

## Stock investment value analysis based on principal component analysis

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**Abstract:** This paper on China's stock market as the research object, according to the financial characteristics of listed companies in China from a new Angle to select indicators. This paper takes 80 listed companies as the research object, using the principal component analysis is analyzed, and make an empirical analysis of the 80 listed companies in our country. Based on 80 is used to evaluate the investment value of listed companies and sorted, it is concluded that the result of comprehensive evaluation, the final test using the market a-share has risen. The results showed that to some extent, using principal component analysis to get the evaluation conclusion basic conform to the objective reality.

**Keywords:** Principal component analysis ; Stock investment value; SPSS.

### INTRODUCTION

From 1983, the history of China's stock market is the official start, and then China's stock market has spent only 20 years to across to the stock market's road with the world's major capital markets spent hundreds of years to explore. With the high-speed development of China's stock market, stock market pricing problem has become the focus of the financial research. In the stock market, investors trading under huge risk, so it urgently need to know about the stock investment value and evaluation enterprise risk[1].

Therefore, the paper will study China's stock investment value relevance and the influence factors of stock investment value, also establish the evaluation system of the stock.

### THEORETICAL ANALYSIS

To evaluate the value of stock investment, it need to build the evaluation index system of comprehensive evaluation of stock investing value[4-5]. Analysis the influence factors of affect stock investment value can be from two aspects of internal factors and external factors analysis. Therefore, based on the analysis of internal factors and based on the stock investment value of the relevant theory as the instruction, on the basis of literature study, the paper combines with the influence factors of stock investment value and tries to juggle stock and comparability between the availability of data and index to analysis[6-7].

### Standardization principle

Let  $\bar{x}_j$  show the j-th index of average, let  $\sigma_j$  show the j-th index of standard deviation, let  $Y_{ij}$  ( $i=1, 2, \dots, n; j=1, 2, \dots, m$ ) show the j-th index of the i-th unit which after non-dimensional treatment, The standardization of expression is :  $y_{ij} = (X_{ij} - \bar{x}_j) / \sigma_j$ . After standardization, the averages of all indicators is 0, variance is 1.

### Feature extraction and principal component ranking

You can obtain the variance of each main component by a factor loading matrix, Since the front  $P$  eigen values cumulative contribution rate of  $Q\%$ , so instead of the original  $n$  variables with  $P$  new variables. The first  $P$  factor loading matrix can be drawn from the main component expressions. The feature vectors and normalized data obtained each principal component score by multiplying, integrated function coefficients in front of the main component is the main component of variance contribution rate.

### Solving the main component of expression

Solving process is obtained correlation matrix by the above, which can get the first one to the  $P$ -th principal component expression:

$$\begin{cases} Y_1 = \gamma_{11}X_1 + \gamma_{21}X_2 + \dots + \gamma_{p1}X_p \\ Y_2 = \gamma_{12}X_1 + \gamma_{22}X_2 + \dots + \gamma_{p2}X_p \\ \dots \dots \dots \\ Y_p = \gamma_{1p}X_1 + \gamma_{2p}X_2 + \dots + \gamma_{pp}X_p \end{cases} \quad (1)$$

### CONSTRUCTION OF MODEL

Use proportional as the weight calculation Principal Component Synthesis Model [2], the proportional is the characteristic value of each principal component and all the main components extracted feature value added ratio.

$$F = \alpha_1 Y_1 + \alpha_2 Y_2 + \dots + \alpha_p Y_p \quad (2)$$

$$\alpha_k = \lambda_k / (\lambda_1 + \lambda_2 + \dots + \lambda_p) \quad (k = 1, 2, \dots, p)$$

show the  $k$ -th principal component  $Y_k$  of the variance contribution rate.

### Empirical analysis

#### Sample selection and data processing

Select Up to December 31, 2013 from the website of the Securities Star 80's financial indicators empirical analysis. Financial, metal, machinery, real estate, mining and other enterprises elected class sample. Standardization of data processing, at the cumulative variance contribution rate specified principal component extracted, comprehensive principal components calculated value based on Principal Component Synthesis Model and press the comprehensive principal component values are sorted. The cumulative variance contribution rate of 89.433%, extract four principal components decomposed principal ingredient matrix based on factors give the Principal Component Synthesis Model:

$$F = 0.17x_1 + 0.27x_2 + 0.35x_3 + 0.25x_4 + 0.04x_5 + 0.02x_6 \quad (3)$$

### RESULT

By Table 1, Everyday Network with 5.14 score higher than other companies, which was mainly due to a higher number of financial indicators to reflect the profitability and asset management capabilities on the net assets per share of 13.7794, for other companies ten times. For Cofco Property, the first principal component values higher than the other companies, the main component embodies the company's profitability and

asset management capabilities, the higher the value, the stronger its competitiveness, and the higher the ratio of those that investment brings the higher the income level. Operating cash flow per share in the data reflects the solvency Cofco Property is the weak link, and therefore, when the company's investment needs careful consideration. Row at the bottom of \*ST Tianwei in composite score is negative, and there is the score on the two principal components are negative, indicating that the larger the company's investment risk. \*ST shares means the loss of listed companies for three consecutive years of stock, also known as junk bonds. Consistent with the fact that the financial indicators data conclusion in this paper, listed company \*ST Tianwei analysis.

#### Product test

The following were chosen before the ranking 4 and after 2 listed companies, and the middle ranking of a listed company, compare these 7 stocks rose in the fourth quarter of 2013 and the first quarter of 2014, also with the same period A-share market's gains were compared.

As it can be seen from Table 2, Everyday Network ranked first in the first quarter of 2014 over the same period in the broader market index, also stronger than most other stocks. Ranked in the second to fourth listed company, its shares rose stability is also stronger than many other stocks, the amplitude of the gains were less than 12%, and analysis in this paper is also more in line with rank. Compare ranked by two companies rose can be found, this two stocks rose fluctuations, the trend is less than ideal and \*ST Tianwei although the increase is less volatile, but because of its gains in the first two quarters are negative and the high percentage of negative, obviously do not have investment value. This is consistent with the fact that \*ST Tianwei is ST shares.

**Table 1 Comprehensive Index Investment Value of Listed Company**

Abbreviation	Composite	Ran k	1-th	Ran k	2-th	Ran k	3-th	Ran k	4-th	Rank
Everyday Network	5.14	1	0.33	75	0.93	44	0.46	54	-2.27	72
Luzhou Laojiao	2.73	2	0.33	76	1.04	39	0.47	53	0.13	11
Huafa Industrial Co.	2.72	3	2.1	36	2.6	7	0.37	60	0.24	10
Straight Flush	2.52	5	3.25	19	1.93	13	0.84	38	-2.01	70
Cofco Property	0.3	74	9.54	1	-0.08	70	1.67	16	-0.5	23
Songjiang	-0.73	79	3.52	14	-22.1	80	0.77	40	-0.85	35
*ST Tianwei	-2.06	80	2.88	24	-1.37	75	0.33	63	-0.54	26

**Table-2: Data in The Fourth Quarter of 2013 and The First Quarter of 2014**

Abbreviation	The Fourth Quarter of 2013 (%)	The First Quarter of 2014 (%)	The Fourth Quarter of 2013 coincident index (%)	Composite Rank
A-share	-2.71	-3.87		
Everyday Network	-4.11	19.34	5.14	1
Luzhou Laojiao	-4.55	-14.95	2.73	2
Huafa Industrial Co.	-6.58	-10.06	2.72	3
Straight Flush	-19.75	-8.8	2.57	4
Cofco Property	-4.38	-6.2	0.3	74
Songjiang	70.34	0.27	-0.73	79
*ST Tianwei	-17.98	-18.65	-2.06	80

## CONCLUSION

Based on the 80 listed companies' financial indicators during the fourth quarter of 2013 a preliminary analysis, the main use of earnings per share, net assets per share, operating cash flow per share, the main revenue growth, the main profit growth, return on equity these six aspects of financial indicators. Using principal component analysis of six indicators dimensionality reduction to give four principal components, the calculated sample the company's overall value rankings. The A-share market rose with the 80 listed companies rose over the same period for comparison, the previous five ranking in the study period the relative investment value of having them, the composite score ranked first of three five or six network is the most investment value of the company.\*ST Tianwei ranked last in ranking, tested also shows that it does not have clear investment value, consistent with their shares of ST as a fact. The method can also be used to analyze the value of investments in other listed companies, which can become a new market Investors right decisions reference analysis.

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