks and endogenous risks, and each type of supply chain financial risk needs to be paid attention to and widely concerned.

2.3. Causes of supply chain financial risks

The emergence of supply chain financial risks has certain characteristics of contingency and suddenness, and no matter what kind of supply chain financial risks can be completely eliminated. Moreover, if we want to really prevent and control supply chain financial risks, we must have a more accurate understanding of the causes of each kind of risks[4]. The financial business of supply chain is obviously different from the traditional financial business, and it is more susceptible to the interference of internal and external double risk factors.

The supply chain has played a positive role in the financing behavior of enterprises, but the accompanying financial risks also extend "along" the upstream and downstream of the supply chain, which leads to severe financial risk impact in the upstream and downstream of the supply chain. Among the causes of supply chain financial risks, financial risks come not only from credit risks and trade risks, but also from the stability of the relationship between upstream and downstream enterprises in the supply chain, corporate social credit and the quality of corporate financial management[5].

In addition, once the financial capital of an upstream and

downstream enterprise in the supply chain breaks or the commercial bank withdraws, it will not only generate the corresponding supply chain financial risks, but also adversely affect the future development of the whole supply chain and industrial chain.

For the supply chain financial business, it is not the core enterprises of the supply chain that need a lot of financial support from commercial banks, but the upstream and downstream small and medium-sized enterprises of the supply chain, such as supply enterprises and sales enterprises, which are often associated with the core enterprises of the supply chain. Most of these enterprises are faced with obvious shortage of financial funds[6]. Under the positive influence of supply chain and core enterprises, commercial banks will have interest and motivation in financing. However, most of these small and medium-sized enterprises have some problems, such as low social credit rating, low financial management quality and small business scale, which will increase the probability that banks and other financial institutions will face financial risks. In addition, if there are a series of potential financial risk inducements in the supply chain financial business, such as a large number of illegal behaviors that commercial banks fail to accurately identify, unreasonable operation of upstream and downstream enterprises in the supply chain in the process of substantive transactions, and serious lack of authenticity of supply chain transactions, commercial banks will face greater financial risks[7].

3. Types of Supply Chain Financial Risks

3.1. Policy risk

All along, in the process of business development, enterprises can generally receive dividends brought by relevant policies issued by government departments, which will have a positive impact on the business development of supply chain finance[8]. However, if a government department introduces a new policy for a certain industry or industry, or the original policy changes significantly due to the adjustment of industrial structure and layout, it will have a significant impact on the operation of the entire industrial chain and supply chain, and both upstream supplier enterprises and downstream seller enterprises may be affected. Once banks and other financial institutions choose to provide financial services to the industrial chain and supply chain, their financial risk coefficient will be significantly improved[9].

3.2. Moral hazard

Financial moral hazard in supply chain is also a common type of financial risk, which mainly involves related enterprises in the supply chain. Simply put, although the supply chain can form a relatively stable win-win cooperation relationship among enterprises, it can effectively connect upstream supplier enterprises and downstream seller enterprises with the core enterprises as the center, thus ensuring that a long-term interest chain can be established among enterprises[10]. However, if an enterprise in the supply chain violates social credit, social morality and other aspects in the course of its operation, for example, it makes unethical behaviors that harm the economic and social interests of other enterprises for its own benefit, which will easily lead to financial risks in the supply chain.

3.3. Operational risk

Supply chain finance is prone to operational risks, which will cause serious financial and economic losses. The financial operational risk of supply chain mainly comes from the irregular and unreasonable internal operation behavior of supply chain, which may come from the subjective will of operators with problems, or from the operational risk caused by unexpected external events. In order to meet the financial pressure faced by upstream and downstream SMEs in the supply chain as much as possible, banks and other commercial organizations will provide necessary financial business support for such enterprises, and ensure that enterprises can always keep sufficient and surplus financial funds in the process of production and operation. In order to avoid the credit risk of small and medium-sized enterprises in the supply chain in the financial business, the relevant mechanism to prevent credit risk has been established, but these measures are easy to cause corresponding operational risks[11]. Simply put, whether we can really avoid credit risk depends on the implementation effect of the operational risk avoidance system. However, in the actual operation process, it is easy that the credit risk is not completely eliminated due to irregular, unreasonable, illegal and other behaviors, so that there will be chain reactions such as credit risk and operational risk, which will eventually lead to commercial loans issued by commercial institutions such as banks that cannot make profits or even recover the principal.

3.4. Market risk

In supply chain finance, it is necessary for supply chain-related enterprises to provide high-quality products and services to the consumer market, so as to ensure that enterprises can always maintain a relatively high core competitiveness in the economic market, thus ensuring that supply chain enterprises can smoothly withdraw funds while obtaining rich economic benefits. However, it should be noted that due to the obvious dynamic characteristics of the economic market, the economic market is often changeable, and even the core enterprises in the supply chain may face severe and complicated production and operation problems from the market. Once an enterprise does not manage well in the capital market, commercial banks often can't recover the invested financial funds normally, and even can only make up for commercial loans by recovering the movable property of the enterprise, which will bring serious market risks to financial institutions such as banks.

4. Characteristics of Supply Chain Financial Risks

4.1. Financial Characteristics of Supply Chain

First, transitivity. Relevant enterprises in the supply chain will cooperate around a certain product in an all-round way. From product design and development to market sales, all enterprises in the supply chain need to cooperate with each other. Although this method can promote the research and development, production and sales of products, it is also easy to increase the probability of supply chain financial risks. Simply put, financial risks may be transmitted to upstream enterprises or downstream enterprises along the supply chain, and financial risks in the supply chain may accumulate continuously. This will greatly reduce the ability of the supply chain to resist financial risks, and it is easier to have adverse

effects on the production and operation of the supply chain; Secondly, cooperation and competitiveness. Although all enterprises in the supply chain can cooperate closely with each other and actively share resources in order to achieve a certain business development goal, it should be noted that different enterprises also have different interests and business directions, and there is also information asymmetry among enterprises. In order to achieve their respective interests, enterprises may launch fierce market competition and shopping mall games, which may lead to serious supply chain financial risks.

4.2. Difficulties in supply chain financial management

First, information asymmetry. Information asymmetry is a difficult point in supply chain financial risk management. In order to achieve their own interests, enterprises often don't publish their core information to the outside world, on the contrary, they will tightly block this part of information. Because the information exchange is not smooth, and the sharing of data and information resources among enterprises is not thorough enough, it is easy to lead to frequent fluctuations in product market prices, thus increasing the probability of supply chain financial risks; Secondly, there are many units involved. There are many enterprises in the supply chain, and the scale and industries of enterprises are quite different. Even many supply chain financial services are closely related to local government departments, and the participation of local governments in supply chain finance is relatively high, which will lead to complicated sources of supply chain financial risks and increase the difficulty of prevention and control of supply chain financial risks.

5. Analysis of supply Chain Financial Risk Control Strategy of Financial Engineering

5.1. Clarify the supply chain financial risk control mechanism

To really prevent and control the financial risks in the supply chain, it is necessary to show the positive role of risk identification, which is the key to improve the risk control ability and ensure the risk control effect. Commercial banks should accurately judge and understand the types, causes and prevention and control measures of supply chain financial risks, so that they can formulate different risk prevention and control measures according to different types of supply chain financial risks. In addition, commercial banks need to accurately analyze and evaluate the occurrence probability of supply chain financial risks through risk measurement. This depends on the data information accumulated by commercial banks for a long time, constantly improving the risk analysis model, and then accurately identifying the occurrence probability of supply chain financial risks through scientific and reasonable mathematical models. In addition, commercial banks can continuously develop supply chain risk transfer, risk insurance and other means on the basis of conventional measures such as risk identification, risk avoidance, risk prevention and control, and risk reduction.

5.2. Make good use of the core value of financial derivatives

In the supply chain financial business, if the price fluctuates

in a certain link of the supply chain, it may lead to the price deviation of the final enterprise products. Once this price fluctuation exceeds expectations, or has seriously affected the investment and financing benefits of the supply chain, it may cause financial risks in the supply chain. Financial derivatives can effectively reduce the financial operation cost of the supply chain, and they also have outstanding advantages such as high accuracy, outstanding timeliness and ideal value cost. Therefore, whether financial derivatives can be reasonably used will greatly affect the effect of financial risk prevention and control in the supply chain, so it is necessary to ensure that financial derivatives can give full play to their own role. Financial derivatives have become the core measure in the current supply chain financial risk control. No matter what price fluctuations happen in the sales market of supply chain products, they will not bring financial risks to investors. This mainly depends on the operation methods of "hedging transactions" and "margin transactions" of financial derivatives, which significantly improves the operability of supply chain financial business and investment institutions such as commercial banks. Moreover, in financial derivatives, the risks in the supply chain have been transferred and "shared equally". Financial risks are no longer borne by a certain enterprise or unit with weak risk control ability, but by enterprises or units with strong risk tolerance, and the investment income of investment institutions such as commercial banks may also increase. It can be seen that financial derivatives not only have the ability to avoid and prevent financial risks, but also can help investors in the supply chain gain profit opportunities.

5.3. Practical application of financial derivatives

In the supply chain financial business, the relationship between enterprises, commercial banks and other investors is very close. This relationship is not only reflected in financial funds, but also in product market sales and the burden of profit and loss. To put it simply, most supply chains don't have only one product sales market. Once a product has a negative profit in the market sales, it may be hedged by a profitable market. In this operation link, the core enterprises, upstream suppliers and downstream vendors of the supply chain may conduct reverse operations in the capital market, so as to achieve the expected operation purpose, and reduce the strong impact and adverse effects brought by the financial risks of the supply chain, and reduce the occurrence probability of the financial risks of the supply chain.

Through the positive role of financial derivatives, the upstream enterprises in the supply chain can avoid the financial risks of the supply chain as much as possible by "hedging". At the same time, the upstream and downstream enterprises in the supply chain can also form a relatively stable cooperative relationship, and complete the marketing of products of the corresponding scale through the established cooperation scheme, thus increasing the purchase options of the core enterprises in the supply chain and downstream sales enterprises to the upstream supplier enterprises, and ensuring a more stable supply chain financial business. Moreover, supply chain enterprises can flexibly adjust the purchase quantity, and can also ensure that there is a sufficient amount of real transaction volume in each production cycle and transaction cycle, which will help to enhance the common risk aversion ability of supply chain enterprises, and then enhance the stability and sustainability of the cooperative relationship

between supply chain enterprises.

5.4. Through options and futures cooperation

This method plays a positive role in preventing and controlling financial risks in supply chain. Simply put, by agreeing on the transaction scale and mode of supply chain enterprises in advance, and paying the corresponding proportion of royalties, the buyer can buy or sell the corresponding quantity of goods according to the market price agreed by both parties within the specified time. Although the buyer can trade according to the commodity price and purchase scale agreed in advance, it is not necessary to ask the other party to trade according to the products agreed in advance.

In this way, even if the market price fluctuates obviously, investors don't need to continue to trade according to the contract agreed in advance, and investors have more consideration space, operation space and choice right. No matter whether the futures price rises or falls, investors in the supply chain financial business will not lose a large amount of financial funds, that is, the loss of royalties at most, which can better ensure that supply chain enterprises will not face huge financial risks, so as to achieve the purpose of profitability.

5.5. Reasonably judge the risk control capability of the supply chain

For the prevention and control of supply chain financial risks, the most fundamental measure is to evaluate and analyze the overall financial risk control capability of the supply chain beforehand. On the one hand, it is necessary to evaluate the market reputation and market competitiveness of core enterprises and small and medium-sized enterprises in the supply chain; on the other hand, it is necessary to judge the market core competitiveness and influence of core products in the supply chain.

This requires financial engineering means such as data model, centralized processing and dynamic input of supply chain data information, so as to ensure a basic judgment of the current most basic situation of supply chain. In addition, it is necessary to identify the core enterprises in the supply chain, especially to avoid the misunderstanding of entering the core enterprises in the supply chain. It is not a large-scale enterprise that is a core enterprise, but an enterprise that has mastered the technical core, market core, brand core and strong product market competitiveness in the supply chain that can be called a core enterprise.

6. Conclusion

Supply chain finance is a relatively new financial service

management mode for enterprises. Doing a good job in controlling the financial risks of supply chain in the financial engineering system can significantly reduce the probability of enterprises facing financial risks, and bring more substantial economic benefits to enterprises. In order to ensure the optimal level of financial risk prevention and control measures in the supply chain, it is necessary to give full play to the advantages of financial engineering, especially to ensure that financial engineering can always be innovated and upgraded, and truly adapt to the development of the supply chain, so as to promote the long-term development of the supply chain.

References

- [1] Motohiro Yogo. The evolution from life insurance to financial engineering [J]. Shanghai Insurance,2022(10):30-37.
- [2] Zhang Qionglin. Research on the application of financial engineering in risk control of Internet financial innovation[J]. China Market,2022(20):176-178.DOI:10.13939/j.cnki.zgsc.2022.20.176.
- [3] Kang Xiaoyan. Exploring the application of financial engineering in supply chain risk management [J]. China Economic and Trade Journal,2022(06):90-91.
- [4] Serving Chunhui. Financial market risk control in financial engineering [J]. Wealth Today (China Intellectual Property), 2022(06):31-33.
- [5] Li, Tuolu. Arbitrage ideas and financial engineering research[J]. Business Watch,2022(09):51-54.
- [6] Deng Wen. Innovation of corporate financial engineering and financial management[J]. Marketing World,2022(03):61-63.
- [7] Wang Gang. Application of financial engineering in supply chain risk management[J]. Wealth Today,2022(01):52-54.
- [8] Peng Ke. Exploring the application of financial engineering in supply chain risk management [J]. Old brand marketing, 2021 (09):91-92.
- [9] Wang Yisong. The application of financial engineering in supply chain risk management[J]. Business News, 2020(31): 91-92.
- [10] Yang Zonghan,Chen Xiaomei,Peng Wei. Research on the development of aviation logistics industry based on supply chain financial support--based on the perspective of China-ASEAN financial reform along the border[J]. Enterprise Reform and Management,2020(16):97-98.DOI:10.13768/j.cnki.cn11-3793/f.2020.1617.
- [11] Zhang Y. Risk management and exploration of China's bank supply chain finance--based on game analysis perspective [J]. Technology Economics and Management Research, 2018(01): 72-76.