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The Application of Principal Component Analysis on Financial Analysis in Real Estate Listed Company

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Abstract

This article is written in the base of the financial reports of the third quarter of 2010, selected 12 real estate listed companies, and compute its various financial indicators, using the principal component analysis in the spss software to its financial performance method, evaluation and analysis.

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Keywords: principal component analysis; real estate listed company; financial analysis

1. Overview of listed companies about real estate situation

The real estate industry is the pillar of the national economy industry in the national economy, and has an important position and role, and gradually become the pillar industries of China's economic. Through the performance of listed companies to real estate evaluation and analysis, finding in the operation of real estate market, the existing problems of the real estate industry of our country will help understand the development situation and its development prospect and improve the real estate enterprise comprehensive competitive power. At present Chinese stock market has 135 companies listed companies, based on real estate 12 real estate as sample of listed companies in 2010 to analyze the previous three, because the data is too much, the relationship between index is relatively complex, so using the principal component analysis to analyze the 10 main financial index data , with each company 10 indexes completed with Excel.

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2. The introduction of principal component analysis

Principal component analysis method is a kind of multiple analysis method to search comprehensive index in several indexes, a kind of effective way to solve the problem of multi-target integrated evaluation, a statistical analysis method by dimension reduction techniques to multiple variables into a few principal components (namely variables). The general purpose of principal component analysis is: i). variables of reduced-order; ii).main component explanation.
The main steps of the principal component analysis are as follows:

2.1. Standardization processing on the original data

$x_{ij}^{*} = \frac{x_{ij} - \mu_i}{\sqrt{\sigma_j}}, i = 1,2,\cdots p$ Among them, $\mu_i = \frac{1}{n}\sum_{i=1}^{n} x_{ij}$, $\sigma_j = \frac{1}{n-1}(x_{ij} - \mu_i)^2$

2.2. The correlation coefficient matrix of the standardized data

$\mathbf{R} = \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1p} \\ r_{21} & r_{22} & \cdots & r_{2p} \\ \vdots & \vdots & & \vdots \\ r_{p1} & r_{p2} & \cdots & r_{pp} \end{bmatrix}$ Among them, $r_{ij} = \frac{1}{n-1}\sum_{i=1}^{n} x_{ij}^{*} x_{ik}^{*}, r_{jj} = 1, r_{ik} = r_{ki}$, that is R is symmetrical matrix, the data on the diagonal are all 1.

2.3. Calculate the characteristic value of related coefficient and the eigenvalue of the corresponding feature vector, and the contribution of variance

If can through orthogonal transform Q makes $\mathbf{Q}'\mathbf{R}\mathbf{Q} = \begin{bmatrix} \lambda_1 & & & \\ & \lambda_2 & & \\ & & \ddots & \\ & & & \lambda_P \end{bmatrix}$. And the $\lambda_1, \lambda_2, \cdots, \lambda_p$ is the p eigenvalues of R.The contribution of each component of the variance $V_K = \frac{\lambda_K}{\sum_{j=1}^{P} \lambda_j}$. The biggest contribution is the first principal components, the main component, second for the second principal components, and so forth.

2.4. Determine the number of main components

According to the principle of more than 85% of the total variance contribution rate to determine the number of main components, the calculation formula of accumulative total variance contribution is $CV_k = \sum_{i=1}^{k} V_i = \frac{\sum_{i=1}^{k} \lambda_i}{\sum_{j=1}^{p} \lambda_j}$. The cumulative variance contribution rate of the current m principal components is over 85 percent above, determine m, namely the number of the principal components is m.

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