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Research on Financial Risks of Internet Listed Companies

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Abstract: The Internet industry is one of the most promising emerging industries in China, and its financial risk is related to the sustainable development of the company. This paper toke 45 Internet listed companies as research samples, and selected 14 financial indicators from five aspects to study their financial risks in 2019. Factor analysis was first conducted with the help of SPSS24.0 software by constructing a financial risk evaluation model and scoring and ranking according to the factor score model. Then the 45 companies were classified into four categories according to the magnitude of comprehensive financial risk: almost no risk, less risky, more risky and very risky by the K-means clustering method. Finally, corresponding countermeasures are proposed for the risk problems commonly existing in Internet listed companies.

Keywords Internet listed companies, Financial risk, Factor analysis, Clustering analysis

INTRODUCTION

In recent years, China's Internet industry has developed very strongly and has taken a place among the most promising industries. In the 45th China Internet Development Statistics Report, the size of China's Internet users has reached 904 million by the end of March 2020, and the Internet penetration rate has reached 64.5%. In life, online taxi, takeaway, Taobao shopping and online education have gradually become people's daily life. At the same time, the rapid development of emerging Internet enterprises has given traditional industries a new development model, of which nothing is more remarkable than the traditional commerce formed by the Internet as the basis of e-commerce. Online shopping platforms Taobao, Jingdong and Jindo are triple-headed, and in the 2019 Double Eleven shopping festival, Taobao even created a brand-new record of 268.4 billion sales in one day. With the introduction of the first E-Commerce Law, the industry will enter a phase of quality upgrade. In the context of the rapid development of today's digital economy, a large number of modern information technology development opportunities, mainly represented by big data and artificial intelligence, are excellent; the real economy with the Internet has also won a beautiful development situation of mutual support and synergy. China's Internet industry has a bright future and huge development potential. But at the same time, due to fierce competition, in the process of development, Internet enterprises have been troubled by business risks and financial risks.

The research on financial risk by domestic and foreign scholars has been gradually fruitful. William [William 1966] proposed univariate analysis in 1966, which applied individual financial indicators in predicting the financial risk of a firm. In 1968, Edward [Edward 1968] first proposed the Z-value model for financial risk early warning using the paired sampling method. Ohlson [Ohlson 1980] developed a logistic model in predicting the bankruptcy of a firm. He found that the important variables that affect the probability of bankruptcy of a firm are mainly: liquidity, firm size, operating performance, and capital structure. Odom and Sharda [Sharda 1990] demonstrate the superior financial early warning effectiveness of the transfer neural network model, which can handle both quantitative and qualitative indicators. Le [Le 2020] proposed the CAPM using the non-parametric Bayes Estimator, which can make the model more fitting. Simaan [Simaan 2020] proposed a model that enables real-time monitoring of a bank's capital chain, allowing early warning of the risks it faces. Domestic scholars are also enthusiastic about the study of financial risk. Zhou [Zhou 1996] proposed the F-score model based on the Z-score model, and added the effect of cash flow on financial risk to the model, which strongly supported the established financial warning model. Peng et al. [Peng, et. al., 2014] used a fixed effects model to empirically analyze Chinese real estate listed companies. The study demonstrated that both national macro policies and corporate governance structure have an impact on corporate financial risk. Zou et al. [Zou, et. al., 2019] applied factor analysis to evaluate the risk of China's aircraft manufacturing industry. The results of the study showed that the aircraft manufacturing industry has high financial risks, mainly in terms of large capital requirements, high asset-liability ratio and weak asset liquidity. Wang [Wang 2020], Shi [Shi 2020], and Li [Li 2020] have also conducted relevant studies on financial risk. In view of the fact that current scholars' research on the risk of Internet listed companies mainly focuses on large level theoretical analysis, while there are few empirical studies. Therefore, this paper will study the risk of 45 Internet

listed companies by selecting them with the help of factor analysis.

STUDY DESIGN

Data source and sample selection

Based on the industry classification of China Securities Regulatory Commission (CSRC), this paper focuses on the secondary classification of the information technology industry, namely the Internet industry, and studies its financial risks. In order to obtain data, companies such as *ST, ST, or missing data which have a series of factors that seriously affect the empirical results are eliminated. Finally, based on 45 listed companies, the 2019 annual financial statements of them are sorted out and the relevant data are used for empirical research with the help of SPSS software.

Index selection

This paper draws on the index selection of other scholars' research on financial risk evaluation, and refers to the specific reality of Internet listed companies, and finally selects five major index systems that can represent the solvency, profitability, operating capacity, development capacity and cash position of enterprises through several tests and screenings, so as to build the index system for financial risk evaluation of Internet listed companies. The specific indicators are shown in Table 1.

Table 1 Financial risk evaluation indicators

Indicator Type	Variable Name	Symbols
Debt service capacity(A_1)	Gearing ratio	X_1
	Current Ratio	X_2
	Quick Ratio	X_3
Operating Capacity(A_2)	Total assets turnover ratio	X_4
	Accounts Receivable Turnover Ratio	X_5
	Current asset turnover ratio	X_6
	Inventory turnover rate	X_7
Profitability(A_3)	Return on Net Assets)	X_8
	Total Return on Assets	X_9
	Earnings per share	X_{10}
Development capacity(A_4)	Total assets growth rate	X_{11}
	Operating income growth rate	X_{12}
Cash position(A_5)	Cash flow per share	X_{13}
	Operating income to cash ratio	X_{14}

EMPIRICAL PROCESS AND ANALYSIS

Factor Analysis

(1) Indicator pre-processing. We know that when there are large differences in the values between indicators, it affects the comparability of variables. Based on this, this paper first standardized the raw data with the following formula (1).

$$Z_{ij} = (X_{ij} - X_j) \div \delta_j \qquad (1)$$

In the formula: Z_{ij} represents the standardized financial index; represents the j^{th} financial indicator of the i^{th} company; represents the average value of the j^{th} index; represents the average difference of the indices in row j. After standardization, the mean value and standard deviation of financial indicators are 0 and 1.

(2) Factor analysis condition test. Before factor analysis, we want to test the eigenvalues with the aim of seeing if they can support the next step of factor analysis. We commonly use KMO and Bartlett's sphericity test. The KMO is used to calculate the bias correlation between variables, and we generally consider that if the KMO value is less than 0.5, the factor analysis is not applicable. The Bartlett's test is used to test whether the variables are independent. When its significance is less than 0.01, we can consider that the correlation between the variables is significant and can be analyzed by factor analysis. Through the test, the KMO value of this paper is 0.625, which indicates that factor analysis is applicable. At the same time, the significance of Bartlett's test comes out very close to 0, which is much smaller than 0.01, so this paper can be completely used by factor analysis.

(3) Factor extraction and naming. By analyzing the total variance explanation table, we can extract five factors, which all have eigenvalues greater than 1 and a cumulative contribution of variance of 83.666%, meeting our factor extraction conditions. (Table 2)

From the rotated component matrix table (Table 3), we can use F1, F2, F3, F4 and F5 to denote the extracted 5 factors respectively. F1 is the gearing ratio, current ratio, and quick ratio, which represent the solvency of the company. F2 is the earnings per share, return on net assets, and return on total assets, which represent the profitability of the company. F3 is the total assets turnover, current assets turnover, accounts receivable turnover, and inventory turnover, which represent the operating capacity of the company. F4 is the cash flow per share, operating income. F5 is the growth rate of operating income and total assets, which indicates the growth capability of the company.

Table 2 Total variance explanation table

Components	Total	Initial eigenvalue variance percentage	Accumulation %	Total	Rotational load squared and percent variance	Accumulation %
1	3.821	27.291	27.291	3.026	21.615	21.615
2	3.330	23.786	51.077	2.804	20.026	41.641
3	2.075	14.823	65.900	2.564	18.314	59.955
4	1.383	9.880	75.780	1.822	13.015	72.970
5	1.104	7.886	83.666	1.497	10.696	83.666
6	.717	5.123	88.790			
7	.503	3.595	92.385			
8	.380	2.715	95.100			
9	.332	2.371	97.470			
10	.195	1.390	98.860			
11	.111	.796	99.656			
12	.036	.254	99.910			
13	.012	.085	99.995			
14	.001	.005	100.000			

Note: Extraction method: Principal component analysis method.

Table 3 Component matrix after rotation

	Components				
	1	2	3	4	5
X_1	.858	-.439	-.014	-.040	-.206
X_2	.964	.015	-.096	.126	-.071
X_3	.968	.008	-.098	.108	-.065
X_4	.005	.066	.663	.306	.156
X_5	-.015	-.100	.426	-.123	.077
X_6	-.088	.055	.964	-.024	-.028
X_7	-.170	-.005	.938	-.063	.094
X_8	.024	.654	.039	.354	-.071
X_9	-.027	.940	.034	.004	.087
X_{10}	-.136	.952	.024	.166	.034
X_{11}	-.188	.252	.250	.228	.760
X_{12}	.023	.480	.218	-.145	.895
X_{13}	.080	.099	-.022	.935	-.021
X_{14}	-.571	-.265	-.010	.761	-.116

Note: Extraction method: Principal component analysis method. Rotation method: Kaiser normalized maximum variance method.

(4) Factor score. By analyzing the matrix of score coefficients (Table 4), we obtain the expressions for the scores of each factor, and the expressions are as follows.

Table 4 Factor score coefficient matrix

	Components				
	1	2	3	4	5
X_1	.310	-.183	-.052	.086	-.166
X_2	.330	.008	.053	.023	.003
X_3	.333	.009	.053	.012	.008
X_4	.059	-.045	.254	.140	.064
X_5	.044	-.084	.133	-.064	.002
X_6	.071	.049	.416	-.110	-.086
X_7	.046	.020	.391	-.115	.003
X_8	.003	.216	.005	.082	-.103
X_9	.027	.420	.025	-.234	-.014
X_{10}	-.029	.386	-.002	-.113	-.058
X_{11}	-.013	-.001	.029	.086	.492
X_{12}	-.006	.027	.034	-.098	.641
X_{13}	-.040	-.186	-.082	.634	-.022
X_{14}	-.185	-.049	.100	.397	-.017

Note: Extraction method: Principal component analysis method. Rotation method: Kaiser normalized maximum variance method.

$$F1 = 0.310 * X_1 + 0.330 * X_2 \Lambda \ -0.185 * X_{14}$$
$$F2 = -0.183 * X_1 + 0.008 * X_2 \Lambda \ -0.049 * X_{14}$$
$$F3 = -0.052 * X_1 + 0.053 * X_2 \Lambda \ +0.100 * X_{14}$$
$$F4 = 0.086 * X_1 + 0.023 * X_2 \Lambda \ +0.397 * X_{14}$$
$$F5 = -0.166 * X_1 + 0.003 * X_2 \Lambda \ -0.017 * X_{14}$$

The composite score F of the firm was obtained by referring to the total variance explanation table as well as by weighting the summary according to the variance contribution of the five factors and the cumulative variance rate, and the expression is as follows.

$$F = (21.615\% * F1 + 20.026\% * F2 + 18.314\% * F3 + 13.015\% * F4 + 10.696\% * F5) \div 83.666\%$$

Cluster Analysis

In this paper, after ranking 45 Internet listed companies in terms of comprehensive risk, we then used the idea of clustering to classify the financial risk levels of the sample companies. The ranks are divided into 4 levels, which are: almost no financial risk, little financial risk, great financial risk and great financial risk. The five main factor scores were used as the basis of new variables for the K-means cluster analysis of 45 Internet listed companies again, and the results are shown in Table 5.

From the results of cluster analysis, we can see that there are three companies with almost no financial risk, namely, Guoxin Health (C000503), Dalian Chenxin (C002447) and Zhejiang Daily Interactive (C300766). There are 6 companies with low risk, respectively, Hangzhou Pingzhi (C300571), Lakala (C300773), Beijing Zhidemai (C300785), Hangzhou One Network One Innovation (C300792), Xiamen

Jibit (C603444), Beijing Guolian Video (C603613). There are 35 companies with higher risk and 1 company with high risk, namely Shanghai Steel Union (C300226). This shows that most of the Internet listed companies in the sample have higher financial risks.

Table 5 Clustering of risk levels

Risk Level	Number of cases per cluster	Company Code
Almost no risk	3	C000503; C002447; C300766
Less risky	6	C300785; C300571; C300773; C300792; C603444; C603613
Higher risk	35	C000606; C000676; C832093; C002131; C002175; C002235; C002247; C002315; C000796; C002439; C002467; C002517; C002530; C002624; C002803; C300031; C300038; C300043; C300113; C300343; C300459; C300467; C300494; C600070; C600242; C600358; C600633; C600640; C600986; C601360; C603000; C603258; C603533; C603825; C603888
High risk	1	C300226

From the results of cluster analysis, we can see that there are three companies with almost no financial risk, namely, Guoxin Health (C000503), Dalian Chenxin (C002447) and Zhejiang Daily Interactive (C300766). There are 6 companies with low risk, respectively, Hangzhou Pingzhi (C300571), Lakala (C300773), Beijing Zhidemai (C300785), Hangzhou One Network One Innovation (C300792), Xiamen Jibit (C603444), Beijing Guolian Video (C603613). There are 35 companies with higher risk and 1 company with high risk, namely Shanghai Steel Union (C300226). This shows that most of the Internet listed companies in the sample have higher financial risks.

For the 3 companies with almost no risk, companies should make further efforts to do a good job in financial management and prevent risks before they occur. For the 6 companies with less risk, executives should pay close attention to the changes of the company's financial indicators on the current financial system and minimize the financial risk of the company through an effective early warning mechanism. As for the 35 companies with higher risks, companies should actively analyze the indicators to find out the main influencing factors of financial risks and take countermeasures to prevent further deterioration of the company's financial situation, as well as to conduct real-time financial monitoring. As for Shanghai Steel Union(C300226), which has a high financial risk, the company should pay high attention both inside and outside the company to quickly identify the causes and prevent its extreme deterioration through relevant measures.

Through analysis, the author found that the gearing ratio of Shanghai Steel Union(C300226) is at 73.736%, which is only slightly lower than the 74.239% of Oriental Times(C002175) and 74.527% of Zhejiang Juli(C002247), while the latter two also have greater financial risk. It indicates that Shanghai Steel Union(C300226) is operating with excessive debt, which aggravates the financial risk. Meanwhile,

its cash flow per share is -1.175, indicating that the enterprise encounters a difficult situation of capital in operation, investment and fund raising, and the enterprise is under pressure to pay out dividends. In addition it is also at a low level in various items such as return on investment. Therefore the company should promptly adjust its financial strategy to reduce financial risks by starting from various financial indicators as well as its own specific situation.

CONCLUSION AND COUNTERMEASURES

Conclusion

This paper selects 14 representative financial indicators and makes factor analysis with SPSS24.0 software. Each index is divided into five main factors to carry out comprehensive risk ranking, and the risk classification analysis of Internet listed companies is carried out by using cluster analysis. The results show that China's Internet listed companies generally have financial risks, and the enterprises with higher financial risks are the main body. The size of financial risk profoundly affects the survival and long-term development of the company. Enterprises should pay attention to the prevention and evaluation of financial risks. By actively taking preventive measures and response measures, and always pay attention to the change of financial risk, to create a good development environment for enterprises.

Risk prevention countermeasures

(1) Improve the financial risk prevention awareness of financial personnel. Enterprises can improve the overall professional quality of their financial personnel through regular training. In addition, when managing financial work, attention should be paid to cultivating financial personnel's awareness of risk prediction as well as prevention. So that they can figure out the potential financial risks in time and put forward targeted preventive measures at the first time, which can help prevent the enterprise from suffering from serious financial shocks.

(2) Sound financial decision-making management system. For Internet companies, they should establish a financial decision-making management system early, so that the three mechanisms of the enterprise, namely, financial decision-making mechanism, responsibility mechanism and reward mechanism, can be more effective in dealing with the complex business environment.

(3) Optimize the capital structure. Enterprises should effectively coordinate the flexibility of capital structure and financial flexibility, enrich the enterprise's financing channels, and make them more diversified. Moreover, the actual situation of the enterprise's strong or weak solvency should be taken into account when determining the ratio of the enterprise's liabilities. At the same time, it is necessary to properly manage current assets and focus on the future cash flow of the enterprise to prevent unexpected breakage of the capital chain.

(4) Set reasonable risk control targets. The Internet business itself is inseparable from the Internet, and the Internet is like a big net, which is diffuse and borderless, but has a vast range of services and applications. Therefore, in the process of developing business, the potential financial risks will invariably expand with it. Therefore, the enterprise should control the risk target and strictly control the daily capital flow of the enterprise and the related investment and financing cash activities to ensure the vitality of the enterprise development.

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