Performance evaluation of Internet financial enterprises based on factor analysis- Taking Dongfang fortune Information Co., Ltd. as an example

Hongmin Zhang *, Yang Han

School of Finance, Harbin University of Commerce, Harbin, China

*Corresponding author e-mail: zhanghm0315@163.com

Abstract. lin recent years, China's Internet enterprises and financial institutions have developed very rapidly. The combination of the two - Internet finance has a great impact on people's life. In the fierce market competition, the evaluation of the operating performance of Internet financial enterprises can not only provide investors with investment reference information, but also help managers find their problems in operation and management. Taking Dongfang wealth Information Co., Ltd. as an example, starting from profitability, solvency, operation ability and growth ability, this paper selects ten indicators: gross profit margin, return on total assets, return on net assets, current ratio, quick ratio, asset-liability ratio, total asset turnover, accounts receivable turnover, net profit growth rate and operating revenue growth rate, Factor analysis is used to evaluate its business performance.

Keywords: Internet finance, factor analysis, business performance.

1. Introduction

Internet finance refers to a new financial business model in which traditional financial institutions and Internet enterprises use Internet technology and information communication technology to realize capital financing, payment, investment and information intermediary services.

Since 2008, the added value of China's financial industry has maintained a sustained growth of nearly 20%, and its proportion in GDP has steadily increased from 4.02% in 2005 to 8.35% in 2016. The financial industry plays an increasingly important role in the national economy. With the continuous development of Internet technology and the continuous increase of residents' personal financial assets, the deep integration of the Internet and finance has become the general trend. By the end of 2016, the number of natural person A-share accounts with a circulation market value of more than 1 million yuan in China had been 1356800, accounting for 2.75% of all accounts, and the average growth rate of funds had reached 22.91%. Since 2009, the average growth rate of the number of natural person A-share accounts with a circulation market value of more than 1 million yuan in China has reached 18.36%. The increase in the number and proportion of natural person stock accounts with high market value means the improvement of residents' income and financial management awareness, bringing more funds into the financial industry,so as to promote the development of the Internet financial information service industry.

Dongfang fortune Information Co., Ltd. is an Internet service platform integrating internet financial portal platform, financial e-commerce platform, financial terminal platform and mobile terminal platform. Dongfang fortune has become an Internet service platform with the most significant number of users and the highest user stickiness in China,and has maintained a competitive advantage in the number of users and user stickiness for a long time,It has a leading market position.

2. Literature review

In recent years, many scholars have used factor analysis to evaluate the performance of enterprises. Mao Chaomei and Sun Jianbin (2019) took Suning cloud business as the research object, made an empirical analysis on their financial indicators by using factor analysis method, made a comparative analysis on the performance of Suning cloud business before and after strategic transformation,and

put forward relevant suggestions.Taking Suning Tesco as an example, Zhu Qi (2020) used factor analysis to evaluate its financial performance from the four dimensions of profitability, solvency, operation ability and development ability,and put forward some suggestions for the existing problems of Suning Tesco. Ouyang qiangbin (2017) evaluated and calculated the growth capability index of 50 mobile Internet concept stock enterprises listed on the A-share market by using factor analysis. Wang xinni (2020), using the financial data of 25 listed Internet enterprises in 2017 as samples, used factor analysis to select 13 indicators from five aspects to build a financial performance evaluation system, obtained the scores and rankings of each factor and comprehensive economic level, and gave reference opinions on improving the financial performance level of listed Internet enterprises in China.

3. Financial performance evaluation of Oriental Wealth Information Co., Ltd

3.1 Source of information

This paper selects the relevant financial data from 2007 to 2020. The main source of the data is the financial statements of Dongfang wealth Information Co., Ltd. from 2007 to 2020.

Table 1. KMO and Bartlett test

KMO and Bartlett test		
KMO sampling suitability quantity		.431
Bartlett sphericity test	Approximate chi-square	276.217
	Freedom	45
	Significance	.000

3.2 Index selection

This paper mainly selects ten financial indicators from four aspects: profitability, solvency, operation capacity and growth capacity, including gross profit margin, return on net assets, return on total assets, current ratio, quick ratio, asset-liability ratio, total asset turnover, accounts receivable turnover, net profit growth rate and operating revenue growth rate, It comprehensively reflects the financial performance of the enterprise.

3.2.1. Profitability

Profitability refers to the enterprise's ability to obtain profits, also known as the capital appreciation ability of the enterprise's funds. The general production performance is the amount and level of the enterprise's income in a certain period of time.This paper selects gross profit margin (x1), return on total assets (x2) and returns on net assets (x3) as indicators to measure the profitability of Oriental wealth.

3.2.2. Solvency

Solvency refers to the ability of an enterprise to repay long-term and short-term debts with its assets. It is an important symbol reflecting the financial situation and operating capacity of an enterprise. Whether an enterprise has the ability to repay its debts is the key to its healthy survival and development. This paper selects the current ratio (x4) and quick ratio (x5) as indicators to measure the solvency of Oriental wealth.

3.2.3. Operating capacity

Operating capacity mainly refers to the efficiency and benefit of operating assets. The efficiency of an enterprise's operating assets mainly refers to the turnover rate or turnover speed of assets. The higher the speed of capital turnover, the better the operation of the enterprise. This paper selects asset-liability ratio (x6), total asset turnover ratio (X7) and accounts receivable turnover ratio (x8) as indicators to measure the operating capacity of Oriental wealth.

3.2.4. Growth ability

The growth ability of an enterprise refers to the potential ability of an enterprise to expand its scale and strength. Through vertical analysis, the financial indicators of the enterprise are compared with previous years to roughly judge the development trend of the enterprise.This paper selects net profit growth rate (x9) and operating revenue growth rate (X10) as indicators to measure the growth ability of Oriental wealth.

3.3 Empirical analysis process

3.3.1. Construct factor analysis model

Factor analysis is a statistical technique to extract common factors from variable groups. Factor analysis can find the hidden representative factors in many variables, classify the variables with the same essence into one factor, reduce the number of variables, and test the hypothesis of the relationship between variables.

3.3.2. Validity Analysis

Make KMO test and spherical test on the data.

Because factor analysis needs to construct a small number of representative factor variables from massive original data, the original variables should meet the potential requirements of solid correlation, otherwise it is impossible to extract a few standard factor variables that can reflect the common characteristics of the original variables, In this paper, KMO and Bartlett spherical test are used to test whether the data are suitable for factor analysis. The test results are shown in Table 1. It can be seen from Table 1 that the sampling appropriateness of KMO test is $0.431 > 0.3$, which indicates that there is a partial correlation between variables and is suitable for factor analysis. The p-value of the spherical test is $0.000 < 0.001$, which indicates that there is the correlation between variables and provides conditions for the success of factor analysis.

3.3.3. Principal component analysis and extraction of common factors

It can be seen from Table 2 that most of the extracted values of common factor variance exceed 0.8, indicating that the variables are well expressed by factors.

Table 3 is the total variance interpretation table. The first column in the table is the number of factors,the second column is the characteristic root, the third column is the contribution rate, and the last column is the cumulative variance contribution rate. The eigenvalue of the first factor after rotation is 3.104, and the variance contribution rate is 31.035%; The eigenvalue of the second factor is 2.932, and the variance contribution rate is 29.321%; The eigenvalue of the third factor is 2.454, and the variance contribution rate is 24.539%. The cumulative variance contribution rate of the first three variables reaches 84.895%, indicating that these three factors can represent 84.895% of the total variance of the original ten financial performance management evaluation indicators, and can be used as three common factors to analyze the level of financial performance management.

Table 2. Common factor variance

Common factor variance		
	Initial	Extract
Gross profit margin（X1)	1.000	.850
Return on total assets (X2)	1.000	.907
Return on net assets(X3)	1.000	.880
Current ratio(X4)	1.000	.937
Quick ratio(X5)	1.000	.937
Asset liability ratio(X6)	1.000	.933
Total asset turnover (X7)	1.000	.843
Accounts receivable turnover rate(X8)	1.000	.796
Net profit growth rate(X9)	1.000	.595
The growth rate of operating revenue (X10)	1.000	.812
Extraction method: principal component analysis		

Table 3. Interpretation of total variance

component	Initial eigenvalue			Extract the sum of squares the loads			Sum of squares of rotating loads		
	Total	Percentage variance	Accumu late %	Total	Percentage variance	Accumu late %	Total	Percentag e variance	Accumu late%
1	4.301	43.008	43.008	4.301	43.008	43.008	3.104	31.035	31.035
2	2.936	29.362	72.370	2.936	29.362	72.370	2.932	29.321	60.356
3	1.253	12.525	84.895	1.253	12.525	84.895	2.454	24.539	84.895
4	.880	8.796	93.691						
5	.341	3.409	97.100						
6	.192	1.918	99.018						
7	.092	.920	99.938						
8	.005	.049	99.987						
9	.001	.013	100.000						
10	4.824E-8	4.824E-7	100.000						

3.3.4. Common factor naming

To name the common factors, we need to build a rotated component matrix, determine a load of each enterprise's financial performance management index on each common factor, and clarify the meaning of the common factor.

It can be seen from Table 4 that the first common factor accounts for a large proportion in the three indicators of return on total assets, total asset turnover, net profit growth rate and operating revenue growth rate, which can reflect the asset utilization ability of the enterprise and is named as asset factor; The second common factor accounts for a large proportion in current ratio, quick ratio and asset-liability ratio, which can reflect the short-term solvency of enterprises, and is named short-term solvency factor; Among the third common factor, the larger ones are gross profit margin, return on net assets and accounts receivable turnover, which reflect the profitability of the enterprise and are named profit factor.

Table 4. Composition matrix after rotation

	Component		
	1	2	3
Gross profit margin（X1)	.080	-.148	.906
Return on total assets (X2)	.359	-.172	.866
Return on net assets(X3)	.845	.138	.384
Current ratio(X4)	-.133	.958	-.043
Quick ratio(X5)	-.132	.958	-.043
Asset liability ratio(X6)	-.266	-.926	.071
Total asset turnover (X7)	.849	.214	.276
Accounts receivable turnover rate(X8)	.398	.168	.780
Net profit growth rate(X9)	.706	-.297	.092
The growth rate of operating revenue (X10)	.878	-.084	.184
Extraction method: principal component analysis. Rotation method: Caesar normalization maximum variance method.			
a. Rotation converged after iteration 5			

It can be seen from the component matrix that each variable is represented by a factor:

$$X1=0.080F1-0.148F2+0.906F3 \quad (1)$$

$$X2=0.359F1-0.172F2+0.866F3 \quad (2)$$

$$X3=0.845F1+0.138F2+0.384F3 \quad (3)$$

$$X4=-0.133F1+0.958F2-0.043F3 \quad (4)$$

$$X5=-0.132F1+0.958F2-0.043F3 \quad (5)$$

$$X6=-0.266F1-0.926F2+0.071F3 \quad (6)$$

$$X7=0.849F1+0.214F2+0.276F3 \quad (7)$$

$$X8=0.398F1+0.168F2+0.780F3 \quad (8)$$

$$X9=0.706F1-0.297F2+0.092F3 \quad (9)$$

$$X10=0.878F1-0.084F2+0.184F3 \quad (10)$$

Using table 6, the scores of each factor can be calculated as follows:

$$F_1=-0.208X_1+0.359X_2-0.070X_3+0.274X_4-0.069X_5-0.069X_6-0.119X_7+0.304X_8-0.037X_9+0.348X_{10}- \quad (11)$$

$$F2=-0.012X1-0.028X2+0.047X3+0.331X4+0.331X5-0.310X6+0.068X7+0.085X8-0.113X9-0.040X10 \quad (12)$$

$$F3=0.493X1+0.392X2-0.003X3+0.055X4+0.055X5+0.071X6-0.063X7+0.348X8-0.153X9-0.137X10 \quad (13)$$

The formula is used to calculate the factor comprehensive score expression as follows:

$$F=3.104/8.49\cdot F_1+2.932/8.49 \quad (14)$$

$$F_2+2.454/8.49\cdot F_3=36.6\% \quad (15)$$

$$F_1+34.5\%\cdot F_2+28.9\%\cdot F_3 \quad (16)$$

Table 5. Component score coefficient matrix

	Component		
	1	2	3
Gross profit margin（X1)	-.208	-.012	.493
Return on total assets (X2)	-.070	-.028	.392
Return on net assets(X3)	.274	.047	-.003
Current ratio(X4)	-.069	.331	.055
Quick ratio(X5)	-.069	.331	.055
Asset liability ratio(X6)	-.119	-.310	.071
Total asset turnover (X7)	.304	.068	-.063
Accounts receivable turnover rate(X8)	-.037	.085	.348
Net profit growth rate(X9)	.300	-.113	-.153
The growth rate of operating revenue (X10)	.348	-0.40	-.137
Extraction method:a principal component analysis. Rotation method: Caesar normalization maximum variance method. Component score.			

The above table shows the total operating performance scores of Dongfang wealth Information Co., Ltd. from 2007 to 2020. It can be seen from the above table that only the total score from 2007 to 2012 is positive, but it also shows a downward trend. The comprehensive score from 2013 to 2020 has been negative, indicating that its operating capacity is weak. Enterprises should take into account profitability, solvency, operating capacity and growth capacity, set an overall goal, and carry out various production and operation activities around this goal. Enterprises should also improve the level of fund management, improve the efficiency of fund use, and strictly control the expenditure of costs and expenses, so as to rationalize the level of liabilities. At the same time, enterprises should also broaden business channels, strengthen diversified development of business scope, plan long-term development plans, and carry out various production and operation of enterprises from the perspective of long-term plans,so that enterprises can develop in the long term.Suggestions on improving the operating performance of Internet Financial Enterprises

4. Suggestions on improving the operating performance of Internet Financial Enterprises

As an emerging enterprise combining traditional financial industry and Internet technology, Internet financial enterprises should make up for their shortcomings in time and promote healthy and sustainable development. Although compared with the traditional financial industry, Internet finance makes innovative use of Internet concepts and technical means,its essence is finance. Since it is still finance in essence, Internet finance should be based on serving the real economy and people's livelihood.

Table 6. Seven comprehensive scores

Particular year	F1	F2	F3	Comprehensive score
2007	3.09254	-0.03787	-0.07587	1.1
2008	0.63871	0.38191	0.50456	0.51
2009	0.54499	0.52126	0.65905	0.57
2010	-0.56578	2.03567	0.12019	0.53
2011	-0.41851	1.10629	0.30779	0.32
2012	-0.45862	1.66035	-0.65389	0.22
2013	-0.07096	-0.16782	-1.42573	-0.5
2014	0.4455	-1.04461	-0.45934	-0.33
2015	-0.37439	-0.69564	2.65643	0.39
2016	-0.4975	-0.63107	-0.69769	-0.6
2017	-0.43834	-0.78697	-0.99625	-0.72
2018	-0.47581	-0.71225	-0.64685	-0.61
2019	-0.66066	-0.7917	-0.04679	-0.53
2020	-0.76121	-0.83754	0.75458	-0.35

The healthy development of Internet financial enterprises should build an efficient and good internal operation mechanism. First of all, enterprises should understand the current situation of the company and have a clear plan for the future development direction of the company. In terms of operation, enterprises should effectively evaluate their risks, constantly update and timely improve the supporting systems and procedures, so as to achieve early identification, early warning and early disposal of risks, so as to ensure the stability of enterprise fund management. Secondly, in terms of enterprise development, enterprises should continue to promote the construction and improvement of the one-stop Internet financial service platform, strengthen the improvement and upgrading of the database, improve the data processing capacity of enterprises, and establish a healthy and effective Internet financial enterprise environment centred on the creation of integrity system. Finally, if enterprises want to avoid being marginalized in the fierce competition and enhance their competitiveness in the market, they must make timely adjustments to the new environment and new formats. In order to survive in the fierce market competition, enterprises should improve their innovation ability, focus on customer needs as the guide, pay attention to user feelings and experience, and develop financial products suitable for all kinds of people.

References

[1] Mao Chaomei, sun Jianbin Financial performance analysis of Suning yunshang based on factor analysis [J] Modern business, 2019 (35): 28-30 DOI: 10.14097/j.cnki. 5392/2019.35.01.

[2] Zhu Qi Business performance evaluation of Internet enterprises based on factor analysis -- Taking Suning Tesco as an example [J] Modern business, 2020 (13): 151-153DOI: 10.14097/j.cnki. 5392/2020.13.069.

[3] Ouyang qiangbin Research on growth evaluation of mobile Internet A-share listed enterprises in China -- Based on factor analysis [J] Economic research reference, 2017 (72): 71-78 DOI: 10.16110/j.cnki. issn2095-3151.2017.72.010.

[4] Wang xinni Financial performance evaluation of Internet listed enterprises based on factor analysis [J] Administrative assets and finance, 2020 (16): 20-22.

[5] Lehman Financial performance management evaluation of feed enterprises based on factor analysis model [J] Feed research, 2021,44(20):96-99DOI: 10.13557/j.cnki.issn1002-2813.2021.20.021.

[6] Yang Lei Application of factor analysis method in financial performance evaluation of feed listed companies [J] China feed, 2020 (10): 135-138 DOI: 10.15906/j.cnki. cn11-2975/s.20201034.

[7] Zhang Weijin, Wang anying Financial performance evaluation of Retail Listed Companies Based on factor analysis [J] JOURNAL OF SHENYANG UNIVERSITY (SOCIAL SCIENCE EDITION), 2020,22 (02): 182-186 + 195 DOI: 10.16103/j.cnki. 21-1582/c.2020.02.011.

[8] Li yashuo Development status, problems and Countermeasures of Internet finance [J] Business culture, 2021 (34): 35-36.

[9] Liu Yan Research on the operation mode of Internet financial enterprises [J] China business theory, 2021 (02): 121-123 DOI: 10.19699/j.cnki. issn2096-0298.2021.02.121.

[10] Li Yan Thoughts on the current development status and future of Internet finance [J] Economist, 2021 (11): 125-126.

[11] Zhao Feng, Zhang Dongning, Zhang Jie Research on typical transaction mode and risk governance of Internet financial platform [J] Management and technology of small and medium-sized enterprises (next ten days), 2020 (12): 56-57.

[12] Zhou Xiaomei, Huang Tingting Reform of Internet financial supervision system under the background of financial innovation [J] Price theory and practice, 2020 (09): 16-20 DOI: 10.19851/j.cnki. cn11-1010/f.2020.09.403.

[13] He Peishan Research on the prevention and control mechanism of Internet financial risk [J] Trade show economy, 2020 (13): 35-37.

[14] Chen Jiayi Internet financial development and the responsibility of platform enterprises [J] Zhejiang economy, 2020 (07): 56-57.

[15] Tao Yaping Research on driving factors and Strategies of Internet Financial Development [J] Times finance, 2021 (18): 88-90.