Evaluation on the Financing Cost of Listed Companies in China

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Abstract—**In the light of the phenomenon that our country's listed companies prefer equity financing, a financing cost measurement index system with perspectives of operating risk, financial risk, operating efficiency and development potential is established according to the nature of financing cost in this paper. And efforts are made to assess the application value of the system. The empirical results of 44 listed companies in Shanghai and Shenzhen stock markets show that the most influential factor for corporate financing cost is the operating risk, followed by financial risk and operating efficiency and the development potential. The operating risk factor scores bellow -1.17, financial risk below 5, operating efficiency below -2.8 and development potential below 2 points.**

Keywords—core competitiveness; financial analysis system; application

I. THE STATUS QUO OF THE FINANCING OF LISTED COMPANIES IN CHINA

Our country's listed companies generally have a relatively strong preference for equity financing. From the TABLE I, it can be seen that in the financing structure of listed companies, equity financing accounts for relatively large proportion of the total amount of financing, ranking on the top of all financing methods. Therefore, it is concluded that the equity financing becomes the main means of financing of listed companies. The domestic listed companies have issued bond financing since 1998. Although the proportion of bond financing amount in the total financing amount has increased in recent years, it is still not very high. Therefore, the bond financing is classified into "Others" category. Through the above analysis, it is not hard to see that China's listed companies have a serious preference for equity financing.

TABLE I.   FINANCING STRUCTURE OF LISTED COMPANIES IN CHINA

Year	Number of listed companies	The proportion of equity financing	The proportion of liability financing	Others
2009	1671	32.38%	40.67%	26.95%
2010	2019	25.71%	42.89%	31.39%
2011	2300	24.38%	44.67%	30.95%
2012	2455	31.29%	45.71%	23.00%
2013	2457	26.86%	42.86%	30.29%
2014	2582	30.71%	48.57%	20.72%
2015	2805	29.67%	47.56%	22.77%
2016	3032	25.71%	42.86%	31.43%
2017	3467	27.86%	40.63%	31.51%

II. FINANCING COST EVALUATION INDEX CONSTRUCTION PRINCIPLE

1. Use methods of quantitative analysis and qualitative analysis. In view of the restrictions of calculation mode and incomprehensiveness of data collected in quantitative analysis, qualitative analysis is required to address those problems.

2. Follow the principle of comprehensiveness and importance. It is necessary to consider both comprehensiveness and importance when selecting indicators.

3. Bear in mind the operability and practicality. The current information processing method must be applicable to data collection and the scientific performance indicator selection, so as to fulfill the ultimate goal of performance evaluation.

4. Adhere to the principle of authenticity and pertinence. The data of the listed companies used in this paper is authentic and reliable, together with which the status quo of domestic listed companies is taken into consideration to design an evaluation index system.

III. DESIGN OF EVALUATION INDEX SYSTEM OF FINANCING COST

Financing cost emerges as the ownership of funds and the right to the use of funds gets separated. In order to obtain the right to use funds, enterprises need to give something satisfying to the fund owner [1]. The registration fees, agency fees and service charges involved in the trading by the two sides are the financing charges. Financing cost consists of the fund use fee and the financing cost. As the financing cost is the non-recurring expense and accounts for a small proportion of the total financing, the impact of it on financing cost is not studied in this paper. Whereas, fund use fee is the return that is mainly classified into risk-free return and risk return, paid consecutively by the enterprise to the investors. The interest rate of national debt is generally used as the risk-free rate of return, while the scale of risk return depends on the size and uncertainty of enterprise operating income [2]. Therefore, China's listed companies financing cost evaluation index system can be designed from the dimensions of enterprise operating risk, financial risk, operating efficiency and development potential, which are marked as K1, K2, K3 and K4 respectively in the following TABLE II and TABLE III. There are also 11 indexes involved, namely X1: the risk-free rate of return, X2: rate of return on common stockholders' equity, X3: return on total assets ratio, X4: current ratio, X5:

liability on asset ratio, X6: net profit growth rate, X7: current assets turnover, X8: total assets turnover, the natural logarithm of the final total assets X9, X10: Net Profit Margin on Sales, and X11: Earning Per Share.

TABLE II.   CHINA'S LISTED COMPANIES FINANCING COST EVALUATION THIRD CLASS INDEX

Index	Formula	Correlation predicted
X1	Short-term bond interest rate	Positive correlation
X2	Current assets/Current liabilities×100%	Negative correlation
X3	Total liabilities /Total assets×100%	Positive correlation
X4	Net profit/ The total number of common shares at year-end	Positive correlation
X5	Net profit/ (opening net assets+ closing net assets)/2	Negative correlation
X6	Net profit/ (opening net assets+ closing net assets)/2	Negative correlation
X7	Net profit /Gross sales×100%	Negative correlation
X8	Sales revenue /Total current asstes×100%	Negative correlation
X9	Sales revenue /Total assets×100%	Negative correlation
X10	(net profit for the current year - net profit for last year) / net profit for last year×100%	Negative correlation
X11	LN (closing net assets)	Negative correlation

TABLE III.   CHINA'S LISTED COMPANIES FINANCING COST EVALUATION SECONDARY INDEX

Operating risk	Risk-free rate of return	Positive correlation
	Earnings Per Share	Positive correlation
	Rate of Return on Common Stockholders' Equity	Negative correlation
	Return on Total Assets	Negative correlation
Financial risk	Current Ratio	Negative correlation
	Liability on asset ratio	Negative correlation
	Net profit growth rate	Negative correlation
Operating efficiency	Current Assets Turnover	Negative correlation
	Total Assets Turnover	Negative correlation
Development potential	Net Profit Margin on Sales	Negative correlation
	The logarithm of closing total assets	Negative correlation

IV. TEST ON THE EVALUATION INDEX SYSTEM OF FINANCING COST

A. Sample collection

This paper cannot cover the financing costs of all listed companies as there are a huge number of listed companies in China. Therefore, 100 listed companies with the largest market value as of December 31, 2017 in Shanghai and Shenzhen Stock Exchange are selected initially as samples. However, the listed companies in abnormal operation in that year, such as ST, *ST and the one with incomplete financial data are excluded. Finally, the data of 22 enterprises in Shanghai Stock Exchange and 22 enterprises in Shenzhen Stock Exchange from 2017 to 2013, were selected as samples for factor analysis.

B. Correlation test

The results of correlation test are shown in TABLE IV.

TABLE IV.   PEARSON CORRELATION TEST

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11
X1	1										
X2	0.045	1									
X3	-0.015	-.636**	1								
X4	0.078	-0.004	0.079	1							
X5	.465**	0.054	0.037	.600**	1						
X6	.458**	.275**	-.223**	.476**	.898**	1					
X7	0.011	.299**	-.166*	.396**	.361**	.421**	1				
X8	-0.045	-.340**	0.015	-0.003	-0.021	-0.012	-.157*	1			
X9	.419**	-0.094	-0.038	0.087	.365**	.371**	-.150*	.488**	1		
X10	-.227**	-.201**	.341**	0.041	-.181**	-.287**	-0.042	0.023	-.208**	1	
X11	0.012	0.022	-0.018	0.126	.155*	.154*	.414**	.151*	0.053	0.041	1

In the above table, the indicator with one "*" in the upper right corner indicates the significance level is 0.01, and with two "**" represents the significance level of 0.05. The third indicator is the number of samples [3]. In summary, the X1 has a highly significant correlation with X5, X6, X9, and X10 and X2 has a highly significant correlation with X3, X6, X7, X8 and X10. X4 has a highly significant correlation with X5, X6 and X7. X5. X5 has a highly significant correlation with X6, X7, X8 and X10. X6 has a highly significant correlation with X7, X9, X10 and X11. The highly significant correlation also exists between X7 and X11, X8 and X9, and X9 and X10. It can be seen that there is a correlation among the 11 financial indicators selected in this paper, and factor analysis can be carried out for these 11 indicators.

C. *Factor analysis*

1) KMO and Bartlett's Test

KMO is an indicator of simple correlation and partial correlation among evaluation variables [4]. When the square of simple correlation coefficient of all variables is much larger than the square of partial correlation coefficient, KMO will be very close to 1, which means the variable is very suitable for factor analysis. Oppositely, KMO will be close to 0, and the selected index is not suitable for factor analysis.

TABLE V. KMO AND BARTLETT'S TEST

Kaiser-Meyer-Olkin sample adequacy Measurement		.629
Bartlett test of sphericity	The approximate chi-square	1094.581
	dK	55
	Significance	.000

In table, the KMO value is 0.629, falling within the scope of barely suitable for factor analysis. The Bartlett value is 0.000 (under 0.01). Above all, the factors from X1 to X11 are applicable for factor analysis.

2) The results of factor analysis

The results of factor analysis are shown in TABLE VI, TABLE VII, TABLE VIII, TABLE IX, TABLE X and TABLE XI.

TABLE VI. COMMUNALITY

	Initial	Extract
X1	1.000	.592
X2	1.000	.770
X3	1.000	.805
X4	1.000	.625
X5	1.000	.901
X6	1.000	.880
X7	1.000	.756
X8	1.000	.818
X9	1.000	.790
X10	1.000	.485
X11	1.000	.646

TABLE VII. TOTAL NUMBER OF VARIANCES EXPLAINED

Component	Initial eigenvalue			Extraction sums of squared loadings			Rotation sums of squared loadings		
	Total	Variance %	Accumulation %	Total	Variance %	Accumulation %	Total	Variance %	Accumulation %
1	3.184	28.950	28.950	3.184	28.950	28.950	2.769	25.173	25.173
2	1.971	17.922	46.872	1.971	17.922	46.872	1.971	17.920	43.092
3	1.668	15.163	62.034	1.668	15.163	62.034	1.677	15.244	58.336
4	1.243	11.304	73.338	1.243	11.304	73.338	1.650	15.002	73.338
5	.825	7.496	80.833						
6	.711	6.461	87.294						
7	.397	3.608	90.902						
8	.374	3.396	94.298						
9	.323	2.937	97.235						
10	.235	2.137	99.372						
11	.069	.628	100.000						

In TABLE VI, the initial values of X1 to X11 are all set as unit 1, and the extract ratios are 0.592, 0.770...0.646 respectively. The extract quantity is seen in TABLE VI. It can be seen in the TABLE VII that the contribution rate of component 1 is highest one, with 28.950%. The cumulative contribution rate of component 1, 2, 3 and 4 is 77.338%, which means that the four components could explain 77.338% of all variables, and then suggests that they can be extracted as the primary factor.

TABLE VIII. COMPONENT MATRIX

	Component			
	1	2	3	4
X6	.934	.031	-.020	-.082
X5	.872	.248	.178	-.219
X4	.575	.158	.511	-.087
X7	.555	-.357	.500	.265
X1	.534	.297	-.314	-.347
X2	.387	-.741	-.256	.073
X9	.390	.619	-.464	.197
X3	-.302	.585	.503	-.345
X10	-.396	.126	.559	.017
X11	.277	.020	.371	.657
X8	-.047	.614	-.206	.629

The factor loading of variable X6 in component 1 is very high, reaching at 0.934, so we can attribute X6 to component 1. However, the factor loading of variable X8 in component 3 is 0.614, and in component 4 is 0.629, both of which are relatively high and close to each other.

TABLE IX. ROTATION COMPONENT MATRIX

	Component			
	1	2	3	4
X5	.926	.003	.024	.205
X6	.851	-.317	.044	.231
X1	.669	-.120	.175	-.315
X4	.610	.233	-.125	.428
X3	.074	.886	-.034	-.117
X2	.078	-.794	-.332	.150
X10	-.281	.574	-.171	.217
X8	-.126	.125	.872	.158
X9	.411	-.090	.767	-.155
X11	.006	-.017	.250	.764
X7	.303	-.182	-.274	.746

The component 1, 2, 3 and 4 are coded as K1, K2, K3, and K4 for measurement. The factor loading of K1 in X1 is 0.669, the largest. The largest factor loading value of K2 in X2 is -0.794 and in X3 is 0.88. The largest factor loading value of K1 in X4, X5 and X6 are 0.610, 0.926 and 0.851 respectively. In X7, K4 has the largest factor loading value 0.746. In X8 and X9, K3 has the largest factor loading value 0.872 and 0.767. In X10, K2 has the largest factor loading value 0.574. In X11, K4 has the largest factor loading value 0.746.

To sum up, factors like X1, X4, X5, X6 are assigned to K1. X2, X3, X10 belong to K2. Factors X8 and X9 belong to K3. X7 and X11 are assigned to K4. The data analysis of the main factors K1, K2, K3 and K4 is shown in TABLE 10.

TABLE X. COMPONENT SCORE COEFFICIENT MATRIX

	Component			
	1	2	3	4
X1	.289	-.016	.035	-.281
X2	-.035	-.396	-.151	.051
X3	.132	.482	-.093	-.079
X4	.226	.195	-.106	.194
X5	.351	.090	-.044	.016
X6	.285	-.090	-.003	.041
X7	.032	-.043	-.120	.426
X8	-.132	.002	.559	.196
X9	.117	-.059	.437	-.091
X10	-.075	.294	-.101	.172
X11	-.119	-.015	.221	.522

According to TABLE 11, the linear relationship between the four main factors and the 11 independent variables is obtained.

$$K1=0.289*X1-0.035*X2+0.132*X3+0.226X*4+0.351*X5+0.285*X6+0.032*X7-0.132*X8+0.117*X9-0.075*X10-0.119*X11$$

$$K2=-0.016*X1-0.396*X2+0.482*X3+0.195*X4+0.090*X5+-0.090*X6+-0.043*X7+0.002*X8-0.059*X9+0.294*X10-0.015*X11$$

$$K3=0.035*X1-0.151*X2-0.093*X3-0.106*X4-0.044*X5-0.003*X6-0.120*X7+0.559*X8+0.437*X9-0.101*X10+0.221*X11$$

$$K4=-0.281*X1+0.051*X2-0.079*X3+0.194*X4+0.016*X5+0.041*X6+0.426*X7+0.196*X8-0.091*X9+0.172*X10+0.522*X11$$

On this basis, the ratio of the variance contribution rate of each factor to the total variance of the four factors is weighted as the weight, and the comprehensive performance score k of the sample enterprise is obtained as follows:

$$K=30.21\%K1+26.15\%K2+22.31\%K3+21.33\%K4$$

According to formula k of comprehensive score, the comprehensive score of financing cost of 44 enterprises from 2017 to 2013 can be estimated. This paper showcases the comprehensive score of financing cost of 44 enterprises in 2017, as shown in TABLE XI.

TABLE XI. THE COMPREHENSIVE EVALUATION OF FINANCING COST IN 2017

No.	Companies	K1	K2	K3	K4	K
1	Yunan Aluminum	-0.906654	7.206522	-1.570698	4.514007	2.223020
2	Zhongnan Construction	-0.744797	7.452308	-2.681788	3.537918	1.880106
3	Inspur Group	-0.618077	6.576027	-1.953060	3.399387	1.822272
4	Avic Electromechanical	-0.593518	6.673895	-2.418115	3.147025	1.697701
5	GRG Banking	-0.596123	5.812254	-2.616880	3.271458	1.453792
6	Holitech	-0.598624	6.660165	-2.254618	3.356725	1.773773
7	Oriental Energy	-0.666021	6.773455	-1.781570	3.956864	2.016585
8	Binjiang Real Estate	-0.529562	7.132979	-2.658254	3.512996	1.861559
9	BROAD-OCEAN MOTOR	-0.588557	6.517884	-2.359398	3.010598	1.642402
10	Bicon Pharmaceutical Group	-0.514741	6.454525	-2.594157	3.232341	1.643057
11	Victory Precision	-0.614825	6.625689	-2.204717	3.088890	1.713867
12	Kangdexin	-0.562780	6.569229	-2.612568	3.533352	1.718638
13	Luxshare Precision	-0.600197	6.728212	-2.217687	3.518113	1.833755
14	Souyute	-0.686498	6.069624	-1.801053	3.588637	1.743457
15	Hytera	-0.524294	6.662064	-2.366918	2.816534	1.656448
16	Lomon Billions	-0.924080	6.810649	-1.308289	5.879151	2.463964
17	Kaujingtong	-0.597142	5.952265	-1.968066	3.550599	1.694388
18	MLS	-0.351282	7.109213	-2.326873	3.496035	1.979516
19	Lepu Medical	-0.527396	6.452271	-2.331935	3.374418	1.727451
20	WALVAX Biotechnology	1.630806	6.394410	-6.545428	-7.823549	-0.964243
21	Jetsen	-0.554321	6.418816	-2.428342	3.263735	1.665452
22	Techand	-0.544956	6.846697	-2.300633	3.395489	1.836767
23	Xingyuan Environment	-0.599000	6.435818	-2.185637	3.513799	1.763886
24	Sungrow Power	-0.554017	6.573495	-2.264441	3.653154	1.825621
25	Leyard	-0.506641	6.612683	-2.193839	3.626878	1.860328
26	Mengcao	-0.590897	6.665295	-2.081693	3.841548	1.919441
27	East	-0.554123	6.628554	-2.110708	3.302604	1.799513
28	Lens Technology	-0.607728	6.970572	-2.121521	3.737181	1.963039
29	Kingfa Technology	-0.599011	6.569978	-2.221273	3.030211	1.687866
30	Juhua	-1.257953	5.561846	-1.191238	5.954493	2.078723
31	Heungkong Holding	-0.595103	6.568484	-2.449831	3.316549	1.698740
32	Luenmei Holding	-0.476994	5.474451	-2.843679	3.636431	1.428695
33	Meidu	-0.622123	6.585645	-2.340945	2.923709	1.635565
34	Nanshan Aluminum	-0.770105	6.503285	-2.417012	3.496651	1.674561
35	BTG Hotels	-0.641261	7.056256	-1.584080	3.848827	2.119033
36	Baiyunshan	-0.472763	6.372044	-2.562284	3.674864	1.735671
37	Anhui Jianghuai Automobile	-0.566372	7.112597	-2.369472	2.793904	1.756154

Cont. to TABLE XI						
38	CSIC	-0.605358	6.428804	-2.662502	3.478371	1.646186
39	Fujian Funeng	-0.531261	6.547726	-2.440670	3.152628	1.679678
40	Shanying Intel	-1.094442	7.004269	-1.124695	5.671866	2.459875
41	Taiji Industry	-0.603622	6.672746	-2.180004	3.271278	1.773974
42	Bailian Group	-0.627247	7.177540	-2.063559	3.389982	1.950138
43	Maoye	-0.635824	7.097119	-1.606712	3.765413	2.108519
44	Lingang Group	-0.556977	6.195542	-2.584143	3.187820	1.555311

V. CONCLUSIONS

1. TABLE VII shows that the contribution rates of the four main factors K1, K2, K3 and K4 through factor analysis are 28.950%，17.922%，15.163% and 11.304% respectively. Among them, K1 has the highest figure, which can be construed that the impact of K1 on the financing cost of enterprises is the largest one. That is to say, the most influential factor the financing cost of enterprises is the operating risk, followed by the financial risk factor and operational efficiency factor, and the least influential one is development potential.

2. From Table XI, following conclusions can be drawn. (1) factors scoring below -1.17 indicate that they are strong to reduce financing cost. If the score is above -0.55, the factor has a strong ability to raise financing cost; (2) if scoring below 5 points, the financial risk factor has a strong capability to reduce financing cost, while scoring above 7 points indicate that the factor has a strong ability to raise financing cost; (3) as for the operating efficiency factor, if scoring below -2.8, it has a strong ability to reduce financing cost. Whereas the score above -1.8 indicates that the factor has a strong ability to improve financing cost; the score of development potential factor is below 2 points, indicating that the factor has a strong ability to reduce financing cost, and the score above 4 points embodies that the factor has a strong ability to improve financing cost

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