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FINANCIAL RISK ASSESSMENT OF LISTED TOURISM COMPANIES BASED ON GREY RELATIONAL DEGREE MODEL

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Abstract. *Tourism industry in China has achieved rapid development in recent years. Tourism enterprises are facing financial risks as well as opportunities. How to accurately evaluate financial risk of the listed tourism companies is of great practical significance. This paper first chooses the representative financial index to establish the financial risk index system of listed tourism companies. Then the entropy weight method is used to determine the index weight. Finally, the grey relational degree model is used to evaluate the financial risk of 15 scenic spots listed tourism companies based on 2017 data, and the satisfactory results are obtained. According to the financial risk assessment information, managers can take corresponding measures so as to make the enterprise more healthy and sustainable.*

Keywords: Financial risk assessment, Listed tourism companies, Entropy weight method, Grey relational degree model

1. **Introduction.** With the rapid development of China's economy, people's living standard is gradually improved, and their consumption demands are increasing day by day. More and more people choose to travel for spiritual satisfaction. The development of the tourism industry has brought a very favorable period of development opportunities for tourism enterprises. However, tourism enterprises are facing with many financial risks while accelerating their development, which will affect their benefits. Enterprises can effectively avoid risks by accurately assessing the financial risks, conducting scientific guidance and effective management, which is beneficial to the scientific, healthy and sustainable development of China's listed tourism companies.

Foreign academics studied the various enterprise financial risks. Jaberidoost et al. used chromatography and weighted average method to study the risks of pharmaceutical enterprises [1]. Almany evaluated Altman's z-score using discriminant analysis and characteristic ratio, i.e., cash flow ratio to predict the financial status of the enterprise [2]. Ribeiro and Chen evaluated the financial risk of the financial industry through hash function and generalized regression neural network method [3]. Bakes used sensitivity analysis to assess financial risks in the insurance industry [4]. In view of the financial risk of tourism enterprises, some domestic scholars have explored and applied different models and methods to research. Li used analytic hierarchy process to evaluate the financial risk of small and medium-sized enterprises with huanli company as an example [5]. Wu used factor analysis to study the financial risk of TB real estate company [6]. Yin took 50 manufacturing listed companies as training samples, extracted 23 indicators and established a traditional logistic model, and analyzed the financial operation of the company through empirical research [7]. Zhang took MATLAB as the platform and took BP neural network as the

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model algorithm to build an enterprise financial analysis model and optimize the traditional financial management model [8]. The above domestic and foreign research process and research results have certain reference value for this paper.

In conclusion, this paper combines the entropy weight method with grey relational degree model, to solve the problem of listed tourism company financial risk assessment. The research method herein is not involved in the existing research literature. This paper builds financial index system based on the financial perspective, then uses the entropy weight method to determine the index objective weights, and finally uses grey correlation model to evaluate the financial risk of the listed tourism companies. It is proved that the process is simple, the maneuverability is strong, and the results are in conformity with the actual. The financial risk assessment results can be used by managers and investors to make the correct scientific management decision.

2. Financial Risk Assessment Index of Listed Tourism Companies.

Listed tourism company refers to listed companies that main tourism business income accounts for no less than 50% of total revenue, including tourist catering, hotel service, scenic spots tourism service, tourism transport, tourism information, and tourism product marketing, etc. [9].

Tourism industry has strong dependence on natural resources and human resources. It is comprehensive, seasonal and sensitive, and is vulnerable to external influences. It faces many constraints, big risks and great potential [10]. Therefore, the financial risk of the listed tourism companies has the characteristics of persistence, dynamics, volatility and complexity. The solvency, operating capability and profitability of tourism enterprises have great influence on the financial risk of the enterprises. In this paper, based on the relevant theory of enterprise financial risk assessment and the characteristics of the financial risk of listed tourism company, also the reference related literature of the scholars at home and abroad, the financial risk assessment index system of listed tourism company are established from financial perspective in the table below.

Table 1. Financial risk assessment index system of listed tourism companies

Financial risk of listed tourism companies (A)	Solvency (B_1)	Asset-liability ratio	C_1
		Liquidity ratio	C_2
		Quick ratio	C_3
		Equity ratio	C_4
		Interest coverage ratio	C_5
	Operating Capability (B_2)	Inventory turnover ratio	C_6
		Receivable turnover ratio	C_7
		Total asset turnover ratio	C_8
		Cash flow ratio	C_9
	Profitability (B_3)	Total asset profit ratio	C_{10}
		Return on assets ratio	C_{11}
		Sales profit ratio	C_{12}

3. Financial Risk Assessment Index Weight Calculation of Listed Tourism Companies.

3.1. Entropy weight method.

Entropy weight method is an objective weighting method to collect the values of specific indexes of each research sample and construct the judgment matrix. In order to eliminate the influence of dimensionality, the original judgment matrix needs to be treated with dimensionless treatment. Then use MATLAB computer language to calculate the corresponding entropy and entropy weight [11].

1) Construct the pending matrix. The existing research sample size m, index number n, which forms the original matrix $\mathrm{R} = (r_{ij})$, $i = 1, 2, \ldots, m$, $j = 1, 2, \ldots, n$.

$$\mathrm{R} = \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1n} \\ r_{21} & r_{22} & \cdots & r_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ r_{m1} & r_{m2} & \cdots & r_{mn} \end{bmatrix}$$

2) Calculate the proportion of the index value of the i item under the j index p_{ij}:

$$p_{ij} = r_{ij} \Big/ \sum_{i=1}^{m} r_{ij}$$

3) Calculate the entropy of the j index e_j:

$$e_j = -k \sum_{i=1}^{m} p_{ij} * \ln p_{ij}, \qquad k = 1/\ln m$$

4) Calculate the entropy weight of the j index w_j:

The size of entropy weight directly reflects the role of each financial index in influencing the financial risk of the enterprise.

$$w_j = (1 - e_j) \Big/ \sum_{j=1}^{n} (1 - e_j)$$

5) Determine the comprehensive weight of the index β_j:

It is assumed that the evaluator determines the weight of the index to be α_j, $j = 1, 2, \ldots, n$, according to the purpose and requirements. Combined with the entropy weight of the index w_j, the comprehensive weight of the index j can be obtained.

$$\beta_j = \alpha_j w_j \Big/ \left(\sum_{j=1}^{n} \alpha_j w_j \right)$$

3.2. **Selection of sample data.** The listed tourism companies in Shanghai and Shenzhen are divided into three categories: scenic spots, hotels and comprehensive category. This paper selects Tibet tourism (600749), Dalian Sun Asia (600593), Beibu gulf brigade (603869), Oct A (000069), Yunnan tourism (002059), Jiuhua tourism (603199), Lijiang tourism (002033), Guilin tourism (000978), Changbai Mountain (603099), Zhangjiajie (000403), Mount Huangshan B (900942), Xi'an tourism (000610), Qujiang Cultural Tourism (600706), Sante Cableway (002159), Mount Emei A (000888) total 15 listed tourism companies of scenic spots as the research samples, which are with complete financial index data. According to the annual financial data of year 2014∼2017, index weights are determined with entropy weight method (source: NetEase Finance) [12].

3.3. **The index weight determined by entropy weight method.** According to the principle of entropy weight, considering the continuity and stability of company financial index, combined with the financial index values of 15 selected listed tourism companies, the paper averages the original data of 12 financial indicators (year 2014-2017), and the original matrix is constructed as follows:

$$\begin{pmatrix}
0.610 & 0.350 & 0.310 & 0.830 & -2.73 & 4.860 & 10.01 & 0.105 & 0.040 & -0.046 & -0.05 & -0.45 \\
0.424 & 0.950 & 0.940 & 0.711 & 5.910 & 54.32 & 142.36 & 0.37 & 0.415 & 0.049 & 0.354 & 0.141 \\
0.311 & 1.038 & 0.957 & 0.456 & 10.42 & 10.56 & 10.560 & 0.440 & 0.378 & 0.056 & 0.097 & 0.145 \\
0.680 & 1.635 & 0.590 & 2.050 & 10.47 & 0.27 & 84.11 & 0.270 & -0.045 & 0.047 & 0.065 & 0.202 \\
0.550 & 1.330 & 0.550 & 1.180 & 6.550 & 0.695 & 3.850 & 0.360 & 0.016 & 0.047 & 0.137 & 0.143 \\
0.180 & 1.720 & 1.670 & 0.228 & 424.21 & 33.36 & 189.75 & 0.400 & 1.230 & 0.138 & 0.200 & 0.178 \\
0.145 & 5.495 & 5.430 & 0.113 & 5107.2 & 12.64 & 64.14 & 0.275 & 1.300 & 0.170 & 0.230 & 0.318 \\
0.426 & 0.740 & 0.570 & 0.724 & 1.680 & 3.60 & 4.770 & 0.220 & 0.430 & 0.007 & 0.258 & 0.034 \\
0.128 & 4.790 & 4.680 & 0.145 & -33.89 & 20.03 & 352.92 & 0.360 & 1.370 & 0.077 & 0.324 & 0.225 \\
0.371 & 0.470 & 0.450 & 0.630 & 9.280 & 65.25 & 194.80 & 0.465 & 0.468 & 0.055 & 0.245 & 0.126 \\
0.190 & 3.795 & 3.300 & 0.214 & -44.72 & 1.590 & 35.690 & 0.390 & 1.070 & 0.080 & 0.305 & 0.217 \\
0.202 & 1.690 & 1.215 & 0.560 & 17.980 & 35.93 & 43.80 & 0.705 & -0.202 & -0.044 & 0.129 & -0.016 \\
0.508 & 1.070 & 1.005 & 1.030 & 4.130 & 17.92 & 2.850 & 0.610 & 0.183 & 0.029 & 0.217 & 0.046 \\
0.603 & 0.475 & 0.280 & 1.590 & 1.710 & 1.725 & 47.25 & 0.200 & 0.109 & 0.002 & 0.197 & 0.001 \\
0.189 & 2.920 & 2.690 & 0.150 & 45.24 & 10.27 & 52.07 & 0.425 & 1.040 & 0.150 & 0.482 & 0.180
\end{pmatrix}$$

According to the steps of 3.1 entropy weight method, the weights of 12 financial indicators are determined as follows.

TABLE 2. Financial risk index weights with entropy weight method

Standard layer	Weight (W_b)	Sub index		Weight (W_c)
B_1	0.63	Asset-liability ratio	C_1	0.0303
		Liquidity ratio	C_2	0.0892
		Quick ratio	C_3	0.1134
		Equity ratio	C_4	0.0570
		Interest coverage ratio	C_5	0.3369
B_2	0.29	Inventory turnover ratio	C_6	0.0947
		Receivable turnover ratio	C_7	0.1221
		Total asset turnover ratio	C_8	0.0294
		Cash flow ratio	C_9	0.0512
B_3	0.08	Total asset profit ratio	C_{10}	0.0245
		Return on assets ratio	C_{11}	0.0376
		Sales profit ratio	C_{12}	0.0137

4. **Introduction of Grey Relational Degree Model.**

4.1. **Grey relational degree model.** In control theory, people often use the depth of color to show the transparency of information. Black means information unknown, white means information well known, while grey means part information known and part unknown. Accordingly, black system is the system information unknown, white system refers to all information well known system, and grey system is between white and black system [13].

The grey system is a system with poor information, so statistical methods are difficult to work. The grey system theory can deal with poor information system, but only for projects with little observation information. Grey system theory was proposed in 1982 by Chinese famous scholar Deng [14,15]. The research's object is uncertainty poor information system with part information known and part unknown. The theory aims to have exact description and understanding of the real world, on the basis of the part information that has been known. In other words, the grey system is to obtain unknown information of system using known information, and change the system from grey to white [14].

Grey relational analysis is one of the main applications of grey system theory. Grey comprehensive evaluation method is based on grey relation to compare and order the evaluated objectives, by comparing the relational degree between the best plan and all

evaluated plans. Grey comprehensive evaluation method is easy to calculate and understand, and hence is more and more used to evaluate social, economic and managerial problems.

4.2. **The grey nature of financial risk assessment of listed tourism companies.** From financial perspective, this paper selects representative financial indexes to establish the financial risk assessment index system of listed tourism companies, and evaluates the financial risk of listed tourism companies based on grey relational degree model. The index system is not likely to include all indexes known and unknown, but focus on researching part of the important indexes, based on financial perspective and financial risk features. So the information we used for financial risk assessment of listed tourism company is incomplete as it should be, which means that this evaluation system is typically grey, and will be more scientific and reasonable to be evaluated by grey relational degree model [9].

Grey financial risk of listed tourism company is firstly to figure out satisfactory financial risk assessment index sequence, based both on selected financial indexes from the financial risk assessment index system and financial index data of the evaluated companies. This satisfactory financial risk assessment index sequence will be taken as a reference sequence and together with the actual sequence of the evaluated companies to constitute a grey evaluation sample space. In this space, the similarity of correspondent financial risk index curves between the reference sequence and objects' index sequence will be directly compared and analyzed, and then the similarity degree will be defined by uniform grey relational degree [9].

5. **The Empirical Study on Listed Tourism Companies Financial Risk Assessment on Grey Relational Degree Model.** Grey relational degree model of listed tourism companies' financial risk assessment is applicable to evaluating financial risk of certain companies in the same industry, based on financial risk indexes of different companies during the same accounting period. The essence is a horizontal evaluation of different companies in the same industry. The result of the evaluation is to give a financial risk-based ranking of evaluated companies, which will offer scientific basis for different listed tourism companies for their decision-making and management.

5.1. **Grey sample space selection.** As shown in 3.2, this paper selects Tibet tourism (600749), Dalian Sun Asia (600593), etc., total 15 scenic spots listed tourism companies as samples. Based on the financial data of 2017, the financial risk is evaluated. Each sample enterprise chooses specific financial indicators to describe its financial risk according to the index system established above. We use $X_k = \{X_k(1), X_k(2), \ldots, X_k(12)\}$ to express the vector of No. K Company's index sequence composed of several indexes. Obviously, all the individual value gathers to reflect the financial risk standing of K Company during the accounting period.

The 12 selected financial indicators are not judged by being biggest or smallest, so the confirmation of reference sequence of satisfactory financial situation cannot be across-the-board. For some financial indicator, there may be an optimal expected value, but for some others, may be the bigger the better. In this paper, we use Delphi method to confirm satisfactory financial risk index value separately for these financial indexes, then to create reference sequence of "satisfied financial risk status" using vector $X_0 = \{X_0(1), X_0(2), \ldots, X_0(N)\}$ to express.

The financial risk status index sequence of 15 companies and the reference sequence of "satisfied financial risk status" are 12 vectors, which constitute the sample space of grey financial risk assessment.

TABLE 3. The selected financial risk status index sequence of samples and the reference sequence of "satisfied financial risk status"

0.5	2	1	1.2	3	3	3	0.6	1	0.08	0.3	0.3
0.66	0.18	0.15	0.19	−3.3	5.38	12.94	0.11	0.06	−0.06	0.065	−0.577
0.448	0.69	0.68	0.787	6.99	42.47	152.57	0.32	0.22	0.045	0.282	0.152
0.385	0.015	0.014	0.611	8.99	4.10	2.27	0.44	0.026	0.045	0.095	0.110
0.699	1.62	0.60	2.253	9.024	0.24	97.32	0.23	−0.075	0.043	0.092	0.220
0.597	1.19	0.49	1.473	3.95	0.66	4.08	0.37	0.057	0.024	0.135	0.070
0.142	1.99	1.95	0.145	880.34	38.16	196.96	0.39	1.19	0.069	0.367	0.186
0.090	5.70	5.63	0.096	63.03	12.55	69.77	0.25	1.27	0.25	0.249	0.316
0.403	0.63	0.45	0.65	2.22	3.76	6.28	0.21	0.40	0.014	0.286	0.068
0.155	1.63	1.55	0.179	−38.38	20.14	87.63	0.35	0.664	0.063	0.319	0.182
0.332	0.42	0.41	0.389	5.472	60.76	141.89	0.25	0.206	0.028	0.161	0.120
0.120	5.54	5.49	0.097	−125.3	2.18	35.09	0.36	1.518	0.091	0.33	0.246
0.104	1.58	0.94	0.68	−0.39	2.24	42.26	0.52	−0.254	−0.014	0.104	−0.03
0.496	1.13	1.07	0.968	5.465	21.14	2.55	0.62	0.203	0.034	0.237	0.056
0.675	0.37	0.14	2.02	1.77	0.99	49.97	0.21	0.148	0.002	0.207	0.009
0.178	3.49	3.28	0.119	63.48	11.73	50.28	0.40	1.30	0.073	0.49	0.18

5.2. **Grey transformation of sample sequences.** Company financial evaluation indexes often have some number graduations due to their different economic meanings. In order to avoid the excessive disparity among the original data ensures the factors affecting companies' financial situation are in the same order and keep their privileges, we need to make grey transformation of the samples.

There are a number of grey transformation methods, like initialization, equalization and interval valued. As for enterprise financial evaluation of the same industry, the original sequence is index sequence composed by several financial indexes during an accounting period but not time sequence, and we will take equalization for grey transformation.

The vectors $X_k = \{X_k(1), X_k(2), \ldots, X_k(12)\}$ in the sample space can be transformed as the following, and then we get interval valued sequence $Y_k = \{Y_k(1), Y_k(2), \ldots, Y_k(N)\}$:

$$Y_k = \frac{X_k(i) - \min X_k(i)}{\max X_j(i) - \min X_j(i)}$$

TABLE 4. Interval valued sequence

0.013	0.018	0.015	0.001	0.76	0.053	1.19	0	0.070	0	0	0
0.005	0.075	0.074	0.01	0.83	0.43	16.74	0.02	0.011	0.008	0.016	0.054
0.004	0	0	0.007	0.84	0.04	0	0.024	0.007	0.008	0.002	0.05
0.009	0.179	0.065	0.03	0.84	0	10.59	0.009	0.004	0.008	0.002	0.059
0.007	0.13	0.053	0.02	0.81	0.39	21.69	0.02	0.007	0.006	0.005	0.048
0.001	0.22	0.216	0.001	6.27	0.39	21.69	0.02	0.034	0.01	0.02	0.056
0	0.633	0.626	0	1.174	0.126	7.52	0.10	0.036	0.023	0.014	0.07
0.004	0.069	0.049	0.008	0.80	0.036	0.45	0.01	0.015	0.05	0.016	0.05
0.001	0.18	0.171	0.001	0.542	0.204	9.51	0.018	0.022	0.009	0.019	0.056
0.003	0.045	0.044	0.004	0.815	0.62	15.55	0.1	0.01	0.007	0.007	0.052
0.001	0.616	0.61	0	0	0.02	3.66	0.018	0.042	0.01	0.02	0.06
0	0.174	0.103	0.01	0.78	0.02	4.46	0.03	0	0.003	0.003	0.04
0.006	0.124	0.118	0.013	0.815	0.215	0.03	0.038	0.011	0.007	0.013	0.047
0.008	0.04	0.014	0.028	0.79	0.008	5.31	0.007	0.009	0.005	0.01	0.043
0.001	0.39	0.36	0	1.18	0.118	5.35	0.02	0.037	0.01	0.03	0.056

5.3. **Calculation for relational coefficient between the max and min difference.** To get the difference sequence from grey exchanged interval valued sequence $Y_k = \{Y_k(1), Y_k(2), \ldots, Y_k(N)\}$, by formula $\delta_{0k}(j) = |Y_{0k}(j) - Y_k(j)|$.

Table 5. Difference sequence

0.987	0.982	0.985	0.999	0.240	0.947	0	1	0.93	1	1	1
0.995	0.925	0.926	0.990	0.170	0.570	0	0.984	0.989	0.992	0.984	0.946
0.996	1	1	0.993	0.160	0.960	1	0.976	0.993	0.992	0.998	0.950
0.991	0.821	0.935	0.970	0.160	1	0	0.991	0.996	0.992	0.998	0.940
0.993	0.870	0.947	0.980	0.190	0.610	0	0.980	0.993	0.994	0.995	0.952
0.999	0.780	0.784	0.999	0	0.610	0	0.980	0.966	0.990	0.980	0.944
1	0.367	0.374	1	0	0.874	0	0.900	0.964	0.977	0.986	0.930
0.996	0.931	0.951	0.992	0.200	0.964	0.550	0.990	0.985	0.950	0.984	0.950
0.999	0.820	0.829	0.999	0.458	0.796	0	0.982	0.978	0.991	0.981	0.944
0.997	0.955	0.956	0.996	0.185	0.380	0	0.900	0.990	0.933	0.933	0.948
0.999	0.384	0.390	1	1	0.980	0	0.982	0.958	0.990	0.980	0.940
1	0.826	0.897	0.990	0.220	0.980	0	0.970	1	0.997	0.997	0.960
0.994	0.876	0.882	0.987	0.185	0.785	0.970	0.962	0.989	0.993	0.987	0.953
0.992	0.960	0.981	0.972	0.210	0.992	0	0.993	0.991	0.995	0.990	0.957
0.999	0.610	0.640	1	0	0.882	0	0.980	0.963	0.990	0.970	0.944

Based on the difference sequence, we get the maximum difference $\delta_{\max} = 1$, minimum difference $\delta_{\min} = 0$.

Then calculate relational coefficient by formula:

$$\xi_{0k}(j) = \frac{\delta_{\min} + \rho\delta_{\max}}{\delta_{0k}(j) + \rho\delta_{\max}}$$

Among it

$$\delta_{\max} = \max_k \max_j \delta_{0k}(j) \qquad \delta_{\min} = \min_k \min_j \delta_{0k}(j)$$

In this equation, the maximum and minimum values of an indicator are first selected from $j(15)$ sample companies, and then the maximum and minimum values are selected from $k(12)$ indicators of the sample company.

Table 6. Relational coefficient

0.336	0.337	0.337	0.334	0.675	0.346	1	0.333	0.350	0.333	0.333	0.333
0.334	0.351	0.351	0.336	0.746	0.467	1	0.337	0.336	0.335	0.337	0.346
0.334	0.333	0.333	0.335	0.785	0.342	0.333	0.339	0.335	0.335	0.334	0.345
0.335	0.379	0.348	0.340	0.758	0.333	1	0.335	0.334	0.335	0.334	0.347
0.355	0.365	0.346	0.338	0.725	0.450	1	0.338	0.335	0.335	0.334	0.344
0.334	0.391	0.389	0.334	1	0.450	1	0.338	0.341	0.336	0.338	0.346
0.333	0.577	0.572	0.333	1	0.364	1	0.357	0.342	0.339	0.336	0.350
0.341	0.349	0.345	0.335	0.714	0.342	0.476	0.336	0.337	0.345	0.337	0.345
0.334	0.379	0.376	0.334	0.522	0.386	1	0.337	0.338	0.335	0.338	0.346
0.339	0.344	0.343	0.334	0.730	0.568	1	0.357	0.336	0.349	0.349	0.345
0.334	0.566	0.562	0.333	0.333	0.338	1	0.337	0.343	0.336	0.338	0.347
0.333	0.377	0.358	0.336	0.694	0.338	1	0.340	0.333	0.334	0.334	0.342
0.335	0.363	0.362	0.336	0.730	0.389	0.340	0.342	0.336	0.335	0.336	0.344
0.335	0.342	0.338	0.340	0.704	0.335	1	0.335	0.335	0.334	0.336	0.343
0.334	0.450	0.439	0.333	1	0.362	1	0.334	0.342	0.336	0.340	0.346

Here ρ is distinguishing coefficient, normally take $\rho = 0.5$.

The above table shows the 15 listed tourism companies each financial risk index and the optimal correlation coefficient between the reference sequence, the coefficient of mutual reflect the comparative sequence and the relationship between the reference sequence. To

better and more realistic appraisal of the financial risk of listed companies, the influence degree of each index on the final result is changed by the index weight. The calculation formula is as follows:

$$\beta_{0k} = \sum_{j=1}^{N} \zeta_{0k}(j) W_k$$

Among them, the W_k is for k^{th} weights of indicators. To the corresponding index weight and the correlation coefficient multiplication, the result is the final correlation, and concluded in the table below 15 companies rank correlation coefficient and the corresponding correlation:

TABLE 7. Relational ranking of sample enterprises

Corporate name	Relational degree	Comprehensive ranking
Tibet tourism	0.533	11
Dalian Sun Asia	0.571	6
Beibu gulf brigade	0.478	15
Oct A	0.564	7
Yunnan tourism	0.563	8
Jiuhua tourism	0.663	3
Lijiang tourism	0.692	1
Guilin tourism	0.484	13
Changbai Mountain	0.493	12
Zhangjiajie	0.575	5
Mount Huangshan B	0.663	3
Xi'an tourism	0.544	9
Qujiang Cultural Tourism	0.480	14
Sante Cableway	0.542	10
Mount Emei A	0.665	2

5.4. **Discussion.** Relational degree value shows the relational degree between evaluated companies' and satisfactory financial risk situation. The higher degree is, the better financial situation is, while the lower the worse. As shown in the table above, the relational degree ranking about financial risk for the 15 companies based on 2017 data, from high to low is: Lijiang tourism, Mount Emei A, Mount Huangshan B, Jiuhua tourism, Zhangjiajie, Dalian Sun Asia, Oct A, Yunnan tourism, Xi'an tourism, Sante Cableway, Tibet tourism, Changbai Mountain, Guilin tourism, Qujiang Cultural Tourism, Beibu gulf brigade. Among them, Lijiang tourism has the largest correlation with the reference sequence of the best financial risk index, which is 0.692. It indicates that Lijiang tourism financial risk level is at an excellent level; And Beibu gulf brigade is the weakest link, only 0.478. It indicates that the financial risk level of Tibet tourism is in poor condition, and some aspects need to be further strengthened. The results are basically consistent, and the conclusion of this paper is verified. In this empirical study, the risk level of the Beibu gulf brigade and the Qujiang Cultural Tourism is poor. However, from the financial statement data, the operating profit of the two listed companies is in good condition. Seemingly contradictory, in fact an enterprise's financial risk profile will be influenced by many factors, such as government policy, the market situation, the enterprise internal non-financial indicators of factors, so a single financial index data cannot fully represent the financial risk of the enterprise level.

6. **Conclusions.** Financial risk is an important branch of enterprise risk management and the core of modern financial management. It is an important subject concerning the survival and development of enterprises to understand and analyze financial risks objectively and adopt various measures to control and avoid the occurrence of financial risks. In the future, we should strengthen theoretical study, collect more data and conduct more in-depth research. In order to strengthen the company's awareness of financial risk prevention, formulate relevant countermeasures, maintain the vitality of production and operation, and escort the company's development. According to the characteristics and demands of enterprises, a financial risk response system suitable for their own needs and development is constructed. When financial risks occur, they can be quantified according to financial risks, and effective solutions can be proposed to control financial risks. We will reduce financial risks effectively and make our enterprises more realistic, bigger and stronger.

On the basis of establishing the financial risk evaluation index system of listed tourism companies, this paper uses entropy weight method to determine the objective weight of each index, and then uses grey relational degree model to study and analyze the financial data of 15 scenic spots listed companies. The process is feasible, and the research results are practical and scientific and reasonable. It can provide some references for the research of related fields. With the continuous development of assessment theory and financial practice, we should continue to explore and improve the financial risk assessment system of listed tourism companies.

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