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Research Article

A Risk Feature Recognition Method of Cross-Border Financial Derivatives' Transaction Based on Fuzzy Support Vector Machine

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The traditional identification methods of transaction risk characteristics mostly use the amount of profit and cost to complete the risk assessment. The conflict between the two will lead to low stability. Therefore, the identification method of transaction risk characteristics of transnational financial derivatives is proposed. The fuzzy support vector machine method is used to identify the risk characteristics of cross-border financial derivatives transactions and compensate the errors in the identification process. The possibility index, severity index, and financial risk index of cross-border financial derivatives transaction risk are calculated, and the financial risks are screened and ranked. The distance from risk element to positive ideal solution and negative ideal solution is defined, and the joint identification model of transaction risk of transnational financial derivatives is constructed to realize the identification of transaction risk characteristics. The experimental results show that the designed method has good recognition effect and high recognition performance.

1. Introduction

The promotion of globalization and the implementation of "going global" strategy of enterprises make the transnational operation of financial derivatives show a rapid growth trend in both speed and scale, and the situation of transnational operation is very good [1, 2]. However, with the accelerated pace of internationalization of enterprises, there are also some serious problems, such as huge losses caused by illegal operation of financial derivatives in transnational operation [3, 4]. In recent years, with the rapid development of finance and the influx of a large number of capital into the financial field, the attention of financial derivatives is unprecedented. However, in the context of the rapid development of transnational business finance, there are a series of financial risk events, especially the events of heavy losses in transnational financial derivatives transactions of enterprises in recent years. It once caused an uproar in China and became a hot topic in academia, business, and financial circles [3, 5], which is an epitome of the rapid development of Internet finance. On the one hand, the rapid development of transnational operation finance, and on the other hand, the risks contained in transnational operation finance [6].

Relevant scholars have put forward many studies, and reference [7] puts forward the research on the identification and control of financial risk characteristics in transnational operation. In recent years, with the rapid development of China's economy and the world economy, the relationship between China's economy and the global economy has become closer and closer. While China's social economy has developed rapidly, many domestic enterprises are trying to develop transnational corporations, but it should be noted that, in order to produce, operate, and develop more safely, it is essential for multinational corporations to strengthen their understanding and management of financial risks. Peng et al. [8] put forward the research on the cultivation strategy of transnational operation competitive advantage of JAC automobile group. As one of the representatives of Chinese national automobile brands, JAC Automobile Group's internationalization process and competitive advantage have always been concerned by Chinese enterprise management circles and academic circles. Starting from the current situation of international operation of the group company, this study analyzes the basic problems existing in the international operation of the group company and puts forward the basic strategies for cultivating international competitive advantage from the aspects of positioning, R&D, after-sales service, and brand influence. On the basis of the above research, this study puts forward the risk characteristic identification method of cross-border financial derivatives transactions; identify the risk characteristics of transnational financial derivatives trading and compensate the errors in the process of identification; calculate the possibility index, severity index, and financial risk index of cross-border financial derivatives transaction risk; and screen and rank the financial risk. The distance between the risk element and the positive ideal solution and the negative ideal solution is defined, and the joint risk identification model of transnational financial derivatives is constructed to realize the characteristic identification of transaction risks. Through the experimental verification, the designed method can effectively reduce the error generated when the transaction risk feature recognition; the data loss under the method is minimum; and the identification management data identification query process is more real, can reduce the risk coefficient to a minimum, and has a good effect.

2. Identification Method of Transaction Risk Characteristics considering Basic Attribute Mathematical Model

The identification of risk characteristics of cross-border financial derivatives transactions requires the statistics of relevant parameters of various financial derivatives. Its theoretical basis is to: establish a security evaluation management system for cross-border financial derivatives transactions, comprehensively evaluate the major risks in the transaction process, take the evaluation conclusions as an important basis for determining the identification of characteristics, and implement the dynamic management of transaction security risks; prepare special plans and emergency plans for major risks and ensure their smooth implementation; and strengthen risk control in all links of preliminary work and carry out continuous optimization in the planning stage to avoid sensitive areas with high possibility of risk. The feasibility study report needs to conduct special analysis and evaluation on issues related to the safety and quality of transactions and put forward countermeasures. Using the basic attribute mathematical model, the risk of financial derivatives is identified [9]. The characteristics of risk sharing are as follows:

2.1. The Diffusion Speed Is Fast and the Risk Is Difficult to Control. Financial derivatives trading has greater information technology support. Information transmission is not limited by time and region. Rapid and efficient remote processing and data transmission functions can be used to greatly improve the transmission efficiency of financial elements and information. However, it will also accelerate the spread of financial derivatives trading risks, prolong the time to prevent and resolve financial derivatives trading risks, and the information of both parties is asymmetric. The spread of information is no longer limited by time and space, so it is difficult to correct it immediately, resulting in the failure to control the risks in time.

2.2. The Risk Effect Is Enlarged and the Harm Is Wider. Most consumers of financial derivatives transactions are small, medium-sized, and micro enterprises and ordinary people in the financial market. The implied technical risk of financial derivatives transactions will also make their credit level have a higher risk probability. Financial derivatives trading is a credit network established by multilateral credit. Network nodes interact and penetrate each other, and the effect of physical isolation is not strong. Therefore, the spread of risk is wider, the probability of risk infection and cross infection is greatly increased, the ways of infection are more diversified, and the degree and scope of financial risk are directly intensified and amplified. If financial derivatives trading risk breaks out, the risk will increase its influence and destructive power in the form of expansion effect, and even lead to serious group events, affect the order and stability of the national financial system, and then affect the safety of the whole economy.

2.3. High Virtual Level and Difficult Risk Supervision. Financial derivatives transactions are mainly completed online, a small amount online and offline. Products and services are rarely limited by time and space, with short transaction time, high speed, and high frequency. The virtuality and openness of financial derivatives transactions lead to information asymmetry in supervision. It is difficult for financial regulatory authorities to fully and accurately understand the actual situation of regulatory objects, fully control the possible financial derivatives transaction risks, and it is difficult to implement financial risk prevention and supervision. The mixed operation mode is a conventional form of financial derivatives trading, while the mixed operation mode of financial derivatives trading is difficult to take more substantive prevention and control measures in financial supervision, resulting in a "regulatory vacuum."

The specific steps are as follows:

Step 1: set δ_j as the conflict coefficient between the profit volume attribute and the cost volume attribute of the j cross-border financial derivatives transaction form [10, 11] and establish a matrix of different cross-border financial derivatives transaction forms:

$$X = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1p} \\ x_{21} & x_{22} & \cdots & x_{2p} \\ \vdots & \vdots & \vdots & \vdots \\ x_{n1} & x_{n2} & \cdots & x_{np} \end{bmatrix}, \quad (1)$$

where x_{np} is the market value on the pth day of the n type of cross-border financial derivatives transaction requiring risk feature identification.

Step 2: calculate the growth coefficient of the second form of cross-border financial derivatives trading by using the following formula:

$$\eta_j = \frac{x_{np} \times \sqrt{n^2 - 1}}{\delta_n}. \quad (2)$$

Step 3: the following formula can be used to calculate the identification error coefficient of risk characteristics of cross-border financial derivatives transactions:

$$\varphi_j = \frac{X_{jk}\left\{f_{j1} \times 1 + f_{j2} \times (1+2) + \cdots + f_{jp} \times [(p-1)+j]\right\}}{2 \times \left(e_{j1} + e_{j2} + \cdots + e_{jp}\right) \times T \times \eta_j}, \quad (3)$$

where f_{jk} represents the weight coefficient corresponding to the transaction form of transnational financial derivatives, e_{jk} represents the yield parameter of corresponding financial derivatives, and T represents the identification time of risk characteristics of transnational financial derivatives.

In the process of risk analysis and identification of financial derivatives transactions in transnational operations, it is necessary to count relevant data of various forms of financial derivatives [12] and use basic attribute mathematical models to identify financial derivatives transactions in transnational operations. Assuming that in the process of identification, the conflict between the attributes of profit and cost will lead to the defect of reducing the stability of the identification model, leading to the poor accuracy of risk analysis and mining of financial derivative trading of transnational operations [13, 14]. According to formula (2), it can be known that once the conflict coefficient between the profit and cost attributes of financial derivatives increases, the growth coefficient of the j type of transnational financial derivatives transaction will decrease. According to formula (3), it can be known that the decrease of the growth coefficient of the j type of transnational financial derivatives transaction form will lead to an increase in the error coefficient of identification of risk characteristics of transnational financial derivatives transactions. It is of great significance to the stable operation and healthy development of the financial system to master the identification method of transaction risk characteristics of the mathematical model of basic attributes.

3. Risk Analysis and Identification Method of Cross-Border Financial Derivatives' Transactions

The risk analysis and identification of transnational financial derivatives transactions is the core issue of financial research. The basis for researching the identification method of risk characteristics of financial derivatives transactions in transnational operations is that: using traditional algorithms to analyze and identify risks in financial derivatives transactions in transnational operations cannot avoid the defect of poor stability of the identification model caused by the conflict between profit and cost attributes, resulting in a decrease in the accuracy of risk analysis and identification of cross-border financial derivatives transactions. Therefore, a method for identifying risk characteristics of transnational financial derivatives transactions is proposed. The advantage of this method is that most of the management data collected by the crawler can be identified as mutual information, the mutual information can be sorted and identified, and the part of mutual information can be identified to determine the errors generated in the identification of transaction risk characteristics; it can effectively take precise control of financial risks and minimize the risk coefficient.

3.1. A Fuzzy Support Vector Machine Recognition Model Is Established

3.1. A Fuzzy Support Vector Machine Recognition Model Is Established. The risk analysis and identification of cross-border financial derivatives transactions mainly includes the establishment of fuzzy support vector machine identification model and compensation for the errors caused in the identification process [15]. The quality of the identification model is closely related to the identification results of the risk characteristics of transnational financial derivatives transactions. Using the fuzzy support vector machine method to identify the risk characteristics of transnational financial derivatives transactions, it is necessary to establish a mapping relationship for all financial derivatives characteristics and obtain an ideal classification plane through operations, so as to establish a fuzzy support vector machine recognition model.

According to the relevant data of all cross-border financial derivatives transactions, the correlation between different financial derivatives can be described. The formula is as follows:

$$L(y,z) = e_1 L_q + e_2 L_S, \quad (4)$$

where L_q represents polynomial kernel function of data related to financial derivatives, and L_S represents basis function. The above formula needs to comply with $e_1 + e_2 = 1$.

According to the relevant theory of kernel function, it can be known that the result obtained by summing the kernel function conforming to Mercer's condition still conforms to Mercer's condition [16, 17]. Optimizing the parameters related to cross-border financial derivatives transactions can improve the training ability and generalization ability of kernel function [18].

Assuming that the sample is a linear data set, the classification plane can be calculated by using the following formula:

$$lt_j + n = 0, \quad (5)$$

where l represents the weight coefficient of relevant parameters of financial derivatives, and n represents the measurement standard of sample classification. Using this classification plane, the samples in the linear data set can be effectively classified [19, 20]. Assuming that the sample is a nonlinear data set, the above method cannot be used for classification, and the relaxation coefficient ε_j and penalty coefficient ϖ need to be introduced, then the sample data can be classified by using the following formula:

$$\min \gamma\left(t_j\right) = \frac{1}{2}|l|^2 \sum_{j=1}^{p} \varepsilon_j, t_j\left(ls_j + n\right) - 1 + \varpi_j. \quad (6)$$

Assuming that the sample data set is nonlinear, the nonlinear function $\alpha = \varphi(s_j)$ needs to be used to map the sample data s_j to obtain the linear feature space, and the ideal classification plane can be obtained in the feature space to realize the recognition decision.

The classification plane of the linear feature space can be described by the following formula:

$$l\varphi\left(t_j\right) + n = 0. \tag{7}$$

The decision function of the linear feature space is as follows:

$$g\left(s_j\right) = \operatorname{sign}\left(l\gamma\left(s_j\right) + n\right). \tag{8}$$

According to the relevant theory of fuzzy support vector machine and the above decision function, the fuzzy support vector machine recognition model can be established by using the following formula:

$$\max M_E = \sum_{j=1}^{m} \chi_j - \frac{1}{2}\sum_{j=1}^{p}\sum_{k=1}^{p} \chi_j\chi_k s_j s_k L\left(t_j, t_k\right), \tag{9}$$

where $0 < \chi_j < \varpi, \sum_{j=1}^{p} \chi_j s_j = 0$.

Risk analysis and identification of transnational financial derivatives transaction is the core of financial research. Study of international financial derivatives trading on the basis of risk identification method is as follows. The traditional algorithm is used to identify the risk analysis of international financial derivatives trading, is inevitable because LiRunLiang attributes and the cost of the conflict caused by the identification model of the defects of poor stability lead to international financial derivatives risk analysis to identify the accuracy of the reduced. Therefore, a risk feature identification method for transnational financial derivatives is proposed. The advantage of this method is that most of the management data collected by crawler can be identified as mutual information, which can sort out and identify the mutual information and identify the errors generated during the characteristic recognition of transaction risks. This method can effectively take precise control of financial risks and minimize the risk coefficient.

3.2. Error Compensation for Risk Characteristic Identification of Financial Derivatives. In the process of using fuzzy support vector machine recognition model to identify the risk characteristics of cross-border financial derivatives transactions, there will be a certain degree of error [21, 22]. Therefore, these errors need to be compensated to accurately identify the risk characteristics of cross-border financial derivatives transactions. Through the fuzzy support vector machine recognition model, the initial data sequence of financial derivatives can be obtained as follows:

$$Z^{(0)}(v) = \left\{z^0(1), z^0(2), \ldots, z^0(q)\right\}. \tag{10}$$

The error parameters can be obtained by using the following formula:

$$\eta = \left(z^{(0)}(1) - \frac{w}{c}\right)g^c. \tag{11}$$

The sample data of cross-border financial derivatives transactions are divided into q states, and the state transfer of sample data can be realized through the following formula:

$$\lambda_k = \left[\lambda_{1k}, \lambda_{2k}\right], \lambda_{jk} \in \lambda_k, k = 1, 2, \ldots, q, \tag{12}$$

where

$$\begin{aligned} \lambda_{1k} &= A(v) - C_k, \\ \lambda_{2k} &= A(v) - C_k, \end{aligned} \tag{13}$$

where the values of λ_{1k} and λ_{2k} will change according to the trend in cross-border financial derivatives trading.

The probability of error in the process of risk analysis and identification of cross-border financial derivatives transactions can be obtained through the following formula:

$$P_{kl}(m) = \frac{P_{kl}(m)}{P_k}. \tag{14}$$

According to the embedding relationship between the sample data state and probability, the relationship error of the identification management entity is output, as shown in Figure 1:

Thus, it can obtain the matrix composed of errors generated in the process of risk analysis and identification of cross-border financial derivatives transactions:

$$P(m) = \begin{bmatrix} P_{11}(m) & P_{12}(m) & \cdots & P_{1q}(m) \\ P_{21}(m) & P_{22}(m) & \cdots & P_{2q}(m) \\ \vdots & \vdots & \vdots & \vdots \\ P_{q1}(m) & P_{q2}(m) & \cdots & P_{qq}(m) \end{bmatrix} \times \lambda_k \times \lambda_l, \tag{15}$$

where $P_{qq}(m)$ represents the change coefficient of cross-border financial derivatives transaction data, λ_k represents the transformation coefficient after m iteration, and λ_l represents the number of cross-border financial derivatives transaction data sets.

According to the above matrix, the errors generated in the risk analysis and identification of cross-border financial derivatives transactions can be obtained through calculation, so as to compensate [23]. In the way described above, the fuzzy support vector machine method can be used to identify the risks in the transnational operation of financial derivatives transactions, and the error compensation method can be used to compensate the errors generated in the identification process, so as to complete the error compensation of financial derivatives risk feature identification.

3.3. Design of Identification Model for Cross-Border Financial Derivatives' Transactions. The design environment of the cross-border financial derivatives transaction identification model is the process of evaluating all the impacts and possibilities of the identified risks and ranking the possible impacts of the risks on the project objectives. Its function and purpose are to identify a specific risk and give a risk response plan, and at the same time, these risks are arranged in order according to the impact of various risks on the project objectives. The overall risk level of the project is determined by comparing each risk value. The first is to screen and sort the transaction risks of cross-border financial derivatives, and the second is to identify the risk of cross-border financial derivatives transactions.

3.3.1. Screening and Ranking the Transaction Risks of Financial Derivatives in Transnational Operation. According to the possibility index, severity index, and financial risk index [24], the transaction risk of transnational financial derivatives is screened and ranked [25]. The possibility index of transaction risk is usually used to characterize the risk of transnational financial derivatives transaction, and the formula is as follows:

$$\delta_{\text{Like}}(S) = \max\{P_r(S > S_{\max}), P_r(S < S_{\min})\}, \tag{16}$$

where $P_r(\cdot)$ represents the probability value, and S represents the trading node of cross-border financial derivatives.

The formula for amplitude and severity of cross-border financial derivatives trading nodes [26] is as follows:

$$\delta_{SevE}(S) = \max\left\{\frac{|S| - |S_{\max}|}{|S_{\max}|}, \frac{|S| - |S_{\min}|}{|S_{\min}|}\right\}. \tag{17}$$

In order to reduce the solution scale of joint identification of transaction risks of financial derivatives in transnational operation, the analytical hierarchy process is applied to the screening and ranking of transaction risks of financial derivatives in transnational operation [27] and screening and deleting the transaction risks that have little impact on financial derivatives.

The financial risk probability of cross-border financial derivatives transactions is defined as:

$$\alpha = \frac{P}{P_{\max}}, \tag{18}$$

where $P_{\max}$ represents the financial risk limit of transnational financial derivatives transactions, P represents the real-time financial risk of transnational financial derivatives transactions, and α represents the financial risk rate.

For multinational operations, when screening and ranking transaction risks, considering the possible probability of each expected financial risk and the severity of risk consequences, multiply the probability of financial risk in multinational financial derivatives transactions with real-time financial risk [28], the calculation results are taken as the screening and ranking index D_{RI} for the transaction risk of financial derivatives in transnational operation, which is expressed as:

$$D_{\text{RI}} = P \times \alpha. \tag{19}$$

The screening and ranking process of cross-border financial derivatives transaction risks is shown in Figure 2.

In order to reduce the solution scale of joint identification of transnational financial derivatives transaction risk, the possibility index, severity index, and financial risk index

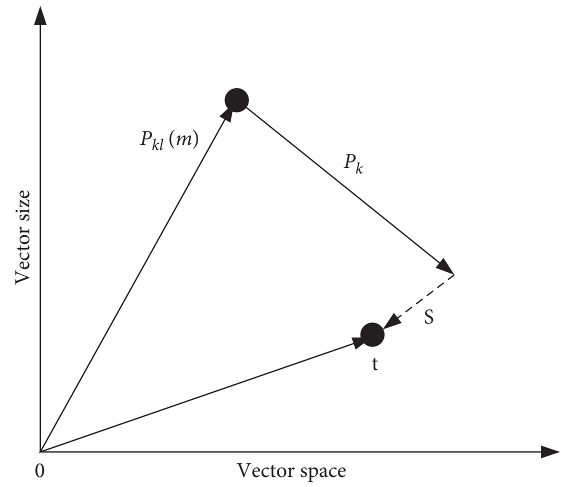

Figure 1: Identifying the output relationship error of the management entity.

of transnational financial derivatives transaction risk are calculated by analytic hierarchy process, and the transaction risk of transnational financial derivatives is screened and sorted.

3.3.2. Identifying the Risk of Financial Derivatives' Trading in Transnational Operation. Aiming at the statistical problem of the distance between the attributes of the joint identification indicators of the transaction risk of financial derivatives in transnational operation, the analytic hierarchy process is adopted to avoid the dimensionalization problem between the attributes of different identification indicators [7, 8, 29] and eliminate the mutual interference between different identification indicators. It is assumed that there is a multi-attribute vector $x = (x_1, x_2, \ldots, x_p)$ of the identification indicators, and its mean value is $\mu = (\mu_1, \mu_2, \ldots, \mu_p)$, s represents the covariance matrix, then the Mahalanobis distance of the multi-attribute vector of the identification index is

$$M(x) = \sqrt{(x - \mu)^T s^{-1} (x - \mu)}. \tag{20}$$

Let $A_i = (a_{i1}^1, a_{i2}^1, a_{i3}^1, a_{i4}^1, a_{i5}^1)$ represent the index value corresponding to the ith transaction risk element after accurate processing, $B^+ = \{b_1^+, b_2^+, b_3^+, b_4^+, b_5^+\}$ represent the positive ideal solution, $B^- = \{b_1^-, b_2^-, b_3^-, b_4^-, b_5^-\}$ represent the negative ideal solution, and s^{-1} represent the inverse matrix of A covariance matrix of transaction risk sample. Since s^{-1} is invariant to all linear transformations, it will not be affected by the dimensioning of identification indicators, and the correlation between different identification indicator attributes can be eliminated [30]. The distance from the ith transaction risk element B^+ to B^- sum is defined as

$$M(A_i, B^+) = \sqrt{(A_i - B^+)^{\text{T}} s^{-1} (A_i - B^+)}, \tag{21}$$

$$M(A_i, B^-) = \sqrt{(A_i - B^-)^T s^{-1} (A_i - B^-)}. \tag{22}$$

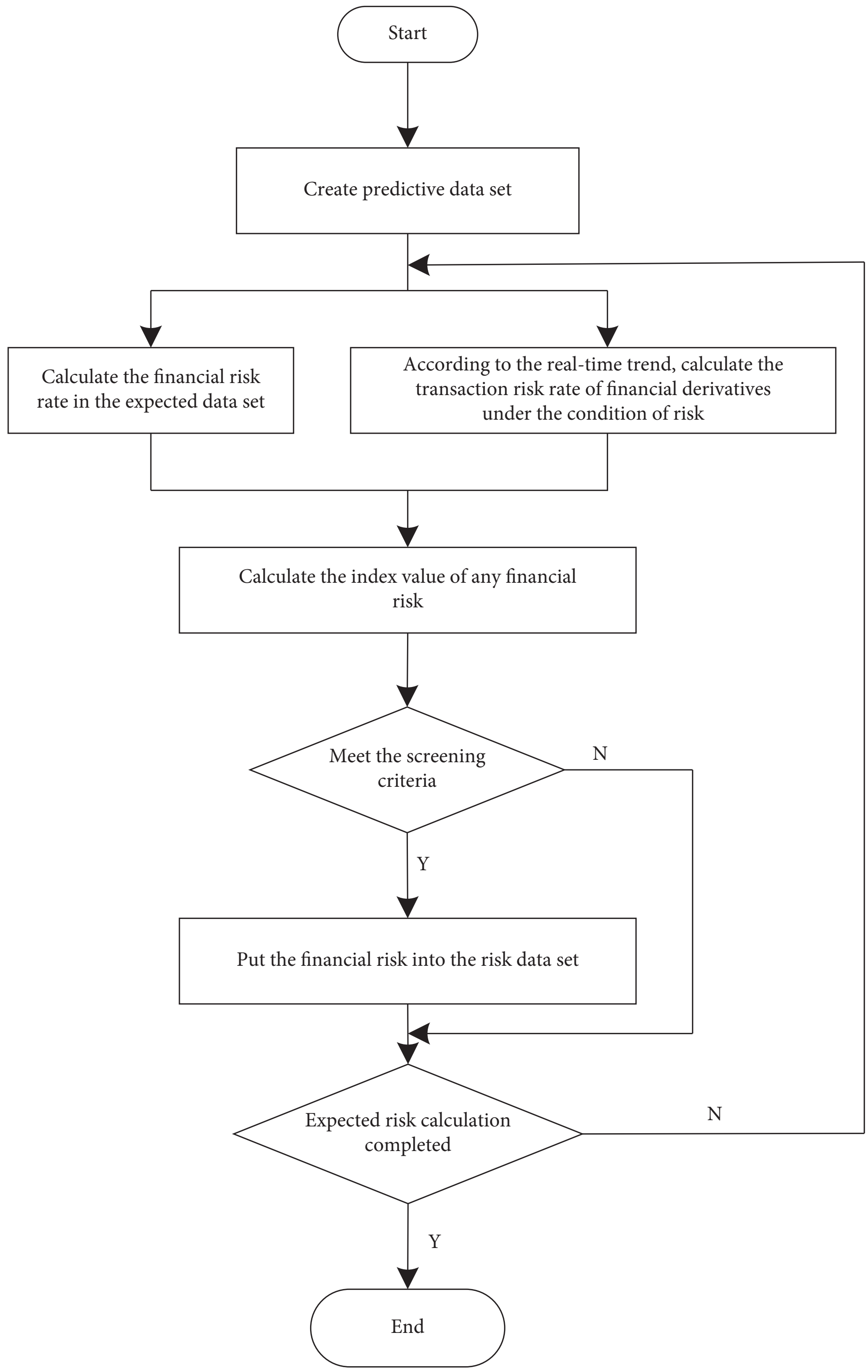

Figure 2: Screening and ranking process of transaction risks of financial derivatives in transnational operation.

Assuming that the closeness of the i transaction risk element is c_i, the formula is

$$c_i = \frac{M(A_i, B^-)}{M(A_i, B^-) + M(A_i, B^+)}. \tag{23}$$

Based on the above analysis, we can design the joint identification steps of transaction risks of financial derivatives in transnational operation as follows:

Step 1: transform the transaction risk feature recognition language given by experts into trapezoidal fuzzy data [31], calculate the fuzzy decision matrix of each transaction risk t_{ij}, and obtain the joint recognition matrix of transaction risk of transnational financial derivatives;

Step 2: after calculating the matrix of each transaction risk, calculate the risk matrix of each transaction risk element to form a group decision identification matrix of financial risk [32, 33];

Step 3: normalize the group decision recognition matrix of financial risk and deal with it accurately.

Step 4: by calculating the covariance matrix of transaction risk decision matrix, the positive ideal solution and negative ideal solution of transnational financial derivatives transaction under financial risk are found out;

Step 5: sort the transaction risk elements to realize the joint identification of transaction risks of financial derivatives in transnational operation.

To sum up, the Mahalanobis distance of the multi-attribute vector of the financial risk characteristic identification index is used to define the distance from the risk element to the positive ideal solution and the negative ideal solution. By calculating the closeness of the risk element of cross-border financial derivatives trading, the joint risk identification model of cross-border financial derivatives trading is constructed to realize the risk characteristic identification of cross-border financial derivatives trading.

4. Experimental Analysis

In order to verify the effectiveness and feasibility of the risk characteristic identification method of cross-border financial derivatives transactions, experiments are set up to verify it. The initial data of transaction risk assessment are sorted, samples with different risk levels are selected, and sample data are obtained. During the experiment, the sample data need to be divided into a training data set and a test data set, wherein the training data set includes 5000 training samples, and the test data set includes 1000 test samples.

According to the measurement formed in the dynamic management data, the management data are defined to identify the correlation of query events. The numerical relationship of mutual information parameters can be expressed as:

$$I(x,y) = \frac{H(x) + H(y)}{H(x,y)}, \tag{24}$$

where $I(x,y)$ represents mutual information parameter, $H(x)$ represents information measurement function, $H(y)$ represents mutual information embedding function, and $H(x,y)$ represents joint entropy of management data. According to the data management program in the information system, the joint entropy numerical relationship in the above numerical relationship is defined. The numerical relationship can be expressed as:

$$H(x,y) = \frac{-\sum p(x,y)}{\log p(x,y)}, \tag{25}$$

where $p(x,y)$ represents the correlation function of mutual information, and the meaning of other parameters remains unchanged. According to the mutual information numerical relationship defined above, the mutual information in the process of reptile data collection is sorted. The actual mutual information results are shown in Figure 3.

According to the amount of management information collected by the crawler, according to the above-defined mutual information numerical relationship, the mutual information results are correspondingly sorted. From the results shown in Figure 3, it can be seen that most of the management data collected by the crawler can be identified as the form of mutual information. To determine the error generated in the identification of transaction risk characteristics, sort out the above-mentioned identification mutual information, identify this part of the mutual information, and select the method of references [7] and [8] and the designed method to participate in the test.

Under the above mutual information of identification management data, the rate of dynamic management data identification query under the theoretical state of financial information system is defined, and the numerical relationship can be expressed as follows:

$$s = \frac{D}{T}, \tag{26}$$

where s represents the identification query rate, D represents the identification mutual information obtained from the above measurement, and T represents the identification query time. Taking the data identification management rate obtained from the above definition as the standard value, the three methods to identify the processing process are called, the identification mutual information obtained above is simulated, the identification query rate generated by the identification process in the upper computer is outputted, and the data inflow speed of the three methods are unified to identify the query process according to the processing speed of the data stream. The dynamic management data topology is decomposed into sub-topologies, as shown in Figure 4:

In the management data subtopology structure shown in Figure 4, the node position is used as the identification starting point of the identification query instruction, and the identification query rate is determined according to the above, and three methods are controlled to query and identify the above dynamic management data, and the identification processing time is controlled to be 10 s. Under the condition of recognition rate, the original data volume generated by the dynamic management data at different processing time points is determined, the data volume is used as the standard, the data volume output is counted by the three methods, and the numerical difference is used as the recognition query command data loss generated during the recognition process. The data loss results generated in the identification process of the three methods are shown in Figure 5:

According to the identification query rate defined above, after dividing the dynamic management data into data sub-topology structures of different data flow sizes, three methods to identify the data in the structure are controlled, and the output data are identified according to the data

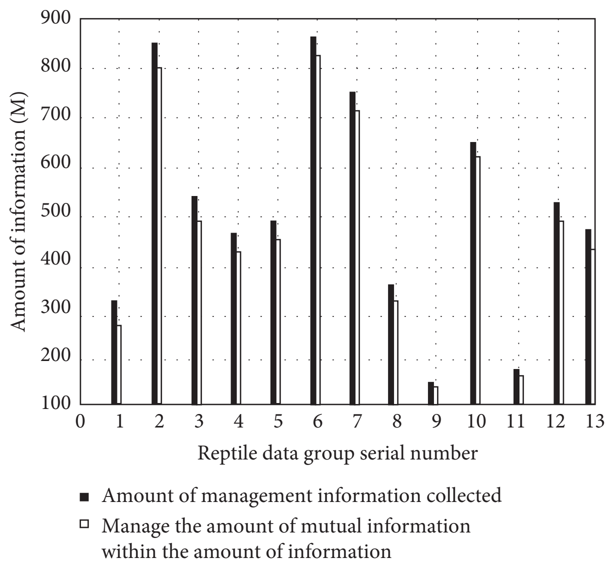

Figure 3: Results of identifying mutual information.

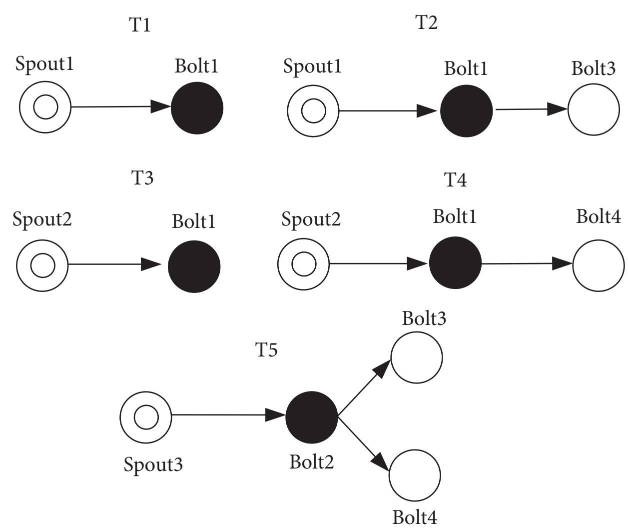

Figure 4: Management data subtopology after decomposition.

volume of each sub-topology structure and the identification output data. The numerical difference between the quantities is used as the final identification data loss result. From the results shown in Figure 5, it can be seen that in the divided sub-topology, the method of reference [7] produces the most loss of identification data. When simulating the identification query data in the T5 sub-topology, the amount of data loss is 11 M, which is the largest amount of lost data. The method of reference [8] produces a loss of 10 M in the same sub-topology structure, and the actual identification data loss is larger. Compared with the two identification methods involved in the test, this identification method produces the smallest amount of data loss in the simulation process, and the identification management data identification query process is more realistic.

Based on the MATLAB platform, the methods in this study, references [7, 8] are compared for risk control. The results are shown in Figure 6.

Figure 6 shows the fluctuation of yield of cross-border financial derivatives trading index in recent 10 years. In the comparison of 3562 measurement indexes, the breakthrough times of reference [7] method and reference [8] method are 58 and 62, respectively, and the breakthrough rates are 1.3685% and 1.4896%. The number of breakthroughs using this method is 29, and the breakthrough rate is 0.5267%, which is significantly better than the other two methods. It can effectively take accurate control of financial risk and minimize the risk coefficient.

To sum up, the designed method for identifying the risk characteristics of financial derivatives transactions in

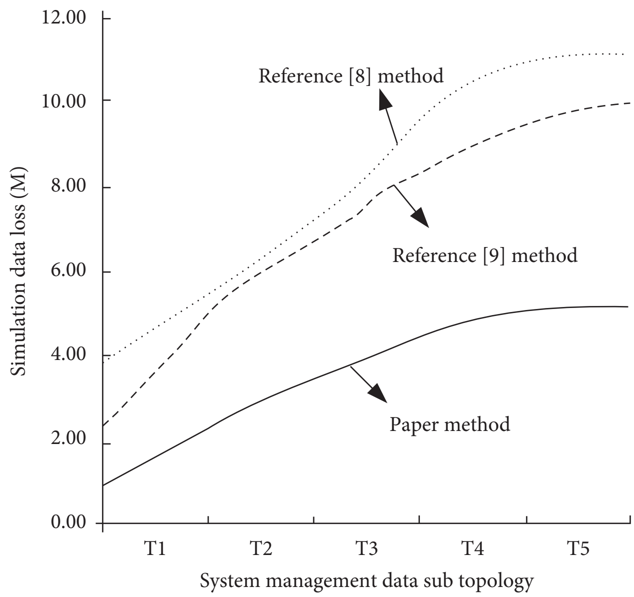

Figure 5: Result of identifying data loss.

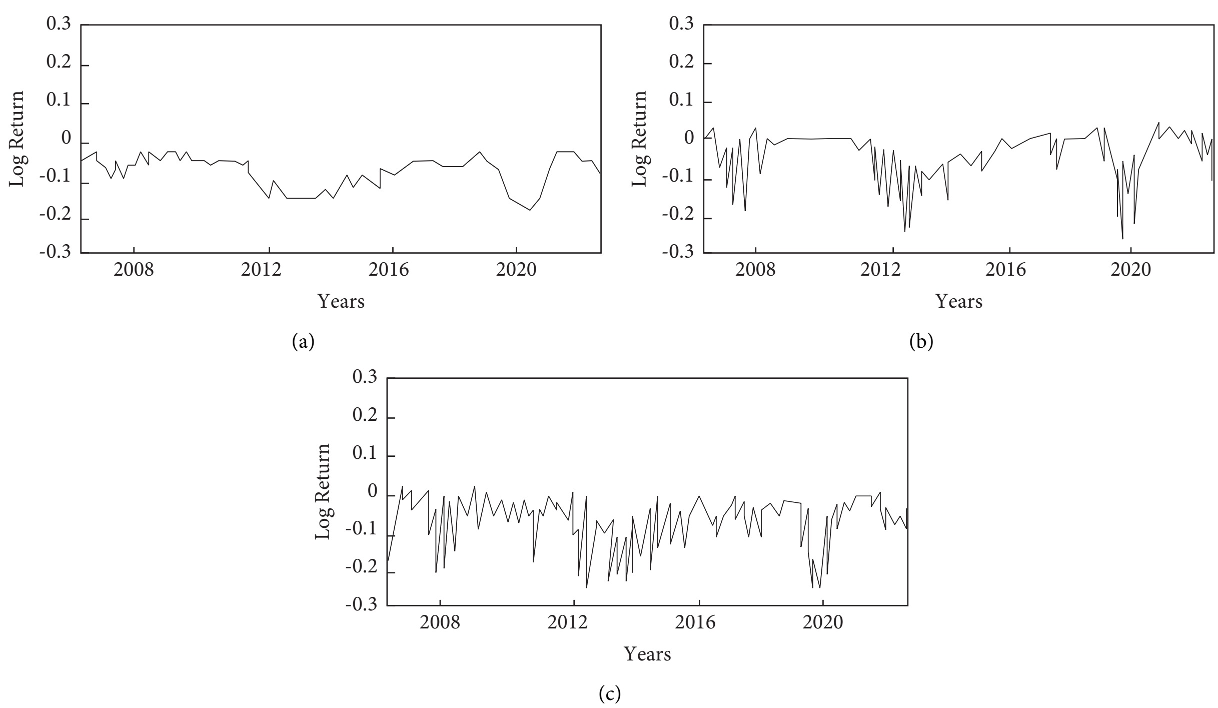

Figure 6: Comparison results of risk control. (a) Reference [8] method. (b) Reference [8] method. (c) Paper method.

transnational operations is based on the fact that most of the management data collected by the crawler can be identified as the form of mutual information. Errors are generated in the identification of transaction risk characteristics; this identification method has the smallest amount of data loss in the simulation process; the identification and query process of identification management data are more realistic, and the number of breakthroughs in the designed identification method is small, which can effectively take precise control of financial risks. Minimize the risk factor.

5. Conclusion

In accordance with the working idea of orderly promotion and unified launch, integrate the relationship between business and system construction in the financial information system, follow the concept of covering a wide range of business and continuously deepening application, and refine various businesses in the financial information system into different management directions. In order to achieve high-quality identification of risk characteristics of cross-border financial derivatives transactions, the simulation management data identification and query process can provide guidance for enhancing the controllability of financial derivatives trading business. The risk characteristic identification method of cross-border financial derivatives transaction is designed, and the following conclusions are obtained:

(1) The designed method can determine the error generated in the identification of transaction risk characteristics
(2) The amount of data loss generated in the simulation process is the smallest, and the identification management data identification and query process is more real
(3) The designed identification method has a small number of breakthroughs, which can effectively take accurate control of financial risks, have good results, and minimize the risk coefficient

Data Availability

The raw data used to support the findings of this article can be obtained from the author upon request.

Conflicts of Interest

The author declares no conflicts of interest regarding this work.

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