Quantification and contribution analysis of financial management risks based on AHP-XGBOOST algorithm

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Abstract. The chemical industry is an important industry that supports the development of the national economy and is closely related to people's lives. With the impact of COVID-19, the continuous changes in the market economy, the deepening of economic globalization, and the increasing optimization of energy companies, the current chemical companies are experiencing volatile development. In order to effectively cope with the unstable external environment, resist market risks, and ensure the sustainable and healthy development of enterprises with high-quality capital management, chemical companies should pay attention to internal management and improve corporate financial management. In this paper, a new measurement method is proposed for financial management risk, and by combining the Analytic Hierarchy Process (AHP) and the Extreme Gradient Boosting (XGBOOST), the index system of financial management risk coefficient is constructed first, and the risk factors that will have an impact on financial management in the macro environment are selected, and the index system of factors affecting financial management risk is constructed to analyze the degree of influence of nine elements in the macro environment on the financial management risk of chemical enterprises The results show that this paper quantifies and contributes to the analysis of macro factors affecting the financial management risks of enterprises, which helps enterprises to predict and measure their own financial management risks more accurately, helps them to respond to and prevent financial management risks effectively in a timely manner, enriches the response methods of enterprises to deal with the influence of macro factors on their own financial management, and better promotes enterprises to achieve their strategic goals. The quantitative analysis model constructed in this paper is widely applicable and has a specific guiding significance for enterprises to apply it in practice.

Keywords: AHP; XGBOOST; Financial Management Risk; Contribution Analysis.

1. Introduction

Chemical industry raw material market prices change quickly and unpredictably, and the impact of market risk on enterprises is significant. The macro-environment has a broad and complex range of factors affecting enterprises, which makes it difficult for chemical enterprises to keep up with the times; in addition, most chemical enterprises themselves have not established a perfect financial management system and cannot respond to market development and competitive environment in a timely and effective manner, and fall into financial management risk. At present, there are few studies in this area, through the study of the elements affecting the financial management risks of enterprises, to help enterprises carry out financial management work, to promote business leaders to more comprehensively and systematically grasp the operation of enterprises, to formulate the corresponding development of strategic planning, to avoid business risks.

Fan [1] through the literature research method to explain the importance of financial management and the factors that affect the financial risk of enterprises based on the internal personnel, decision-making, and capital structure aspects of the enterprise, taking into account the impact of some external factors on the financial risk of enterprises as well, to explore the role of the above four elements on the impact of financial risk mechanism, and finally give the enterprise to establish financial management risk prevention and control mechanism ideas. Wei [2], in his study, pointed out the causes of risks arising from financial management of state-owned enterprises through literature research method in terms of personnel, management subjects, risk control system, information and

control system. In response to these aspects, we propose methods to improve the internal management system and system of enterprises by combining information-based financial management tools, so as to improve the level of financial management work of state-owned enterprises and the effectiveness of financial management risk prevention. Zhou [3] proposed a model for predicting the risk of financial fraud in listed companies using machine learning methods, which mainly selected the financial indicators of the company and has positive implications for identifying financial fraud in listed companies and predicting the risk of corporate financial management. Fan [4] used the literature research method, firstly, analyzed the connotation of financial risk management, secondly, discussed in depth the current situation of financial risk management and the main problems faced by chemical enterprises, and gave the development direction and solution suggestions in terms of improving employees' awareness of risk prevention and improving the internal institutional mechanism of enterprises. Yu [5] used hierarchical analysis to select financial indicators that can reflect the tax risk status, constructed a model and judgment matrix, and finally determined the degree of influence of each factor on enterprise tax risk by consistency test, and successfully constructed an early warning mechanism for enterprise tax risk.

To conclude, previous literature has not combined XGBOOST and AHP for quantitative assessment and analysis of indicators affecting financial management and has less considered the impact of macro elements on financial management risk. Given this, this paper selects financial and non-financial data of Yuntianhua Co. from 2009 to 2019, as well as some macro data. Firstly, the financial management risk of Yuntianhua is calculated by using AHP. Then XGBOOST is used to conduct a contribution analysis to explore each macro factor's influence on the enterprise's financial management risk. This paper constructs a new index for enterprise financial management risk measurement. Meanwhile, analyzing the impact of macro factors on enterprises helps chemical enterprises take timely actions to prevent and control risks, leading to improved competitiveness.

2. Financial management risk coefficient and influence factor system construction

2.1 Index system of financial management risk factor

According to the available literature, financial indicators, corporate governance, and social responsibility will impact financial management risk. In this paper, we use 12 indicators to quantify the financial management risk of enterprises: ① The current ratio and total asset turnover ratio reflect the capital turnover of enterprises and affect the solvency of enterprises; ② The asset-liability ratio is proportional to the company's cash flow income, which can directly reflect the financial situation of enterprises; ③ Return on equity can reflect the relationship between investment and income, reflecting the ability of the enterprise's own capital to obtain net income; ④ Operating profit margin ratio and operating income cash flow ratio can measure the efficiency of the enterprise's operations, reflecting the ability of the enterprise to obtain profits through operations; ⑤ Accounts receivable turnover rate reflects the status of the enterprise to occupy supplier funds; ⑥ Proportion of net cash flow from financing activities reflects the adequacy of external cash sources of the enterprise; ⑦ The operating income growth rate and earnings per share growth rate can measure a company's growth status, reflecting its business quality and market competitiveness; ⑧ corporate governance index can reflect the level of corporate governance; ⑨ Corporate commitment to social responsibility affects its sustainability In summary, the index system of financial management risk coefficient constructed in this paper is shown in Table 1.

Table 1. Financial Management Risk Coefficient and Influence Factor System

Tier 1 Indicators	Tier 2 Indicators	Indicator Unit	Reference
Financial Indicators	Current Ratio	/	[6]
	Asset-Liability Ratio	%	
	Return on Equity	%	[7]
	Operating Profit Margin	%	
	Total Assets Turnover	Times	[8]
	Account Receivable Turnover	Times	
	Operating Income Cash Flow Ratio	%	[9]
	Proportion of Net Cash Flow from Financing Activities	%	
	Operating Income Growth Rate	%	[10]
	Earnings per Share Growth Rate	%	[11]
Coporate Governance	Corporate Governance Index	Point	[12]
Corporate Social Responsibilities	Rankins CSR Ratings	/	[13]

2.2 Indicator system of macro factors affecting financial management risk construction

The macro-financial management environment refers to the critical factors that affect the macro aspects of financial management risk. Also, it is the external conditions that create constraints on the financial management of enterprises. The macro-environment factors of financial management risk include richer contents, such as economic, market, and human. This paper selected macro factors affecting financial management risk are GDP, annual benchmark rate, CPI, fixed asset investment growth, openness, financialization, per capita consumption level, investor sentiment, and urbanization rate.The index system of factors affecting financial management risk constructed in this paper is shown in Table 2.

Table 2. Indicator System of Macro Factors Affecting Financial Management Risk

Tier 1 Indicators	Tier 2 Indicators	Indicator Unit	Reference
Economic Environment	GDP	Billion yuan	[14]
	Annual Benchmark Rate	%	[15]
	CPI	%	[1]
	Fixed Asset Investment Growth Rate	%	[1]
	Openness	/	[1]
Market Environment	Financialization	/	[1],[14]
	Per Capita Consumption Level	Yuan	[1],[14]
	Investor Sentiment	/	[1]
Human Environment	Urbanization Rate	%	[1]

3. AHP-based algorithm for quantifying the risk factor of enterprise financial management

Analytic Hierarchy Process (AHP) was created in the early 1970s by T. L. SAATY, an American operations researcher and professor at the University of Pittsburgh. It decomposes the research object into several constituent factors and groups them inductively according to their relationship to build a multi-level analysis structure model. Then, it determines each constituent factor's importance by calculating. AHP combines qualitative and quantitative analysis, has the advantages of simplicity and practicality, and requires only a small number of data samples to solve complex multi-level and multi-factor decision problems. It is widely used in financial, tax, audit, and other risk determination and analysis studies. The steps of AHP are as follows.

STEP1: Construct the judgment matrix of each level. The core of the AHP method is to decompose the problem into several layers, each containing several factors. This paper establishes a top-down target layer(A), criterion layer(B), and sub-criterion layer(C). The upper layer plays a dominant role

over the lower layer. Among them, the target layer only contains one factor, the enterprise financial management risk. While the criterion layer contains several determinants of such risk, and the sub-criteria layer contains elements that influence each risk determinant. After stratification, the judgment matrix of each level is constructed based on the consistency matrix method proposed by Saaty et al.. Specifically, this paper constructs a matrix-vector by comparing each factor within the hierarchy two by two and using the numbers 1 to 9 and their reciprocals as scales (as shown in Table 3).

Table 3. Judgement Matrix Vector's Value Scale

Value Scale	Connotation
1	a_i and a_j are equally important
3	a_i is slightly more important than a_j
5	a_i is significantly important than a_j
7	a_i is strongly important than a_j
9	a_i is extremely important than a_j

STEP2: Calculate the corresponding weights of each layer's elements. The maximum eigenvalues of the above-constructed matrices are calculated separately. Their corresponding eigenvector values are the influence weights of each factor in the layer on the factors in the upper level.

STEP3: Consistency test of judgment matrix. The AHP method obtains weights by comparing each factor two by two. In order to avoid the situation of contradictory importance among the factors selected, it is necessary to conduct a consistency test on each judgment matrix.

The specific steps are: (1) calculate the consistency index of each judgment matrix $CI=\frac{\lambda_{\max}-n}{n-1}$, where λ_{max} is the maximum eigenvalue of the corresponding judgment matrix and n is the order of the judgment matrix; (2) check the table to obtain the average random consistency index RI corresponding to the order n of the judgment matrix (the RI values corresponding to the values of n from 1 to 9 are shown in Table 4); (3) Calculate the consistency ratio $CR=\frac{CI}{RI}$. If the consistency ratio value $CR<0.1$, the judgment matrix is considered consistent; otherwise, it indicates that the matrix has certain defects and needs to be modified.

Table 4. RI's Values

n	1	2	3	4	5	6	7	8	9
RI	0	0	0.58	0.90	1.12	1.24	1.32	1.41	1.45

Consequently, the enterprise's financial management risk is quantified using the weight of each factor calculated by AHP.

4. Analysis of macro influencing factors of financial management risk based on XGBOOST algorithm

XGBOOST is an integrated learning method based on the Gradient Boosting Decision Tree (GBDT) created by Dr. Tianqi Chen of the University of Washington. It reduces the risk of overfitting the model by introducing a regular term in the loss function. Meanwhile, the second-order Taylor expansion of the loss function makes the gradient convergence faster and more accurate. Thus the efficiency and accuracy of the model solution have been improved. In addition, XGBOOST calculates the sum of the number of splits of each feature in each tree and uses this sum as the feature's importance, resulting in a low complexity algorithm and a highly interpretable model. XGBOOST is widely used in contribution analysis, prediction, and classification problems. The steps of the XGBOOST algorithm are as follows.

STEP1: Define the objective function. The objective function of XGBOOST, whose expression is equation (1), consists of a loss function and a regular term.

$$Obj = \sum_{i=1}^{N} l(y_i, \hat{y}_i^{(m)}) + \Omega(f_m) \tag{1}$$

Among them, the loss function is used to measure the error between the predicted value $\hat{y}_i$ and the actual value y_i. In this paper, Mean Squared Error (MSE) is used to analyze the contribution of macro factors affecting the financial management risk of enterprises, i.e., equation (2).

$$\sum_{i=1}^{N} L(y_i, \hat{y}_i^{(m)}) = \sum_{i=1}^{N} (y_i - \hat{y}_i^{(m)})^2 \tag{2}$$

In order to reduce the complexity of the model to avoid overfitting, a regular term (euqation (3)) is added to the objective function.

$$\Omega(f_m) = \Upsilon T + \frac{1}{2}\lambda \sum_{j=1}^{T} \omega_j^2 \tag{3}$$

Where T is the number of leaf nodes of the tree, ω is the leaf weight value; γ and λ are the leaf penalty coefficient and the leaf weight penalty coefficient, respectively, and f_m is the m^{th} tree model.

STEP2: Add regression tree iteration to optimize the loss function. The XGBOOST algorithm uses the Categorical Regression Tree (CART) as the base learner. The forward distribution algorithm is adopted to optimize the model by adding tree by tree to the algorithm model. The predicted values are calculated by an integrated model composed of multiple CARTs, which is expressed in equation (4). Where M is the number of decision trees and x_i is the eigenvalue of the i^{th} sample.

$$\hat{y}_i = \sum_{m=1}^{M} f_m(x_i) \tag{4}$$

Assuming that the predicted value of the i^{th} sample after the m^{th} iteration is $\hat{y}_i$, and the newly added regression tree is $f_m(x_i)$, the following derivation process can be obtained.

$$\begin{aligned}
&\hat{y}_i^{(0)} = 0 \\
&\hat{y}_i^{(1)} = f_1(x_i) + f_0(x_i) = f_1(x_i) + \hat{y}_i^{(0)} \\
&\hat{y}_i^{(2)} = f_2(x_i) + f_1(x_i) = f_2(x_i) + \hat{y}_i^{(1)} \\
&... \\
&\hat{y}_i^{(m)} = f_1(x_i) + f_2(x_i) + ... + f_m(x_i) = f_m(x_i) + \hat{y}_i^{(m-1)}
\end{aligned} \tag{5}$$

Substituting equation (5) into equation (1) yields expression (6).

$$Obj = \Upsilon T + \sum_{j=1}^{T} \left[\sum_{i \in I_j} l(y_i, \hat{y}_i^{(m-1)} + \omega_j) + \frac{1}{2}\lambda \omega_j^2 \right] \tag{6}$$

STEP3: Taylor second-order expansion of the objective function. In order to quickly acquire the optimal solution, the objective function (6) is Taylor second-order expanded, and the constant term is removed, resulting in the expression (7), where $g_i = l'(y_i, \hat{y}_i^{(m-1)})$, $h_i = l''(y_i, \hat{y}_i^{(m-1)})$.

$$Obj = \Upsilon T + \sum_{j=1}^{T} \left[\omega_j \sum_{i \in I_j} g_i + \frac{1}{2}\omega_j^2 (\sum_{i \in I_j} h_i + \lambda) \right] \tag{7}$$

Let $G_j = \sum_{i \in I_j} g_i$, $H_j = \sum_{i \in I_j} h_i$. Further, the objective function is transformed into Equation (8).

$$Obj = \Upsilon T + \sum_{j=1}^{T} \left[\omega_j G_j + \frac{1}{2}\omega_j^2 (H_j + \lambda) \right] \tag{8}$$

STEP4: Find the optimal solution of the objective function. Assuming that the structure of XGBOOST tree is fixed, the objective function is optimal when the first-order derivative of Obj is 0. At this time, the values of the parameters corresponding to the leaf nodes j can be found:

$$\omega_j^* = -\frac{G_j}{H_j + \lambda} \tag{9}$$

Therefore, the optimal solution is:

$$Obj^* = \gamma T - \frac{1}{2}\sum_{j=1}^{T}\frac{G_j^2}{H_j + \lambda} \tag{10}$$

5. Case Study

5.1 Object selection and data collection

The case study company selected for this paper is Yunnan Yuntianhua Corporation, founded in 1997 and listed on the Shanghai Stock Exchange in the same year. As a leading fertilizer company in China, Yunnan Yuntianhua ranks first in Asia and second in the world in terms of production capacity. The reasons for selecting this enterprise as a case study are as follows: First, the chemical industry in which Yuntianhua is located is characterized by high leverage in the industry as a whole and has an essential position in China's economic development; therefore, the study of the leading enterprise has greater significance for other enterprises in the same industry to identify, avoid and manage financial risks. Second, although Yunnan Yuntianhua‘s financial statements show a large scale of operating revenue and a large number of total assets, the level of net profit is lower than the industry average. The high level of total revenue, the lower-than-industry-average cost of sales, administrative expenses, and financial expenses, coupled with the flat organizational structure in which the general manager is directly responsible for each department, expose Yunnan Yuntianhua to greater pressure to identify, analyze, evaluate, and respond to financial management risks in its own business process and in the setup of its organizational structure. Therefore, it is of greater practical significance to analyze the macro factors of its financial management risks.

Based on the index system constructed above, this paper collected the data of each index of Yunnan Yuntianhua from 2009 to 2019 and applied the mean interpolation method to fill in the individual missing data. The data sources of this paper are CSMAR and RISE. Descriptive statistics of data are shown in Table 5.

Table 5. Descriptive statistics of data

Tier 1 Indicators	Tier 2 Indicators	Max	Min	Mean
Financial Indicators	Current Ratio (CR)	1.526	0.578	0.745
	Asset-Liability Ratio (ALR)	92.480	68.701	82.954
	Return on Equity (ROE)	6.115	-70.590	-8.062
	Operating Profit Margin (OPM)	4.432	-6.914	-0.666
	Total Assets Turnover (TAT)	0.849	0.324	0.642
	Account Receivable Turnover (ART)	17.730	8.6920	13.210
	Operating Income Cash Flow Ratio (OICFR)	112.824	77.904	98.304
	Proportion of Net Cash Flow from Financing Activities (NCF)	5.337	-22.484	-4.734
	Operating Income Growth Rate (OPIGR)	41.674	-21.759	2.540
	Earnings per Share Growth Rate (EPSGR)	196.716	-2876.339	-292.843
Corporate Governance	Corporate Governance Index (CGI)	-0.310	-1.406	-1.025
Corporate Social Responsibilities	Rankins CSR Ratings (CSR)	59.745	38.070	49.551

Given the different meanings of the financial management risk index systems constructed in this paper and the inconsistent data outline, min-max standardization of the data is required before calculating the financial management risk of Yunnan Yuntianhua. Specifically, the Current Ratio and

Asset-Liability Ratio indicators are positively normalized, and the remaining indicators are subject to negative normalization.

5.2 Quantification of financial management risk coefficient

According to the steps of AHP mentioned in the previous section, ten experts were invited to score the importance of each element in the constructed index system in a two-by-two comparison and then construct a judgment matrix. In the hierarchical model of the financial management risk index system constructed in this paper, target layer A is enterprise financial management risk, the criterion layer B contains three elements of financial indicators, corporate governance, and corporate social responsibilities, and the sub-criterion layer C contains all the tier 2 indicators. Accordingly, the judgment matrix A, B_1, B_2 and B_3 are obtained, respectively.

$$A=\begin{pmatrix} 1 & 5 & 8 \\ 0.2 & 1 & 3 \\ 0.125 & 0.333 & 1 \end{pmatrix} \tag{11}$$

$$B_1=\begin{pmatrix} 1 & 3 & 4 & 5 & 8 & 6 & 6 & 4 & 2 & 1 \\ 0.3333 & 1 & 2 & 2 & 3 & 2 & 2 & 1 & 2 & 0.3333 \\ 0.25 & 0.5 & 1 & 7 & 9 & 5 & 5 & 1 & 0.3333 & 0.1429 \\ 0.2 & 0.5 & 0.1429 & 1 & 5 & 4 & 4 & 0.3333 & 0.1429 & 0.1111 \\ 0.125 & 0.3333 & 0.1111 & 0.2 & 1 & 0.25 & 0.25 & 0.1429 & 0.125 & 0.1111 \\ 0.1667 & 0.5 & 0.2 & 0.25 & 4 & 1 & 1 & 0.2 & 0.1429 & 0.1111 \\ 0.1667 & 0.5 & 0.3333 & 0.3333 & 4 & 1 & 1 & 0.5 & 0.1667 & 0.125 \\ 0.25 & 1 & 1 & 3 & 7 & 5 & 2 & 1 & 0.3333 & 0.2 \\ 0.5 & 0.5 & 3 & 7 & 8 & 7 & 6 & 3 & 1 & 0.3333 \\ 1 & 3 & 7 & 9 & 9 & 9 & 8 & 5 & 3 & 1 \end{pmatrix} \tag{12}$$

$$B_2=(1) \tag{13}$$

$$B_3=(1) \tag{14}$$

The expert scoring results are used to construct the judgment matrix, and the characteristic roots of each matrix are calculated, where the eigenvector corresponding to the largest characteristic root is the weight of each indicator. The results of weight of each element in the criterion layer are shown in Figure 1: the maximum characteristic root of matrix A is 3.0441, resulting in weights of 0.742 for financial indicators, 0.183 for corporate governance, and 0.0752 for social responsibility. the maximum characteristic root of matrix B_1 is 11.2857, and the weights of secondary financial indicators such as current ratio and asset-liability ratio are calculated as shown in Figure 2.

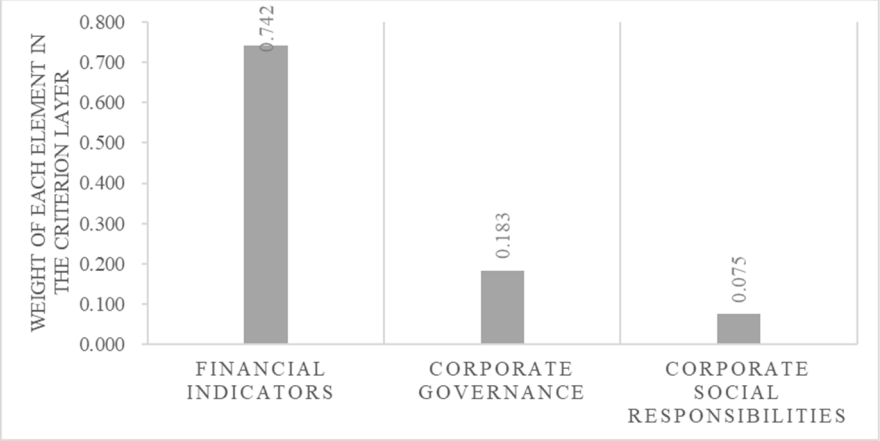

Figure 1. weight of each element in the criterion layer

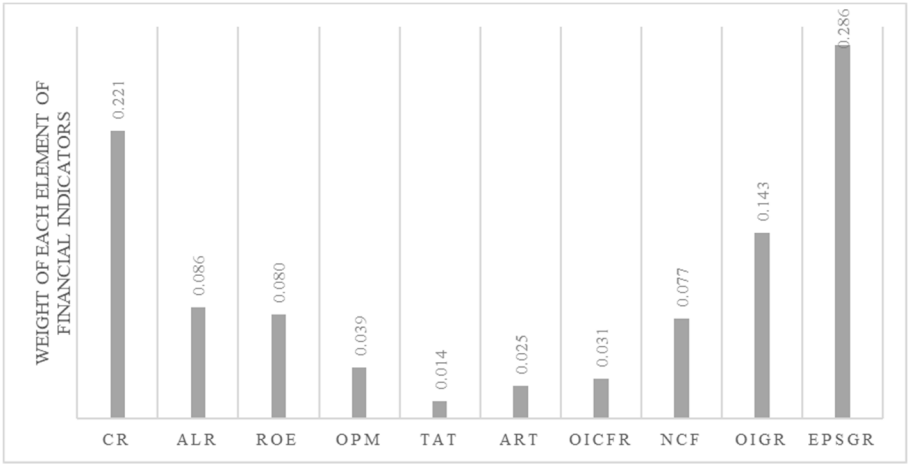

Figure 2. weights of secondary financial indicators

Further, the consistency index and consistency ratio are calculated to check whether there is inconsistency in the importance comparison results. The consistency index CI=0.022, RI=0.525, and CR=0.042 for matrix A. The consistency index CI=0.143, RI=1.486, and CR=0.096 for matrix A. The consistency ratios of both matrix A and matrix are lower than 0.10; therefore, the consistency system established in this paper indicator system has consistency, and the results of the weights calculated by AHP can be used to quantify the financial management risks of enterprises.

Combining the data of each index of Yunnan Yuntianhua from 2009 to 2019, the financial management risk of Yunnan Yuntianhua for each year is quantified based on the index weights to obtain the enterprise financial management risk coefficient, and the trend of the risk coefficient is shown in Figure 3.

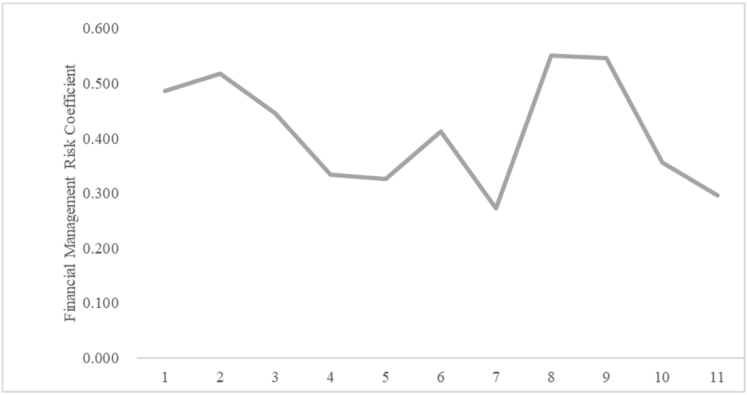

Figure 3. trend of the risk coefficient

5.3 Analysis of XGBOOST regression results

In order to analyze the influence of the above macro external factors on the financial management risk of the enterprise, this paper uses SPSS Modeler software to predict the financial management risk of Yunnan Yuntianhua afterwards by building an XGBOOST model to analyze the contribution of each external factor.

The above constructed financial management risk coefficient data of Yunnan Yuntianhua is used as the dependent variable, and nine indicators reflecting the economic environment, social environment and human environment respectively, such as GDP, annual benchmark rate, fixed asset investment growth rate, CPI, openness, investor sentiment, per capita consumption level, financial integration index and urbanization rate, are used as independent variables, and the model parameters of GBDT are adjusted by each iteration step is 100, from 100 to 1000 unit decision trees are iterated separately to find the optimal decision tree. The algorithm accuracy of XGBOOST is evaluated based on R^2 and mean error (MSE) of the model. In addition, the model training set was set to 70% and the test set was set to 30%. The iterative results are shown in Table 6.

Table 6. XGBOOST iteration results

GBDT decision tree	R^2	MSE
100	0.884	102.30
200	0.768	175.20
300	0.952	28.590
400	0.843	99.22
500	0.674	203.75
600	0.972	25.63
700	0.979	24.79
800	0.866	97.22
900	0.965	30.28
1000	0.790	154.33

The analysis of the results of the above ten iterations reveals that when the model parameter is 700, the model accuracy converges, the corresponding R^2 reaches the maximum, and the mean error (MSE) is small. At this time, the model confidence has the highest confidence level, and the optimal result should be selected for contribution analysis this time.

(1) First gradient (85% to 100%): significant impact

GDP and annual benchmark rate. The level of economic development as an important factor constituting the external economic environment of enterprise financial management activities; its level can directly affect the survival and development of enterprises. The so-called economic development level refers to the scale, speed and height of economic development of the country or region, where the enterprise is located. As the main party providing products and services to society, the development and survival of the enterprise are naturally directly affected by the economic development level. Changes in annual benchmark rate have a direct impact on a company's financing activities, which in turn determine various aspects of the company's production and operations down the line. Thus, taken together, both GDP and annual benchmark rate levels can have significant impacts on the financial management risk of individual companies.

(2) Second gradient (50%~85%): Higher impact

Per capita consumption level, CPI, fixed asset investment growth rate and urbanization rate. Among them, the per capita consumption level and urbanization rate reflect the people's living standard, which is shown to be increasing in the time series, on the basis of which the changes in residents' spending on consumption affect market demand. As providers of products and services, enterprises' financial management risks are bound to receive the impact of changes in such indicators. The fixed asset investment growth rate reflects the change in government financial support, and the financial management risk of enterprises will be affected accordingly in the context of the change in the business environment. CPI reflects the level of inflation in a country or region through changes in the purchasing power of the population. Changes in inflation affect the real purchasing power of consumers on the one hand, and on the other hand, the marginal rewards required by investors will be adjusted accordingly with changes in the price level, which in turn acts on the financial management risks of enterprises from both the production and operation and financing sides.

(3) Third gradient (25% to 50%): less impact

Financialization and openness. The degree of financialization of a region or country reflects the effect of the "financial gas pedal". Differences in the financialization of a country or region's economy show the strength of different "financialization shocks", which are reflected in the micro-level corporate output gap and macro-level changes in the level of inflation. The macro- or micro-level impact of "financialization shocks" will have an impact on the financial management risks of enterprises. It is also clear that the degree of openness of a country or region to the outside world determines an enterprise's import and export trading activities, which involve a large number of changes in assets, liabilities and equity, and can also pose challenges to enterprise financial management. It should be noted that, in practice, the degree of regional financialization and openness usually act on the above-mentioned more contributory indicators before affecting the financial

management risk of enterprises in this way. Therefore, this echelon indicator shows a smaller impact in terms of contribution.

(4) Fourth gradient (0% to 25%): minimal impact

Investor Sentiment. Investor sentiment has a direct impact on investor behavior. As mentioned above, the change in investor sentiment on the one hand reflects the impact of changes in the human environment on corporate financial management risk. On the other hand, its impact needs to be influenced by changes in investor sentiment affecting investor behavior, which leads to changes in the supply and demand of funds in the market and the subsequent adjustment of interest rate levels, and then reflected in the path of action on corporate financial management risk. Naturally, the contribution of investor sentiment alone is smaller in value.

6. Conclusion

This paper takes Yunnan Yuntianhua Co., Ltd as the research object. It firstly constructs the internal financial risk coefficient index system and calculates the financial management risk of Yunnan Yuntianhua Co. using AHP. Then it analyzes the influence of macro factors on the financial management risk of Yuntianhua enterprise using the XGBOOST algorithm. The research findings of this paper are as follows.

(1) Annual benchmark interest rates and GDP fundamentally impact corporate financial management risk.

(2) The per capita consumption level, urbanization rate, fixed asset investment growth rate, and CPI indirectly affect enterprises' financial management risk. Among them, the per capita consumption level and urbanization rate affect the financial management risk by influencing the market demand. The fixed asset investment growth rate and CPI affect the financial management risk by influencing the business environment and the purchasing power of consumers, respectively.

(3) The financialization, openness, and investor sentiment influence corporate financial management risk less.

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