# Research on Earnings Quality Evaluation of Small and Medium-sized Internet Listed Companies based on Factor Analysis

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**Abstract:** With the rapid development of the information age, the earnings quality of each company has become the focus of attention of investors. This paper takes empirical research as the sample, selects independent variables and relevant indicators according to existing research. It analyzes and evaluates the results of empirical research, conducts detailed analysis and comparison, and puts forward relevant countermeasures and future prospects for earnings quality of small and medium-sized Internet listed companies based on the empirical results.

## Introduction

The earnings quality management of enterprises is closely related to the development of enterprises, especially the Internet industry, which is famous for high risks and high returns. Chen Zhongming (2013) believes that the premise of evaluating the earnings quality of a company is to repair the profitability of the company according to the cash flow[1].Li Yan (2014) believes that an enterprise is the blood of production and operation[2].Ren Shujuan (2015) believes that the cash flow statement reflects the increase or decrease of cash and cash equivalents in a certain period of time[3].

Lipe(2017)believes that the reaction coefficient of surplus is positively correlated with uncertainty[8].Imhoff and Lobo(2018) believe the greater the uncertainty in advance, the lower the earnings response coefficient[9]. Penman(2014)believes different items that constitute surpluses have different market reactions in a short period of time, but in the long term, there is no obvious difference[10].

To sum up, foreign scholars have been studying this issue for a long time. In China, scholars started their research on earnings quality relatively late.

**Status analysis of earnings quality evaluation of small and medium-sized Internet enterprises**

**Less investment in research and development.** In recent years, the expenditure of small and medium-sized Internet in China is generally low.As high-tech enterprises, intangible assets are the core competitiveness of enterprise development. If the amount of r&d expenditure input is low, it is also one of important factors that affect the sustainability of earnings quality of Chinese Internet enterprises.

**The corporate governance structure is unreasonable.** As an emerging happy technology enterprise, the Internet itself is especially small in size, and the enterprise structure and system are not perfect, which makes the enterprise less professional and less transparent. Such a series of problems directly lead to the enterprise internal control link weak, easy to cause the quality of accounting information is low. Compared with other industries, the equity structure features of Internet enterprises reflect the significant characteristics of high concentration of equity and single dominant share.

**Weak awareness of risk assessment .**Weak awareness of the Internet has the characteristics of high risk, risk assessment for enterprise is unable to establish a reasonable and effective risk early warning system.It puts forward the corresponding precautionary measures. When risk really comes, it will impact on enterprise's current and future performance.

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## Research on earnings quality evaluation system of small and medium-sized Internet listed companies

Model design principles. The quality of earnings information does not have much particularity in nature. In essence, it is much the same as ordinary commodities and needs to show its earnings quality from multiple perspectives. When constructing an evaluation system of earnings indicators, the more earnings indicators are selected, the more comprehensive the quality level of earnings can be reflected. The earnings quality evaluation index system of small and medium-sized Internet listed companies constructed in this paper is shown in table 1 below.

Table 1 earnings quality evaluation index system table

| The index type | Indicator name and code | Index properties | Index calculation formula |
|---|---|---|---|
| Truth of earnings | Earnings cash guarantee multiple X1 | Positive indicators | Net operating cash flow/net profit |
| | Cash operating index X2 | Positive indicators | Operating cash flow/operating cash |
| | R&d expenditure X3 | Positive indicators | Operating profit/intangible assets |
| Earnings profitability | Earnings per share X4 | Positive indicators | (net income - preferred dividends)/total number of common shares |
| | Gross margin X5 | Positive indicators | Net profit/main business income |
| | Rate of return on total assets X6 | Positive indicators | Total compensation/average total assets |
| Earnings persistence | Operating profit ratio X7 | Positive indicators | Main business profit + other business profit - management expense - financial expense |
| | Net income operating index X8 | Positive indicators | This year's main business income growth/last year's main business income |
| | Total asset turnover X9 | Positive indicators | Sales revenue/average total assets |
| Surplus growth | Revenue growth rate X10 | Positive indicators | Revenue growth of the current year/total revenue of the previous year |
| | Net profit growth rate X11 | Positive indicators | Current year profit growth/net profit for the same period last year |

## Empirical model construction

Let the original p variables X1,X2... Xp, and the mean value of each variable is 0 and the standard deviation is 1. Now, each original variable is used m (m<p) and each factor F1, F2... The linear combination of Fm can be expressed as:

$$\begin{aligned} X_1 &= a_1 F_1 + a_{12} F_2 + \ldots + a_{1m} F_m + \varphi_1 \\ X_2 &= a_{21} F_1 + a_{22} F_2 + \ldots + a_{2m} F_m + \varphi_2 \\ &\ldots\ldots \\ X_p &= a_{p1} F_1 + a_{p2} F_2 + \ldots + a_{pm} F_m + \varphi_p \end{aligned} \tag{1}$$

The above equation is the model of factor analysis, and the matrix is abbreviated as: $X = AF + \varphi$

Factor analysis is a method to calculate the score of each common factor F and the total score through the model.X is a random variable that can be measured, F is called the factor, and A is called the factor load matrix. $X = AF + \varphi$

$a_{ij}$(i= 1, 2,... , p; j= 1, 2,... ,k) is called factor load, $\varphi$ is a special factor, represents the part of original variable that cannot be explained by factor, and its mean value is 0.

**Correlation analysis**

Pearson correlation test is adopted in the test model, and Pearson correlation coefficient is generally used to reflect the degree of similarity of the two variables. Or it can be used to calculate the similarity of two vectors. Pearson correlation coefficient can be calculated as follows:

$$\rho_{xy} = \frac{\operatorname{cov}(X,Y)}{\delta_X \delta_y} = \frac{E((X-\mu_X)(Y-\mu_y))}{\delta_x \delta_y} \tag{2}$$

Cov of X,Y is the covariance, the product of the standard deviations of two variables. This paper uses this physical method to test the correlation of these six variables. The correlation between these indicators is shown in Table 1.

Table 2 Correlation coefficient matrix table of indicators

| | X1 | X2 | X3 | X4 | X5 | X6 | X7 | X8 | X9 | X10 | X11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| X1 | 1 | | | | | | | | | | |
| X2 | 0.171 | 1 | | | | | | | | | |
| X3 | 0.424 | 0.537 | 1 | | | | | | | | |
| X4 | 0.117 | 0.513 | 0.473 | 1 | | | | | | | |
| X5 | 0.013 | 0.114 | 0.006 | 0.020 | 1 | | | | | | |
| X6 | 0.101 | 0.804 | 0.452 | 0.618 | 0.155 | 1 | | | | | |
| X7 | 0.039 | 0.566 | 0.729 | 0.384 | 0.030 | 0.437 | 1 | | | | |
| X8 | 0.186 | 0.151 | 0.049 | 0.208 | 0.024 | 0.054 | 0.008 | 1 | | | |
| X9 | 0.302 | 0.005 | 0.027 | 0.041 | 0.009 | 0.001 | 0.295 | 0.065 | 1 | | |

We can clearly see that each variable has a certain correlation, but the correlation between them is different.

**Factor analysis.** Variables in the same category are highly correlated.A common factor is latent and unobservable. Table 3 is the main factor analysis results of each year.

Table 3 Main factor analysis results of each year

| Factor | Eigenvalue | | | Proportion | | |
|---|---|---|---|---|---|---|
| | 2016 | 2017 | 2018 | 2016 | 2017 | 2018 |
| Factor1 | 3.044 | 2.937 | 3.559 | 0.534 | 0.431 | 0.553 |
| Factor2 | 1.267 | 1.701 | 1.346 | 0.222 | 0.249 | 0.209 |
| Factor4 | 0.624 | 0.759 | 0.654 | 0.110 | 0.111 | 0.102 |
| Factor5 | 0.339 | 0.641 | 0.393 | 0.060 | 0.094 | 0.061 |
| Factor6 | 0.169 | 0.086 | 0.076 | 0.030 | 0.013 | 0.012 |
| Factor7 | 0.034 | 0.048 | 0.007 | 0.006 | 0.007 | 0.001 |
| Factor8 | 0.073 | 0.133 | 0.025 | 0.013 | 0.02 | 0.004 |
| Factor9 | 0.121 | 0.164 | 0.139 | 0.021 | 0.024 | 0.022 |
| Factor10 | 0.162 | 0.178 | 0.173 | 0.028 | 0.026 | 0.027 |
| Factor11 | 0.197 | 0.21 | 0.222 | 0.035 | 0.031 | 0.035 |
| Factor | | Eigenvalue | | | Proportion | |

From the factor analysis of 2016, it can be intuitively seen that the characteristic value of the first factor changes quite steeply. In 2017, the principal component factors reached three, with values of 2.937, 1.701 and 1.334.So the first three factors could be taken as common factors.In 2018,Factor1 and Factor2 are the first two factors.

In this paper, the contribution rate of variance after rotation of the year is taken as the weight, and the earnings quality evaluation model is put into it to calculate the comprehensive scores of the earnings quality.

By calculating the comprehensive score of earnings quality, the earnings quality of small and medium-sized Internet enterprises in each year can be divided into three grades:A,B and C. Now, the comprehensive score distribution of enterprise earnings quality in each year is analyzed as follows:

Table 4 Comprehensive score distribution of earnings quality in each year

| score | 2016 Z < 0 (C) | 2016 0 < Z < 0.5 (B) | 2016 Z > 0.5 ( A) | 2017 Z < 0 (C) | 2017 0 < Z < 0.5 (B) | 2017 Z > 0.5 (A) | 2018 Z < 0 (C) | 2018 0 < Z < 0.5 (B) | 2018 Z > 0 (A) |
|---|---|---|---|---|---|---|---|---|---|
| The company number | 18 | 35 | 3 | 28 | 23 | 5 | 19 | 29 | 8 |
| The proportion | 32.14% | 62.5% | 5.36% | 50% | 42.86% | 7.14% | 33.93% | 51.79% | 14.29% |

This three years, the surplus quality composite scores for class A number of companies.From 2016 to 2018, there are three, five and eight companies every year. It shows that companies are taking active measures to improve the quality of their own surplus level, to enhance the future development prospect.

## Conclusions and policy recommendations

**The research conclusion.** From the point of research model, this paper constructs the model to evaluate the quality small and medium-sized enterprise surplus Internet.It has proved in this paper, the effectiveness of the quality evaluation model built by the surplus, authenticity, profitable, sustainability and growth is a significant difference to the quality of small and medium-sized enterprise surplus Internet.

**Policy Suggestions.** Too little investment in research and development indicates that the innovation ability of enterprises is not enough. Therefore, Internet enterprises need to increase investment in research and development expenditure to improve their innovation ability.

## References

[1] Z.M. Chen,J. Li.Review of measurement methods of accounting earnings quality [J]. Financial research,2013(2):37-56.(In Chinese)

[2] Y. Li.Analysis of earnings quality of listed companies from the perspective of cash flow [J]. Capital university of economics and business, 2014(3) : 127-129.(In Chinese)

[3] S.J. Ren.Research on the evaluation method of earnings quality[J]. Modern industrial economy and informatization, 2015 (3) :26-29.(In Chinese)

[4] Lipe.Empirical evaluation of accounting income Numbers[J].Journal of accounting Research,2017,134(4):159-178.

[5] Imhoff and Lobo.The Mean reversion in annual eannngs and its implication secunty valuation [J]. Review of Quantirative Finance and Accounring, 2018145 (7) : 27-45.

[6] Penman.Eamings quality and short sellers [J].Accounting Horizons (supplement),2014(8) : 55-82.