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Research Article

The Prevention of Financial Legal Risks of B2B E-commerce Supply Chain

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B2B supply chain finance is a new type of financial model, which is created to help companies raise funds and promote the production, operation, and development of companies in the supply chain. Based on the B2B e-commerce platform, it is used for online transactions and transactions between companies and companies. Information, integrating logistics, business flow, information flow, and capital flow for data analysis and processing. When people enjoy convenient and fast e-shopping, they must not only choose products carefully but also understand and be familiar with the relevant laws and regulations of shopping on the Internet. Avoiding potential legal risks is a key factor. The purpose of this article is to analyze the financial risks of the B2B e-commerce supply chain, according to the current Internet development trend, study the legal risks of the B2B e-commerce supply chain in the development, put forward corresponding recommendations, and build a relevant system to reduce risks. Combining some current legal issues faced by e-commerce, this article first analyzes the generation and operation mechanism of credit risk under the B2B platform online supply chain financial business model; then, based on the supply chain financial risk, a relevant system is constructed to reduce risks. This article first analyzes the generation and operation mechanism of credit risk under the online supply chain financial business model of the B2B platform; then, based on the supply chain financial risks, construct a system that can prevent and control the risks generated under this financial business model risk evaluation index system; finally, the KMV model and case are analyzed to verify whether this risk evaluation research is effective for supply chain financial risks. The experimental results show that through the KMV model, comparing the two sets of data, the default distance of most default groups is smaller than that of the normal group. It can be seen that the greater the default distance, the smaller the credit risk. When the default point coefficient is 0.85, use the KMV model which is most obvious when judging the company's overall probability of default.

1. Introduction

In the supply chain finance model of the B2B e-commerce platform, commercial banks and B2B e-commerce platforms work together to provide financing services to companies in need of financing. This model combines Internet technology with the characteristics of different supply chains. It is difficult for SMEs to obtain financing. The problem was solved, reducing the risk of commercial banks. Since the emergence of this new model, the market scale has continued to expand, and with the expansion of the market scale, credit risks have become increasingly prominent. The effective management and control of credit risk not only affects the credit security of commercial banks but also determines whether the entire supply chain based on this model can run smoothly.

At present, the research on the prevention of financial legal risks in the B2B e-commerce supply chain has been extremely important, and more people have conducted research. Liu et al. pointed out that the key for cross-border e-commerce companies to continuously gain competitive advantage is supply chain flexibility. They studied and analyzed the influencing factors of cross-border e-

commerce supply chain resilience (CBSCR) in order to further enhance the competitiveness of global supply chains. The safe operation of the e-commerce supply chain has certain guarantees. They believe that the adaptability of the supply chain is very important. It can start with strengthening the risk management culture, cooperation between partners, and the construction of supply chain agility [1]. Mourtzis et al., by studying IPSS procurement between industrial companies (i.e., business-to-business-B2B), realized that the complexity, lack of trust, and high cost of interactions between B2B stakeholders, especially for small- and medium-sized enterprises, hindered the establishment of a standardized electronic market similar to the way in the business-to-consumer world. Through this research, they outlined the requirements for supporting supply chain processes on a digital B2B platform and discussed the goals and advantages of the multilateral platform [2]. Liang et al. focus on the research of multisource heterogeneous data fusion algorithms and cleaning technologies and establish a style suitable for data analysis and big data calculation frameworks to maintain the bottom line of systemic financial risks and prevent major financial risks. They use big data to analyze this emerging information technology method, explore new risk early warning methods, build risk monitoring and early warning platforms, realize scientific economic decision-making, and make the source of economic risk traceable in national economic security [3]. With the emergence of information technology and computer application innovation, the e-commerce industry has developed rapidly in the commercial market. However, to manage such a complex network and fight against risks and uncertainties, e-commerce supply chains are relatively fragile. Dutta et al. conducted a statistical analysis of the data obtained from different supply chain experts on the risks encountered in the e-commerce supply chain and various mitigation measures. They conducted two sample t-tests to find out the impact of different risks on SC performance and the impact of one risk on another risk [4]. Dou and Zheng proposed that B2B e-commerce supply chain finance is the business innovation of e-commerce enterprise big data theory chain, supply chain network, and other new technology supply chain finance. The financial framework of the B2B e-commerce supply chain includes multiple components such as a complex network structure. According to the legal constraints, risk management constraints, and platform technology constraints that may exist in the current B2B supply chain finance, corresponding governance methods are proposed to achieve the good development of B2B supply chain finance [5]. In recent years, financial institutions (FI) have tentatively used supply chain finance (SCF) as a means to solve the financing problems of small- and medium-sized enterprises (SMEs). It can be seen from this that predicting the credit risk of SMEs in supply chain finance has become one of the most critical issues in financing decision-making. Zhu et al. combined two classic integrated ML methods, Random Subspace (RS) and MultiBoosting, and proposed an enhanced hybrid integrated ML method that can improve the accuracy of predicting the credit risk of SMEs. From the perspective of e-commerce supply chain

finance, in order to improve the financing capabilities of SMEs, "traditional" factors, such as the current ratio and quick ratio of SMEs, are still crucial. Other SCF-specific factors, such as the characteristics of traded goods and the profit margin of CE, play an important role [6]. In order to better assess and control the financial risks of the supply chain of the e-commerce platform, Zhang and Zhang focus on the entire life cycle of the enterprise, use the e-commerce platform to analyze and process supply chain data, divide the small- and medium-sized enterprises that need financing according to different types, and analyze the company's state, providing data support for investment companies to formulate investment strategies, so that investment companies on the e-commerce platform can accurately locate more high-quality customers and effectively control risks while achieving benefits [7]. However, the current supply chain management process in China is relatively complicated, the market operation mechanism is not perfect, and there are many irregularities in the management of e-commerce, which also leads to the lack of comprehensive research and some loopholes in the prevention of supply chain financial risks.

The innovations of this article are as follows: (1) Combining the current Internet development model, conduct research on the field of online supply chain finance, and conduct comprehensive and in-depth research on the credit risk evaluation of online supply chain finance based on B2B platform through financing behavior. (2) Through a variety of research methods, using big data calculations and analysis, combined with the research results of experts, put forward opinions and suggestions, and prevent and control the legal risks of B2B e-commerce supply chain finance from various aspects.

2. Internet-Based Supply Chain Financial Risk Prevention Methods

2.1. Scale of Internet Finance Platform. At the beginning of March 2017, there were 14,120 Internet financial platforms, and the total number of Internet financial users reached 643 million. The capital scale of third-party payment platforms exceeds 51.5 trillion, the scale of online lending platforms exceeds 3.9 trillion, and the scale of online crowdfunding platforms exceeds 387 trillion. In just a few years, Internet financial platforms have expanded rapidly [8], as shown in Figure 1. It can be seen that the number of users of Internet financial platforms is increasing.

2.2. Traditional Supply Chain Financial Financing Model. Supply chain finance takes core enterprises as the entry point to provide financial support for the supply chain. It is the bank that manages the funds, logistics, and information of upstream and downstream SMEs and transforms the uncontrollable risks of a single enterprise into a supply chain. The overall controllable risk of the enterprise, through obtaining information from many aspects, and controlling the risk to the lowest financial service, the core is that the enterprise obtains credit from the investor with its core assets as collateral [9].
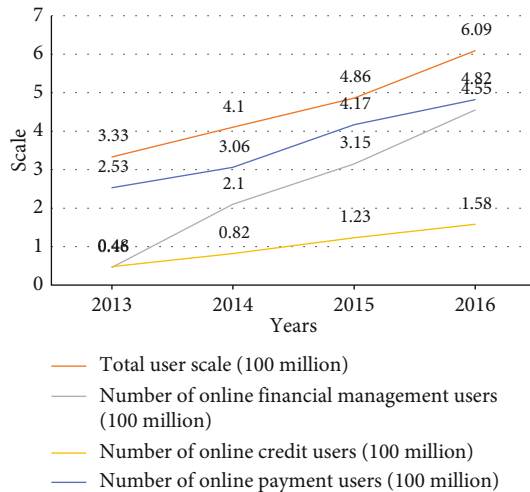
FIGURE 1: The scale of Internet finance.

It can be seen from Figure 2 that supply chain finance can provide services for the procurement, storage, and sales links in commodity circulation. There are different business financing models for different trade links, which can be specifically divided into advance payment financing (including agency procurement and confirmed warehouse financing), warehouse receipt or cargo rights pledge financing, and accounts receivable financing [10].

(1) Prepayment financing (agent procurement and confirmation warehouse financing)

The prepayment mode mainly means that when the company purchases goods, it needs to pay the seller in advance, but the company does not have enough funds to pay for the goods, so it is externally invested, and the company must introduce funds to pay for the purchased goods [11]. Companies that need to introduce funds mortgage their credit and the rights to the goods they can obtain in the future to raise funds. The merchants that produce the goods send the goods to the warehouse designated by the company that pays for the goods, and the warehouse can deliver the goods after the warehouse is shipped.

(2) Warehouse receipts or pledge financing of cargo rights

Distributors and subterminals do not directly consume inventory and are mainly used to transport goods, so they store goods in warehouses. As a form of assets, inventory occupies the company's cash flow. When a company needs funds, it usually uses inventory for financing and obtains funds through warehouse receipts or pledge of cargo rights [12]. In this financing process, the more standard the product, the easier it is for the company to finance, because when a default occurs, goods with a higher standard are easier to handle than those with a lower standard and have stronger pledgeability.

It can be seen from Figure 3 that supply chain companies have the ability to provide logistics and warehousing services, and they can also manage commodities in the industry chain. This model applies to the provision of financial services for the entire industry chain, including sales agents from the purchase of products by the manufacturer to the final process of delivering products to customers. At the same time, in order to effectively manage risks, supply chain companies can trade with upstream and downstream companies in financing [13].

(3) Accounts receivable financing

The financing of this model is mainly based on the accounts receivable generated in the process of business-to-business transactions. The company that needs financing promises the financing company the rights and interests of financing. The financing method can be divided into factoring and reverse factoring. The business model is shown in Figure 4.

(1) Factoring

Factoring means that the seller forms a large amount of accounts receivable by providing downstream credit sales and spot payment services. Seller's accounts receivable are relatively diversified and have different cycle financing activities. This model is generally financed by core enterprises in the industry, with relatively reliable credit status, relatively strong downstream management capabilities, and relatively low financing risks.

(2) Reverse factoring

Reverse factoring is based on accounts receivable arising from financing transactions between core companies and their suppliers. This model needs to be recognized by the core area credit. With the introduction of investors, the accounts receivable in the hands of core corporate creditors can be redeemed in advance, which is different from an acceptance bill.

Order financing: the enterprise applies for financing to the Construction Bank with the purchase and sale contract and the real and effective purchase order issued by the buyer. The supplier has solved the problem of the shortage of funds in the early stage and can obtain funds in advance to successfully complete the order contract.

Movable property financing: in the course of normal business operations, a company uses its own movable property approved by China Construction Bank as a pledge, which is kept by a warehousing company approved by China Construction Bank, and is a credit business that it applies to China Construction Bank.

Warehouse receipt financing: the credit business that the enterprise holds with the warehouse receipt of a professional warehousing company approved by China Construction Bank to pledge and apply to the Construction Bank.

The financing methods of accounts receivable can be divided into factoring and reverse factoring. Forward factoring: factoring (factoring) is the full name of the guarantee
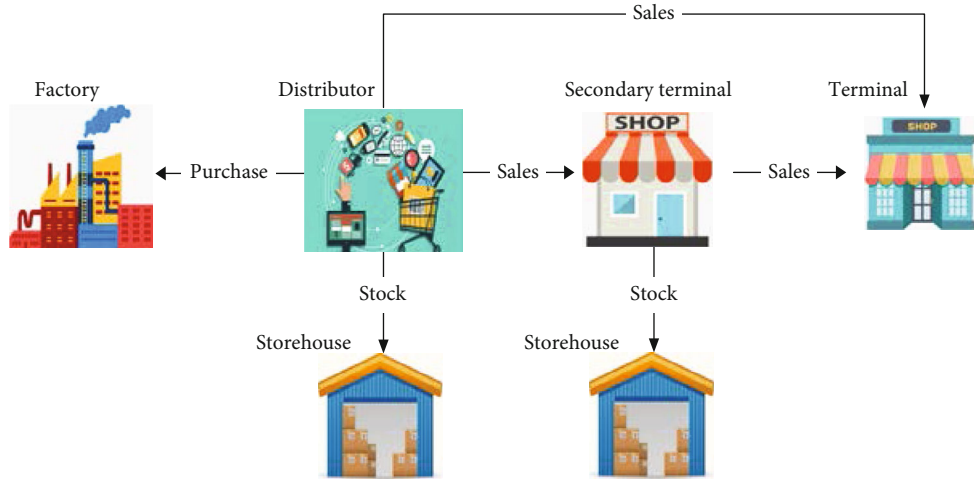
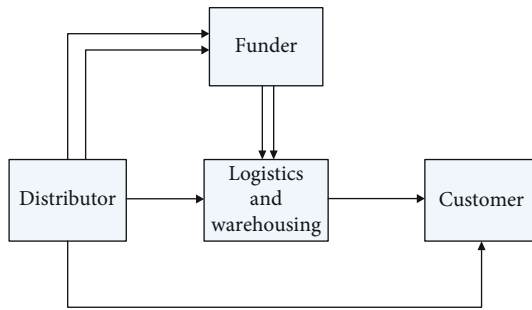FIGURE 2: Financial and trade links of traditional supply chains.

FIGURE 3: The specific business logic of warehouse receipts or pledge financing of cargo rights.

agent, also known as the collection guarantee. The seller transfers its current or future accounts receivable based on the goods sales/service contract signed with the buyer to the insurance A financial institution (a financial institution that provides factoring services) which is a comprehensive financial service method that provides a series of services such as financing, buyer credit evaluation, sales account management, credit risk guarantee, and collection of accounts. It is a method of entrusting a third party (factor) to manage accounts receivable by the seller in order to strengthen the management of accounts receivable and enhance liquidity when the payment is settled by means of collection and credit in commercial trade. Reverse factoring: reverse factoring means that the accounts receivable bought out by the factoring firm are buyers with high creditworthiness. In this way, the bank only needs to assess the buyer's credit risk to carry out factoring, and the flow of funds recovered from the credit also comes directly from the buyer.

2.3. Online Supply Chain Financial Financing Model. The B2B supply chain finance model and the traditional supply chain finance model basically revolve around the three links of procurement, production, and sales for financing. In the actual development, most foreign supply chain finance uses receivable products, because banks pay more attention to

the close connection between the industrial chains, which has less market risk, and the impact of the company's sales risk is relatively small. Domestic supply chain finance prefers to use prepaid services, followed by receivables and inventories. Prepaid products are embodied as an electronic order financing model in B2B platform supply chain finance. On the one hand, it can make the funds of small- and medium-sized enterprises flow faster, resolve overcapacity, and contribute to the improvement of financial statements; on the other hand, prepaid products can turn commercial credit from enterprises into bank credit that can restrain SMEs and reduce credit risk, because if SME is the default, it will be reflected in the credit records and affect their future financing efficiency.

The current B2B platform mainly revolves around enterprises with large product transaction volume and high degree of standardization. B2B platforms centered on the trading of bulk commodities such as steel, petrochemicals, coal, nonferrous metals, and timber have the basis of supply chain financial transactions, which can integrate financing and transactions, carry out coordinated development, improve transaction efficiency, and reduce risk control costs. Steel e-commerce is a leading industry that combines supply chain finance and B2B platforms. Its development background is that the steel industry is facing serious overcapacity and the traditional steel trading industry is facing transformation. The annual demand of the steel trade financing market can reach trillions, but the problem of financing difficulties still plagues the steel trade under the development of traditional credit. This is mainly due to the fact that banks are not familiar with the internal chain of the steel industry and are difficult to assess the authenticity of financing projects. At the same time, they lack the ability to directly handle bulk commodities such as steel when credit risks arise, which will increase the requirements for SMEs to conduct mortgage financing. Professional B2B platforms, such as steel-silver e-commerce, have platform transaction information precipitation and have a good understanding of the chain of steel sales. They not only master the credit information of upstream and downstream
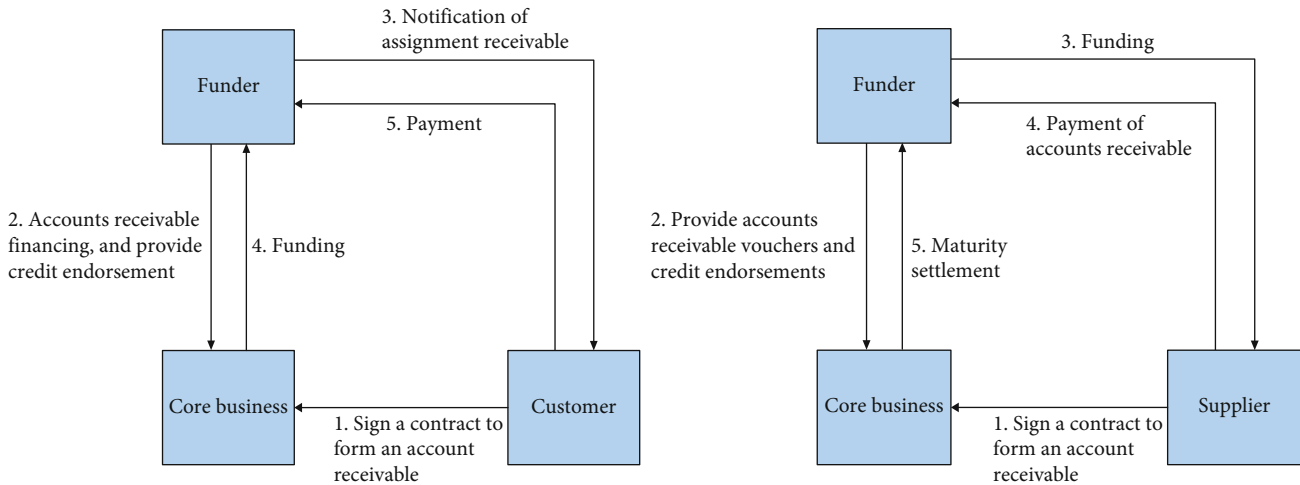
FIGURE 4: Accounts receivable financing business model.

enterprises in steel sales but also have the ability to process pledged steel. The advantage of minimizing credit risk.

At present, B2B e-commerce supply chain finance still faces many problems in general, including the following: first, some vertical B2B e-commerce companies have the problem of unclear business strategies, and there are confusions in the strategic direction of choosing self-operated and third-party platforms. Many vertical B2B e-commerce companies started with information platforms and then began to build third-party trading platforms but found that the third-party platforms did not have high gross profit directly, so they started to operate as self-operated, but they found that the self-operated business took up a lot of funds. The business cannot be expanded. If vertical B2B e-commerce companies make mistakes in their development strategies and make detours, they will often lose the opportunity to lag behind their competitors in a fiercely competitive market. Second, some vertical B2B e-commerce companies also face the problem of unclear strategic choices for developing supply chain finance business. Whether to choose to develop supply chain finance and how to develop supply chain finance are important issues that vertical B2B e-commerce companies need to consider. Some companies follow the trend and pursue the concept of supply chain finance but ignore the conditions required to develop supply chain finance and the matching situation with existing businesses.

For all transactions in the platform, the B2B e-commerce platform can effectively supervise. At the same time, the platform can integrate logistics and warehousing resources to serve both buyers and sellers. The circulation and storage of products are also within the scope of the platform's supervision. The authenticity of transactions is affected by strict management [14]. However, the business structure within the ecology of any comprehensive B2B e-commerce platform is not static. Companies related to various industries, such as brand factories, distributors, and terminals, coexist in the e-commerce platform ecological environment, and transactions within the platform are with the participation of these industries; B2B e-commerce platforms need to design suitable sup-

ply chain financial products for multiple transaction scenarios and enterprises in supply chain finance. The online supply chain financing model is shown in Figure 5.

(1) Electronic order financing model

This model is suitable for small- and medium-sized enterprises that have short-term funding gaps in the upstream and downstream of the supply chain. These enterprises have long-term cooperative relations with core supply chain enterprises. Both upstream and downstream small- and medium-sized enterprises and core supply chain enterprises have registered members of the platform and are in good transaction records on the e-commerce platform; these companies can apply for loans from the bank by pregenerating electronic orders with core companies on the e-commerce platform [15].

(2) Electronic warehouse receipt financing model

In this model, information sharing is realized between the e-commerce platform and the bank. When small- and medium-sized enterprises on the platform want to obtain financing, they must first apply for an online credit extension to the bank. The financing company evaluates and then decides whether to grant credit and the credit limit. After obtaining the quota, SMEs can apply for loans on the e-commerce platform, and the number does not exceed the maximum quota granted by the bank. The e-commerce platform signs a chattel pledge agreement with small- and medium-sized enterprises, and the small- and medium-sized enterprises submit a corresponding amount of pledged goods to the logistics company. After the logistics enterprise confirms that the quality of the goods is in good condition, it generates an electronic warehouse receipt on the e-commerce platform, affixes it with a signature, and transfers it to the e-commerce platform. After receiving the electronic warehouse receipt, the e-commerce platform affixes the platform seal and submits it to the bank after the review is correct. After the bank's review is correct, it will lend money to the SMEs. Small- and medium-sized enterprises can pay a
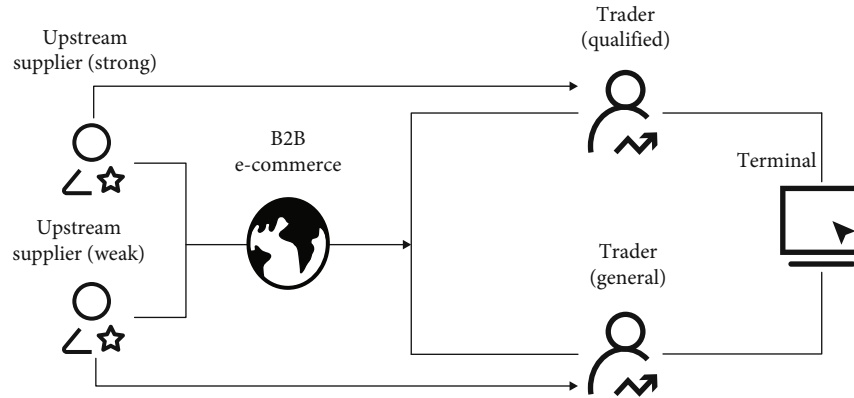
FIGURE 5: Online supply chain financial financing model.

deposit to the bank in batches to withdraw the goods for their own production or product sales. This process continues to circulate until the bank's deposit is fully repaid within the contract period [16].

(3) Prepaid financing model under e-commerce platform

The online prepaid financing model mainly refers to a financing method that can be adopted by small- and medium-sized enterprises downstream of core companies, such as assembly companies or distributors, when they encounter a shortage of funds. In the case of strong market demand, downstream distributors usually organize advance orders to ensure the retailer's demand [17]. Due to the introduction of a third-party e-commerce platform, for the core enterprises and small- and medium-sized enterprises of its member customers, the e-commerce platform can provide banks with transaction information and provide a basis for banks to grant credit [18]. On the third-party e-commerce platform, the information flow of various participants is accelerated, which provides the impetus for the accelerated operation of the supply chain.

(4) Supply chain finance accounts receivable financing model under the e-commerce platform

The purpose of this model is to solve the shortage of funds for financing enterprises in the upstream of the supply chain. In this implementation process, since the repayment target is the core enterprise, compared with the small- and medium-sized financing enterprises with weaker economic strength, the bank's repayment risk is transferred from the small- and medium-sized enterprise to the core enterprise. The repayment risk is greatly reduced and guarantees the profit of the bank [19].

Core enterprises are in a dominant position in the supply chain, and they often pass on the pressure of working capital to relatively disadvantaged upstream SMEs through credit sales, causing SME suppliers in the upstream of the supply chain to face a shortage of working capital. And accounts receivable financing effectively solves the plight of upstream SMEs in the supply chain. It requires the participation of

upstream financing companies, downstream debt companies, and banks.

At present, although supply chain finance has greatly improved the convenience and possibility of obtaining credit loans for small- and medium-sized enterprises, it may involve many different technologies due to its strong flexibility, large number of participants, and more complex operation mode. Fields and industries and small- and medium-sized enterprises in the supply chain are relatively weak in their own risk-bearing capabilities, so some potential risks in their operations cannot be ignored. In summary, there are mainly the following risks:

Exogenous risks mainly refer to the possibility that changes in the external macroeconomic and financial environment will have an impact on the supply chain. It mainly includes factors such as changes in market interest rates, exchange rates, and market prices, which have led to problems such as changes in the market price of pledges, sales of financing objects, changes in market share, and rising corporate financing costs in the supply chain. In addition, there is a risk that factors such as macro policy adjustments and changes in the legal system will cause changes in product market supply and demand, which will lead to difficulties or even interruption of capital circulation.

Endogenous risks are mainly due to information risks, trade and financial credit risks caused by incomplete collaboration between various companies in the supply chain, or information asymmetry and other issues. For example, the debtor or counterparty fails to fulfill the obligations stipulated in the contract on time and causes a breach of contract, which brings credit risk of economic loss to the creditor; the customer's credit rating is inaccurate, and the accounts receivable are difficult to withdraw due to the failure of internal control and human error losses to commercial banks, and operational risks arising from issues such as distortions in the transmission of relevant capital information; due to the large number of participants, the complex environment, and various internal chaos and uncertain factors, all parties in the supply chain seek the maximization of self-interest that produces conflicts of opinion, and the problem of a certain link in the supply chain, and its influence quickly spreads to the

supply chain risk systemic problems of the entire supply chain and so on.

2.4. E-commerce Platform Supply Chain Financial Risk Identification.

As a bridge, the e-commerce platform has established exchanges between core enterprises, small- and medium-sized enterprises, and banks. However, due to Internet security factors and human operation factors, e-commerce platforms also have external and internal risks [20].

The external risk of e-commerce platform refers to the risk caused by relevant national policies, guiding measures, and market environment. At present, China has a positive attitude towards e-commerce platforms and has always been a supportive attitude towards e-commerce. Therefore, the external risks of e-commerce platforms have little effect on the whole.

Different from external risks, e-commerce platforms have a variety of internal risks. The internal risks of e-commerce platforms mainly include information technology risks, management risks, and platform credit evaluation risks.

(1) Information technology risk

Information technology risks mainly come from real-time risks, authenticity risks, and security risks of information. Real-time risk refers to the fact that information can safely, reliably, and truly reflect the current state and attributes of a certain thing. Specific and complete information is generally valid and decisive for a certain period of time [21]. Authenticity risk mainly refers to whether the information is accurate and reliable, which will have a direct impact on the degree of trust between the parties to the transaction. Security risk refers to the information transmitted by the information-related systems in the e-commerce platform, which may be stolen or altered, and the information may be destroyed or lost in the information processing process of the e-commerce platform [22].

(2) Manage risks

This risk refers to the risk of early success of the e-commerce platform itself due to management errors. Management risks include communication risks and external emergencies handling risks. Communication risks are mainly manifested as risks caused by the inability of e-commerce platforms to communicate with platform members in a timely and effective manner. The time handling risk of external emergencies mainly refers to the risk of whether the e-commerce platform has sufficient capacity to respond to emergencies brought about by the external environment and take emergency measures [23].

(3) Platform credit evaluation risk

Platform credit evaluation risk refers to the risk of transaction denial, malicious evaluation, and deception of the buyer when the buyer evaluates the seller after the transaction is completed on the platform. The development of a complete credit supervision system and a strict system to curb such behaviors is one of the directions for the future development of e-commerce platforms. Platform credit evaluation risk refers to the three factors of buyer credit evaluation risk, seller credit evaluation risk, and transaction denial credit evaluation risk aspects [24].

Whether the risks and rewards related to the creditor's rights of receivables have actually been transferred, the financing models of receivables are divided into three types: pledge of receivables, factoring of receivables, and securitization of receivables.

The following three points can be adopted to deal with the financial risks of the supply chain: (1) Ensure the creditworthiness of core enterprises. (2) Ensure the circulation of cargo information. (3) In response to the risk of price fluctuations of pledged commodities, the fund provider can adjust the interest rate and loan ratio according to changes in the production stage and changes in credit risk.

Risks can be avoided by strictly determining the access conditions of core companies in the supply chain.

The various business models of supply chain finance directly or indirectly involve the credit level of the core enterprise. While the core enterprise guarantees the financing of upstream and downstream enterprises, its business risks are also directly passed on to other enterprises in the supply chain. It directly determines the overall profit and loss of the supply chain business, and its access management is particularly important. Banks should set the selection criteria for core enterprises:

One is to consider the operating strength of core enterprises. Such as equity structure, main business, investment income, tax policy, existing credit, contingent liabilities, credit history, industry status, market share, development prospects, and other factors, according to a certain percentage of purchase costs or sales revenue in previous years, the core enterprise set the supply chain financial credit limit.

The second is to examine the management capabilities of core companies on upstream and downstream customers. For example, whether the core company has access and exit management for suppliers and distributors; whether it provides exclusive preferential policies for suppliers and distributors, such as order guarantee, sales rebates, price difference compensation, and marketing support; and whether suppliers and distributors are provided with exclusive preferential policies, there are incentive and restraint mechanisms.

The third is to examine the ability of core enterprises to assist banks. That is, can core companies use their customer relationship management capabilities to assist banks in increasing the default cost of supply chain finance.

If there is a credit risk, because the source of the customer's commodity is a smuggled commodity, there is a risk that the commodity will be confiscated; if the customer does not have full qualifications for the commodity, the commodity is illegal. These will bring immeasurable risks to logistics companies. Another example: poor creditworthiness of customers, there may be various bad behaviors in future operations. For example, when the goods are picked up on a rolling basis, the logistics company has the risk of bad goods; the customer will shoddy goods; the logistics company will exist product quality risk. In addition, it is necessary to

examine the debt-to-asset ratio of the client company. If the debt-to-asset ratio of the client company is too high, the client company may go bankrupt.

2.5. E-commerce Financial Legal Risks. Due to the late development of e-commerce, the corresponding laws and regulations have not yet been formally enacted, and the boundaries of applicable laws are relatively blurred, which makes the development of e-commerce companies have been greatly restricted. In addition, e-commerce is global, leading to when conducting transactions, they can only not violate the current laws and regulations, but they are afraid of conflicts with future laws, which seriously restricts the healthy development of enterprises. E-commerce is mainly conducted in a virtual network environment. When conducting transactions, many electronic contracts, e-commerce certification, and online intellectual property rights do not have clear laws and regulations, which cause corresponding legal risks to enterprises, and legal rights and interests cannot be effectively obtained. Guarantee is not conducive to the normal development and growth of enterprises.

(1) Inversion of burden of proof

The "Consumer Rights Protection Law" mentions that when it comes to commodities such as automobiles, home appliances, and electronic products, e-commerce operators should bear the burden of proof to prove that the products they sell or the services they provide are not flawed. Therefore, e-commerce operators should fully retain the evidence that the product has passed the quality inspection and acceptance in the process of providing products and services.

(2) Pay attention to the phenomenon of oversold products, and prevent the risk of compensation for order breach

Oversold refers to the fact that the amount of orders accepted by e-commerce operators exceeds the amount of goods in stock, resulting in a shortage of supplies, which will cause consumers to lose access to goods. E-commerce operators publish product sales information and prices on the network platform, which constitutes an offer in contract law; once the consumer takes the product, the two parties establish a sales contract. When the e-commerce operator releases the product sales information without specifying and reminding to pay attention to the restrictions on the number of products sold, the time limit for purchase, etc., if the consumer has fulfilled the payment obligation and the operator refuses to ship the goods on the grounds of shortage, it will constitute a breach of contract, which shall bear the liability for breach of contract. E-commerce operators should pay attention to the phenomenon of product oversold in promotional activities and prevent the risk of compensation for order breach.

(3) Provide goods and services to ensure the quality, pay attention to the scope and time limit of unreasonable return of goods

The "Consumer Rights Protection Law" clarifies the priority of consumers to return goods and protects consumers'

right to repent. At the same time, in order to prevent this right from being abused, it has clarified the circumstances in which it is not appropriate to return the goods, and the returned goods should be in good condition, and the responsibility of the return cost. Article 25 of the law stipulates that business operators use the Internet, television, telephone, mail order, etc., to sell goods, consumers have the right to return the goods within seven days from the date of receipt of the goods, and there is no need to explain the reasons. In addition to commodities, if the nature of the commodity is not suitable for return, it must be confirmed by the consumer at the time of purchase. Therefore, e-commerce operators must retain written evidence confirmed by consumers for such commodities. The law on the seven-day unreasonable return of goods is only a minimum requirement. If the operator provides consumers with a longer period for the exercise of the right of return, the period of return shall be subject to the period promised by the operator. For products that are not "seven days without reason to return", they should be marked in an obvious place in accordance with the requirements of laws and regulations. Products that do not meet the "seven days without reason" should not be added without authorization, and the due after-sales service obligations should be fulfilled.

(4) Pay attention to prevent false advertisements and improper promotional activities

Article 45 of the "Consumer Rights Protection Law" stipulates that "Consumers whose legitimate rights and interests have been harmed due to the use of false advertisements or other false propaganda methods to provide goods or services, may demand compensation from the operators." The measures stipulate that the sale of goods or services at false "clearance prices," "sale prices," "lowest prices," and "preferential prices," on-site explanations and demonstrations that are falsified or misleading, shall also bear corresponding legal responsibilities. E-commerce operators must not infringe on consumer rights by false advertising and false publicity in order to attract attention for a while in promotional activities.

(5) Issues concerning the establishment of e-commerce certification bodies

The commercial application of data information makes the services of certification agencies a necessity for e-commerce. The core function of the certification body is to issue and manage users' digital certificates. It proposes verified basic information and credit certificates that both parties to the transaction care about, usually including whom, where, and how the transaction is electronically signed. What is its credit status, etc.? Although many regions, departments, and even enterprises have established certification centers, there are many hidden dangers. At present, judicial notarization should intervene in e-commerce and act as a certification agency to avoid legal disputes between certification agencies before the e-commerce law is promulgated.

(6) Protection of intellectual property rights

As online information dissemination and e-commerce transaction methods and channels have become mainstream, intellectual property protection issues in e-commerce activities have also begun to emerge. Domain name cybersquatting and trademark infringement have become ways for some businessmen to seek illegitimate interests; a large number of unlicensed software on the Internet is that there are numerous infringements and disputes such as downloading, using unauthorized works of others, linking to other people's websites, and downloading and reprinting of original works on the Internet. The urgent task of e-commerce legislation is to strengthen the legal awareness of the protection of intellectual property rights in the entire social network, establish and improve the intellectual property legal system in e-commerce, and promote the healthy development of the Internet.

3. Experimental Design and Result Analysis

3.1. Supply Chain Financial Risk Assessment Model

3.1.1. Least-Squares Support Vector Machine Model (LSSVM)

(1) The Basic Idea of LSSVM. The least-squares support vector machine uses the least-squares linear system as the loss function, instead of the quadratic programming method adopted by the traditional support vector machine, and turns the inequality constraint of the traditional support vector machine into an equality constraint. The least-squares method is introduced into the support vector machine (SVM), and the error squared loss function is used as the experience loss of the training set, which converts the programming problem into the problem of solving linear equations, which improves the efficiency and accuracy of the solution [25].

(2) The Basic Principle of LSSVM.

(i) Construction of regression function model

First, given the data set of the calculation sample,

$$G = \{(\chi_a, \gamma_a)\}^n R^N \times R, \quad a = 1, 2, 3, \cdots, n. \quad (1)$$

Among them, χ_a is the input vector, γ_a is the expected output value, and n is the number of samples.

Get the linear regression function according to the basic principles of the support vector machine (SVM) model:

$$f(\chi) = a^m \chi + c. \quad (2)$$

In the formula, a is the weight vector, $a \in R^n$; c is a constant, $c \in R$.

If the training sample set is given $\{(\chi_1, \gamma_1), (\chi_2, \gamma_2), \cdots, (\chi_n, \gamma_n)\}$, $\chi_i \in R$, the regression prediction is a continuous value, and the classification prediction is a discrete value, as shown in Figure 6.

(ii) Construct the optimal linear equation

According to the structural risk minimization theory [26], the least-squares support vector machine model (LSSVM) problem is transformed into a quadratic solution problem:

$$\min j = \frac{\omega^T \omega}{2} + \frac{c^{\sum_{n-1}^l \xi^2}}{2}, \quad (3)$$

Constrained to $\gamma_n = \omega^T(\chi_n) + b + \xi_n, \quad n = 1, 2, 3, \cdots, k. \quad (4)$

In order to calculate the above regression problem, use its dual form, objective function, and constraint conditions to establish a Lagrangian function:

$$L(\omega, b, \xi, a) = \frac{\omega^T \omega}{2} + c \sum_{n=1}^{k} \frac{\xi_n^2}{2} - \sum_{n=1}^{k} a_i \left(\omega^T \phi(\chi_n) - \gamma_n + b + \xi_n \right), \quad (5)$$

where a_n is the Lagrangian weight. The function L should minimize ω, b, ξ and maximize a_n, so the extreme value of the function should satisfy the following equation: $\partial L/\partial \omega = 0$. According to the partial derivative obtained, the calculated regression problem is transformed into a linear equation system to be solved, namely:

$$\begin{bmatrix} 0 & k_v^T \\ k_{v \ \Omega+C^{-1}k} \end{bmatrix} \begin{bmatrix} b \\ a \end{bmatrix} = \begin{bmatrix} 0 \\ \gamma \end{bmatrix},$$
$$l_v = [1, \cdots, 1]^T,$$
$$l_v = [1, \cdots, 1]^T. \quad (6)$$

(iii) Construct the decision function.

Using the least-squares method to calculate the above linear equations, the regression function of the LSSVM model can be obtained as

$$f(\chi) = \sum_{n=1}^{m} a_n \varphi^T(\chi) \varphi(\chi_n) + c. \quad (7)$$

Introduce kernel function

$$k(\chi, \chi_n) = \varphi^T(\chi)\varphi(\chi_n). \quad (8)$$

Then, the calculation model of the least-squares support vector machine (LSSVM) is

$$f(\chi) = \sum_{n=1}^{m} a_n k(\chi, \chi_n) + c. \quad (9)$$

3.1.2. VaR (Value at Risk) Model.
VaR (value at risk) means "value at risk," which refers to the maximum loss that may
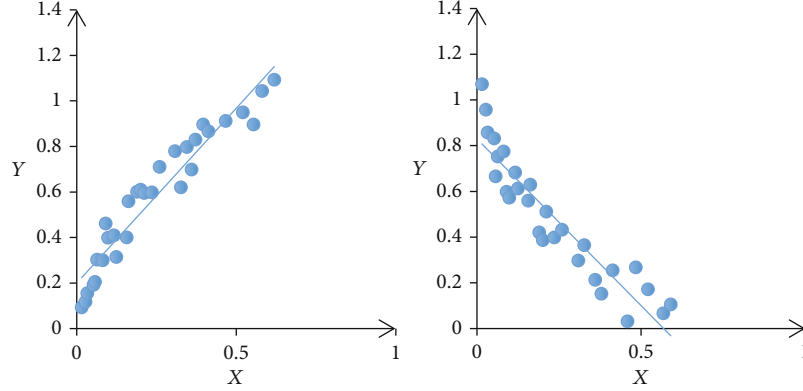
FIGURE 6: Graph of regression and classification functions.

occur in the future under general market conditions and asset price fluctuations in a certain period of time under a certain level of confidence [27]. For example, at a 90% confidence level, the VaR of assets in one day is 500,000 yuan. This means that the probability that the upper limit of asset loss in a day is higher than 500,000 is less than 10%.

(1) The Concept of Value at Risk. The initial investment is W_0, the asset value at the end of the period is W, and the rate of return during the holding period R, so we can get

$$W = W_0(1 + R). \tag{10}$$

Regarding the end-of-period asset value W as a random variable, 100a% of the value is less than W^n, and W^n is called the quantile corresponding to probability a.

When the end value is W^n, the rate of return meets

$$W^n = W_0(1 + R^n). \tag{11}$$

The value at risk is defined as

$$\text{VaR} = W_0 - W^n = -W_0 R^n. \tag{12}$$

Just ask for the quantile under the probability of return on investment and multiply it by the initial investment to calculate the value at risk [28].

(2) Estimation of Value at Risk.

$$\text{VaR}_{t+1}(a) = Z_a\sqrt{u_{t+1}}. \tag{13}$$

Represents the value at risk at a given probability level a from time t to time $t + 1$, Z_a is the ath quantile under the assumed distribution (normal distribution or t distribution), and $\sqrt{u_{t+1}}$ is the one-step predicted value of the conditional standard deviation [29].

(3) Historical Simulation Method. Assuming that there are 100 historical rates of return, VaR is calculated at a significant level of 10%. First, the 100 returns are sorted from small

to large, and the sorted return is expressed as $R_1, R_2, R_3, \cdots, R_{100}$. The quantile corresponding to 10% is $100 \times 10\% = 10$. The first number after sorting is R_{10}, so the historical simulation method is used to estimate the risk. The general formula for value is as follows:

Assuming there are n rates of return, the Mth minimum rate of return

$$\begin{aligned} M &= n \times a, \\ \text{VaR} &= -S \times R_M. \end{aligned} \tag{14}$$

3.1.3. KMV Model. The KMV model is a method created by KMV in San Francisco in 1997 to estimate the default probability of a borrowing company. The model believes that the credit risk of a loan is determined by the market value of the debtor's assets given a given liability.

(1) Overview. On the debt maturity date, if the company's asset market value is higher than the company's debt value (default point), the company's equity value is the difference between the company's asset market value and the debt value; if the company's asset value is lower than the company's debt value at this time, the company sells all of its assets to repay debt, and the value of the equity becomes zero.

(2) Calculation Formula.

$$\left\{ \begin{aligned} E &= V_i N(d_1) - De^{-a} N(d_2) \\ d_1 &= \ln\left(\frac{V_i}{D}\right) + \frac{(r + 0.5\sigma_i^2)}{\sigma_i t} \\ d_2 &= d_1 - \sigma_i t \\ \sigma_E &= \frac{N(d_2)V_i\sigma_i}{E} \end{aligned} \right\}. \tag{15}$$

Among them, E is the company's equity value, V_i is the market value of assets, D is the market value of liabilities, t is the debt maturity, r is the risk-free interest rate, σ_i is the volatility of asset value, and σ_E is the volatility of equity value.

Through the above calculation process, the company's default distance can be calculated:

$$\left\{ \begin{array}{l} DD = \dfrac{[E(V_i) - DP]}{(E(V_i) \times \sigma_i)} \\ DP = SD + 0.5 \times KD \\ P_t = N \times (-DD) \end{array} \right\}. \tag{16}$$

Assuming the probability of occurrence of a given type II error, through the calculation of the KVM model, a certain calculation standard can be obtained to accurately predict the probability of a company that does default in the future, as shown in Figure 7.

3.1.4. Binary Tree Model. Using the binary tree model, first determine the volatility multiplier of the future price of the underlying asset, establish a multiperiod binary tree model, and then construct a binary tree of option value according to the difference between the execution price and market price of the supply chain financial products, so as to obtain the financing interest rate considering the credit risk [30].

(1) The two possibilities of rising and falling are p and $1 - p$, respectively. The risk-neutral pricing method is used here, according to

$$r = p(u - 1) + (1 - p)(d - 1). \tag{17}$$

The upward probability p and the downward probability $1 - p$ can be calculated, where r is the risk-free interest rate.

$$p = e_{u-d}^{T-t} \tag{18}$$

(2) The expected return of each period price of the underlying asset in each period can be obtained through the relevant calculation formula

$$\left\{ \begin{array}{l} G_u = G \times u \\ G_d = G \times d \\ G_{uu} = G_u \times u \\ G_{ud} = G_u \times d \end{array} \right\} \tag{19}$$

(3) Starting from the last period of the binary tree of the underlying asset, compare the price of the underlying asset with the execution price. If the price of the underlying asset is greater than the execution price, then the value q is the difference between the two; if the price of the underlying asset G is less than the execution price D, then the value is 0. Taking q_{uu} as an example, we can get

$$q_{uu} = \max (G_{uu} - D, 0). \tag{20}$$

The general form of the value of each period option can be expressed as

$$q = \max \left(Gu^k d^{n-k} - D, 0 \right). \tag{21}$$

Among them, n is the total number of periods before the option expires, k is the number of periods during which the price of the underlying asset rises, and $n - k$ is the number of periods during which the price of the underlying asset falls.

According to the above formula, the initial value q of the option is obtained:

$$q = \frac{\sum \left\{ n! p^k (1 - p)n - k \max \left[Gu^k dn - k - D, 0 \right] \right\}}{k!(n-k)!(1+r)^n} (k + 0, 1, 2, 3, \cdots n). \tag{22}$$

3.2. E-Commerce Supply Chain Financial Legal Risk Response Measures. According to my country's specific national conditions, implement corresponding e-commerce policies and formulate appropriate laws and regulations, give play to the government's role in the development of e-commerce, conduct macroplanning and guidance on e-commerce, and attach importance to the main r1ole of enterprises in the development of e-commerce. Take active and prudent measures to promote the development of e-commerce, start with the establishment of demonstration projects, and gradually guide them, while complying with existing national laws, regulations, and safety management regulations, strengthen international e-commerce cooperation, and learn from advanced foreign development experience to promote the healthy development of e-commerce in our country.

3.3. Supply Chain Financial Risk Prevention Plan Design. Select multiple companies as the sample, and establish the default group and the normal group, respectively, select the stock closing price data of various types of data of the two samples in 2017, and use the average stock price in November 2017 as the stock price information in the sample. The samples of the default group and the control group are shown in Table 1.

If the daily price changes of stocks obey an independent and dependent distribution, the asset value and asset value volatility calculation formula can be used to calculate the asset value and asset value volatility of these companies, as shown in Table 2.

3.4. The Results of Supply Chain Financial Risk Prevention. Through the statistics and analysis of the above chart data, in order to estimate the most suitable default point in the current market, the long-term debt coefficient generally measured in the market is 0.65, 0.70, 0.75, 0.80, and 0.85 as the default point, derive the KMV model, calculate the default distance of the full sample data using the default point estimation equation, and the results are shown in Table 3.
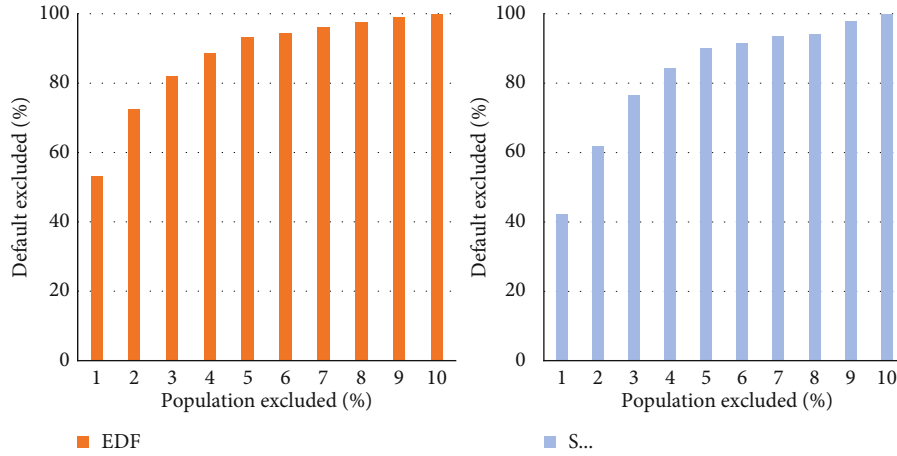
Figure 7: The expected default frequency of the KVM model.

Table 1: Sample company data.

Serial number	Default group			Normal group		
	Company name	Total number of shares (ten thousand shares)	Company equity value (ten thousand yuan)	Company name	Total number of shares (ten thousand shares)	Company equity value (ten thousand yuan)
1	A	1612508	33596327.33	I	2549870	49521038.19
2	B	1392710	59669723.98	J	1687924	36048279.01
3	C	823059	2539710.70	K	132659	5581923.46
4	D	538974	1086714.06	L	3472981	81649792.55
5	E	1169472	66584279.80	N	501273	2106905.20
6	F	604128	3948271.00	M	612458	1685923.78
7	G	1024836	8042396.42	O	2801346	39581781.23
8	H	9915865	90781643.89	P	7064921	80345913.67

Table 2: Asset value and asset value volatility of sample companies.

Company name	Market value (100 million yuan)	Market value volatility (100 million yuan)	Company name	Market value (100 million yuan)	Market value volatility (100 million yuan)
A	78.54	0.46	I	55.41	0.21
B	35.27	0.23	J	63.78	0.25
C	154.32	0.26	K	43.26	0.37
D	89.75	0.49	L	47.89	0.43
E	95.26	0.36	M	71.23	0.37
F	73.20	0.41	N	23.18	0.15
G	156.43	0.56	O	51.08	0.31
H	256.78	0.69	P	36.34	0.18

Through the KMV model, the default distance and default probability of financing companies in the supply chain can be calculated, so as to determine the company's default risk. It can be seen from Table 3 that most of the control group's default distance is greater than that of the default group, indicating that the default risk of the control group is less than the default risk of the default group. This is also more intuitively reflected in Figure 8, which confirms the use of the KVM model. It is effective to measure corporate credit risk.

It can be seen from Table 4 that with the increase of the default point coefficient, the mean difference of the default coefficient gradually increases. When the default point coefficient is 0.65, the average difference between the normal group and the control group default distance is 0.0524; when the default point coefficient is at 0.85, the average difference in default distance between the normal group and the control group is 0.0661. It can be seen from this that when the default point coefficient is 0.85, the KMV model is the most obvious in judging the company's overall default probability.

TABLE 3: Descriptive statistics of default distance of the full sample of companies.

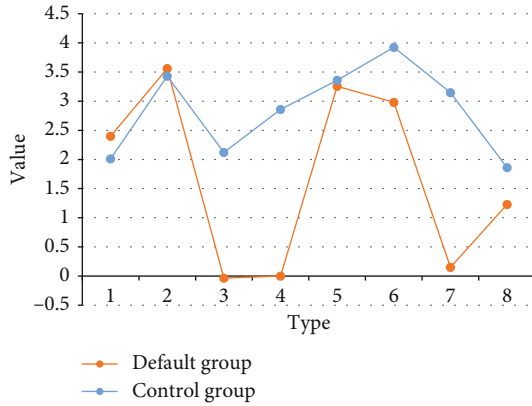|	Point of default	
	Default group	Normal group
Mean	1.9455	2.9156
Standard deviation	1.2365	0.9528
Minimum	-0.0237	0.0156
Max	3.8567	4.302

FIGURE 8: The distance to default calculated based on the point of default.

TABLE 4: Mean difference test.

Point of default	The average value of the default distance		Mean difference
	Default group	Normal group	
DPT1 = STD + 0.65LTD	2.8432	3.1647	0.3201
DPT2 = STD + 0.70LTD	2.8103	3.1456	0.3178
DPT3 = STD + 0.75LTD	2.8012	3.1245	0.3149
DPT4 = STD + 0.80LTD	2.7825	3.0982	0.3137
DPT5 = STD + 0.85LTD	2.7653	3.0724	0.3125

4. Discussion

This paper analyzes the financing modes of traditional supply chain finance and online supply chain finance financing and introduces the least-squares support vector machine (LSSVM) model into the evaluation and calculation of corporate credit risk. Finally, it is simplified to solve the current equation set, which reduces the calculation complexity, and based on the VaR (value at risk) model to propose a credit risk control method, which can optimize and adjust the bank's supply chain business loan structure, effectively control credit risk, and based on the current development of e-commerce, proposes supply chain financial legal risks, and analyzes related types of legal risks that include related risks such as intellectual property rights and institutional certification. The government should provide guidance and other countermeasures to promote the development of e-commerce. Online supply chain finance integrates logistics, capital flow, and information flow, which not only can obtain real-time and accurate warehousing information and improve the efficiency of information flow but also realize the integration of financial services in the entire supply chain and realize the overall supply chain finance. Operation and efficiency are improved, and the bank's costs and operational risks are greatly reduced. Through the case, it can be found that the KMV model is used to predict the risks of the enterprises in the supply chain, and the optimal financing interest rate of the enterprises is determined through the binary tree model. In the credit review and credit evaluation of small- and medium-sized enterprises, the credit records of e-commerce platforms can be used as an important supplementary reference, which makes the information communication between commercial banks and small- and medium-sized enterprises more timely, reducing moral hazard and adverse selection problems. On the one hand, online and information-based operation methods have improved overall operational efficiency and reduced operational costs and risks. Therefore, the optimal financing interest rate based on the option binary tree considering the default risk can effectively control the financial risk of the supply chain.

5. Conclusions

This article considers the four main bodies of financing companies, e-commerce platforms, commercial banks, and logistics companies in online supply chain finance and their mutual relationships, considers risk factors such as credit, market, and operations, and conducts analysis and research. Analyze the financial risk evaluation of the Internet-based B2B e-commerce supply chain, conduct risk identification and risk evaluation of the supply chain financial risk, analyze the factors that cause legal risks regarding e-commerce legal risks, guide e-commerce security management, and give full play to the government's guiding role to make e-commerce more stable development. Based on the analysis of the status quo of supply chain finance, a plan to determine the optimal financing interest rate and risk control using a binary tree is proposed, which enriches related theories and validates the B2B e-commerce supply chain financial risk assessment system and control plan through calculations. Risk prevention and control are practical and effective. It provides a reference for the risk evaluation and control of this model. However, with the continuous development of e-commerce technology, this program will have a certain lag. In the future supply chain financial financing process, the line the risk prevention and control of the upper supply chain also needs further study.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest

Acknowledgments

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