Research On Valuation System with Chinese Characteristics Based on Comprehensive Evaluation Model

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Abstract. Exploring and establishing a valuation system with Chinese characteristics is of great significance to promoting the better performance of the market resource allocation function. This article comprehensively analyzes the valuation system with Chinese characteristics based on a variety of models. First, by analyzing relevant research reports and policy documents, four first-layer characteristics of the special evaluation are selected, namely policy orientation, value investment, industry characteristics, and capital allocation, and then multiple second-layer indicators are selected. The analytic hierarchy process is used to obtain the weights of indicators at all layers, and the characteristic indicators with the smallest weights are eliminated. Finally, after using entropy weight method to correct the weights, eight secondary characteristic indicators were obtained: strategic conformity, reform potential, price-earnings ratio, return on net assets, subsidy preferences, whether it is a state-owned enterprise, industry concentration, and early investment, and a set of appropriate evaluation index systems for medium and special evaluations were established. , define the special evaluation index.

Keywords: Analytic hierarchy process, Valuation system with Chinese characteristics, Stock investment, Entropy weight method.

1. Introduction

On November 21, 2022, the Chairman of the China Securities Regulatory Commission stated at the 2022 Financial Street Forum Annual Meeting that it is necessary to conduct in-depth research on the applicable scenarios of mature market valuation theory, grasp the valuation logic of different types of listed companies, and explore the establishment of a market with Chinese characteristics. Valuation system promotes better performance of market resource allocation function. At the 2023 China Securities Regulatory Commission System Work Conference, the Chairman of the China Securities Regulatory Commission once again stated that it is necessary to improve the scientific validity of valuation and pricing, gradually improve the valuation and pricing logic that adapts to different types of enterprises and the valuation system with Chinese characteristics.

Existing research points out that the key to building a valuation system with Chinese characteristics is to promote the rationality and effectiveness of asset valuation and pricing [1]. Besides, the motivation is related to the fact that the previous valuation system of listed companies failed to reflect the true investment value of enterprises in the digital economy era and was unable to effectively serve the investment and financing needs of the "dual carbon strategy"[2]. Therefore, the original intention of this system is to urge all enterprises in the market to return to their fundamental values, thereby prompting the capital market to return to professionalism and value and make the current capital market closer to a more standardized, transparent, open, dynamic and resilient [3].

The content of the valuation system with Chinese characteristics mainly points to company valuation in a narrow sense. It is mainly the valuation of the stock value of public companies or the intrinsic value of companies under ongoing operating conditions, including listed or planned joint-stock companies, and is committed to serving the capital market investment decisions [4]. Therefore, how to build a reasonable and scientific valuation system with Chinese characteristics has become an urgent problem that needs to be solved. Many scholars have explored the construction path. The mainstream views are exploring differentiated valuation methods for different types of listed companies [5]. The construction of a valuation system with Chinese characteristics should take into

account the social value such as environmental responsibilities, social responsibilities, and corporate governance (ESG) created by state-owned enterprises [6-7]. Some scholars pointed out that the valuation system with Chinese characteristics should closely link shareholder's value with national development strategies, social development trends, and the well-being of all people, and should take into account shareholder value, employee value, and social value [8]. When it comes to building a specific system, we should incorporate some important "Chinese elements" into the system and calculate the weight based on the actual A-share pricing theory [9].

In the process of improving the valuation system with Chinese characteristics, scholars have proposed ways to improve the valuation of state-owned enterprises, mainly to promote the deepening reform of state-owned enterprises, enhance the core competitiveness of state-owned enterprises themselves, enhance the core competitiveness of state-owned enterprises themselves, and establish long-term investment concepts [10].

2. Establishment and solution of valuation system model with Chinese characteristics

2.1. Selection of characteristic indicators of valuation system with Chinese characteristics

By analyzing research reports and existing research literature, and based on expert opinions such as "China Special Appraisal has a low valuation and huge room for future development", this article extracted 9 indicators, comprehensively evaluate stocks from four aspects. This article defines an objective function to describe Chinese Characteristic Evaluation(CCE) — Chinese Characteristic Evaluation Index, and establishes an evaluation index system for CCE stock.

(1) Policy Orientation:

Strategic Compliance: In the context of the game between great powers, only stocks that are in line with the country's strategic direction will have sustained valuation premiums.

Reform potential: Companies with reform potential are expected to obtain high valuations and potential reinvestment opportunities.

(2) Value investment:

Price-to-earnings ratio (P/E): refers to the ratio of stock market price to earnings per share, which reflects the market's valuation layer and profitability of the company. The higher the P/E ratio, the stock price is overvalued, and vice versa.

Return on equity (ROE): refers to the percentage of net profit to average shareholders' equity. It is the best indicator to evaluate a company's long-term profitability.

(3) Industry characteristics:

Industry concentration: It is the most basic and important factor that determines the market structure and reflects the degree of competition and monopoly in the market.

Initial investment: A company's early investment may bring better market performance and profitability to the company, thereby affecting stock valuation.

(4) Capital allocation:

Subsidies: Enterprises supported by the government will receive more subsidies and have great development potential.

State-owned enterprise or not: In terms of the nature of the enterprise, state-owned enterprises play an important role in national strategy and economic development. It is expected to usher in a reshaping of valuations.

2.2. Analytical hierarchy process to construct evaluation system

2.2.1 Build a hierarchical model

As shown in Figure 1 Analytical hierarchy diagram, the evaluation problem is decomposed into three layers. The top layer is the target layer M, which is the key indicator for selecting appropriate stock characteristics in the evaluation; the middle layer is the criterion layer, including policy

orientation (C1) and value investment (C2), capital allocation (C3), industry characteristics (C4) four indicators. The lowest layer is the plan layer, which is nine influencing factors: strategic compliance (P1), reform potential (P2), P/E ratio (P3), ROE (P4), subsidies (P5), state-owned enterprise or not (P6), industry concentration (P7), initial investment (P8), industry barriers (P9) .

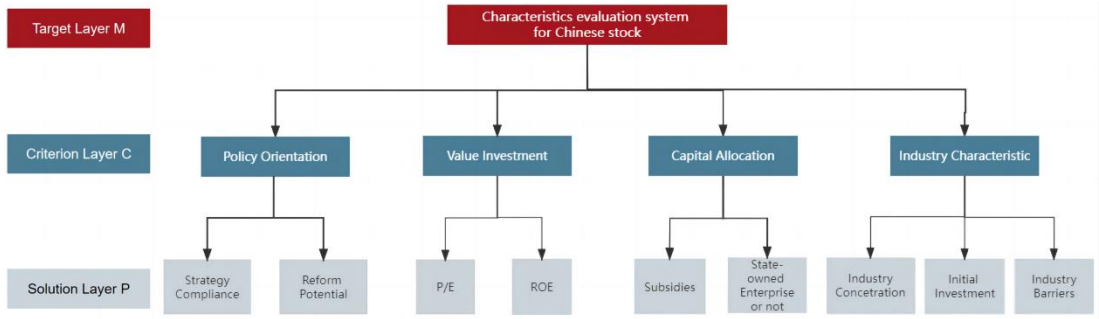


Figure 1 Analytical hierarchy diagram.

2.2.2 Solving process

(1) Construct a judgment matrix M-C (shown in Table 1): Compare the four elements C1, C2, C3 and C4 in the criterion layer pairwise to obtain a pair comparison matrix.

Table 1 Comparison matrix

M	Policy Orientation	Value Investment	Capital Investment	Industry Characteristics
Policy Orientation	1.0000	1.4000	1.6000	1.8000
Value Investment	0.7142	1.0000	1.2000	1.2000
Capital Investment	0.6250	0.8333	1.0000	1.3000
Industry Characteristics	0.5556	0.8333	0.7692	1.0000

We use MATLAB R2021a to solve the eigenvalues of M-C and get $\lambda_{max} = 4.0061$, and the weight vector is (0.3449 0.2455 0.2212 0.1884) T, according to the formula $CI = \frac{\lambda_{max}-n}{n-1}$, $CR = \frac{CI}{RI}$, and compute CR=0.0023＜0.1, which passed the consistency check.

② Construct judgment matrices C1-P. C2-P. C3-P. C4-P, which shown in Table 2 Judgment matrix of C1-P.

Table 2 Judgment matrix of C1-P1

C1	P1	P2
P1	1.0000	1.4500
P2	0.6896	1.0000

2.2.3 Hierarchical sorting and total sorting consistency test

The weight vector, maximum eigenvalue, consistency index CI_i and Consistency ratio CR_j calculated from the above three judgment matrices. It can be seen from the Table 3 Key indicator calculation results that matrices C1-P, C2-P, C3-P, and C4-P all passed the consistency test.

Table 3 Key indicator calculation results

	Weight matrix	λ_i	CI_i	CR_J
C1-P	$\begin{pmatrix}0.5918\\0.4082\end{pmatrix}$	1.9783	0	0
C2-P	$\begin{pmatrix}0.6154\\0.3846\end{pmatrix}$	2	0	0
C3-P	$\begin{pmatrix}0.6135\\0.3865\end{pmatrix}$	1.7599	0	0
C4-P	$\begin{pmatrix}0.4300\\0.3320\\0.2380\end{pmatrix}$	3	6.7833×10^{-6}	1.3045×10^{-5}

2.3. Model conclusion and analysis

According to part 2.2, The total weight of each influencing factor in layer C is calculated and summarized in Figure 2.

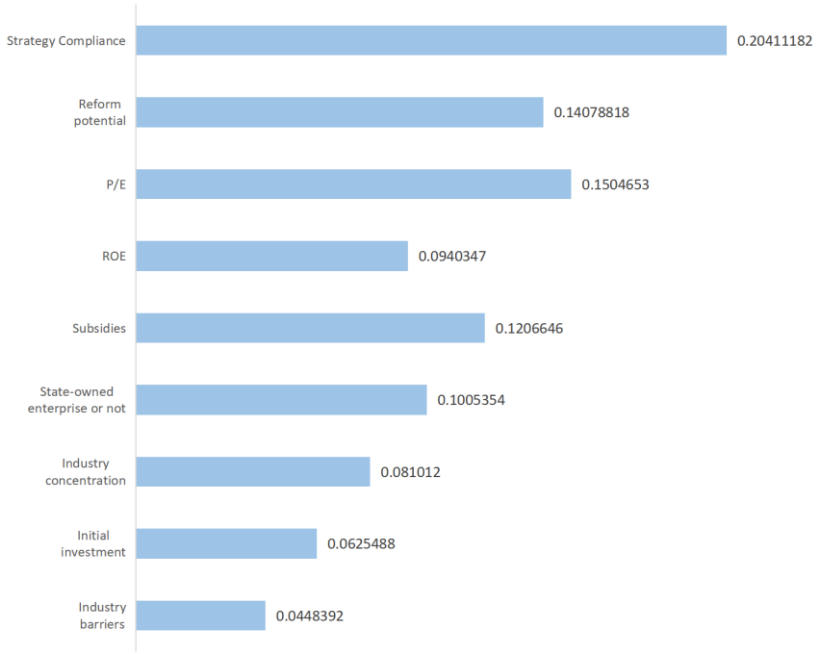


Figure 2 Overview of weights of influencing factors.

Sorting the characteristic indicators of the Chinese stock characteristic valuation system from large to small, we select the top eight factors with the largest weights as branches of the indicator system and discard the indicators with the smallest weights (industry barriers).

Finally, the characteristic valuation system of Chinese stocks we constructed is shown in Figure 3.

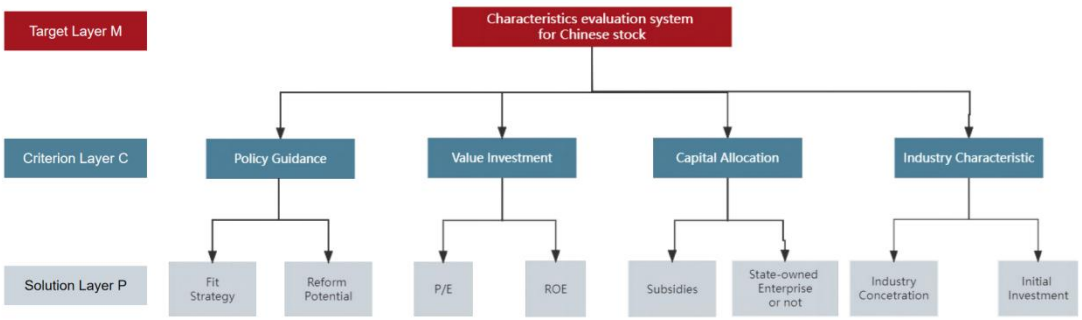


Figure 3 Indicator system.

2.4. Result analysis

2.4.1 Construction of characteristic indicators of CCE stocks

The final evaluation system is shown in Table 4 Indicators' weights determined under the Analytic Hierarchy Process.

Table 4 Indicators' weights determined under the Analytic Hierarchy Process

Evaluation	First layer indicator (Weights)	Second layer indicator (Weights)
Characteristic valuation system for Chinese stocks	Policy Guidance (0.3499)	Does it fit the strategy (0.5918)
		Reform potential (0.4082)
	Value Investment (0.2455)	P/E (0.6154)
		ROE (0.3846)
	Capital Allocation (0.2212)	Subsidies (0.6135)
		State-owned enterprise or not (0.3865)
	Industry Characteristics (0.1884)	Industry concentration (0.1007)
		Initial investment (0.0876)

2.4.2 Use entropy weight method to correct weights

Since the weights set by the analytic hierarchy process have a certain degree of subjectivity, in order to reduce the impact of subjectivity on the quantitative results, this article uses the data-driven entropy weight method to weight, and then recalculates the weight of each indicator in the entire valuation system. proportion. This article extracted all the special-valued stocks in the Shanghai and Shenzhen A securities markets from Flush iFinD, and extracted the relevant indicator data of different medium-valued stocks and the Helfendahl-Hirschman Index of the industry from the CSMAR database.

The entropy weight method is an objective weighting method that can avoid the impact of subjective weighting on the quantitative results of the special evaluation index to the greatest extent. The principle based on the entropy weight method is the degree of variation of the indicator, that is, the higher the degree of variation, the higher the corresponding weight.

First of all, this article needs to forward and normalize the stock indicator data to ensure the non-negative nature of the data.

$$z_{ij} = \frac{x_{ij} - x_{min}}{x_{max} - x_{min}} \tag{1}$$

where z_{ij} is the normalized variable, x_{min} and x_{max} are the minimum and maximum values of each indicator respectively.Calculate the weight of the i-th stock under the j-th indicator, and regard it as the probability of calculating information entropy p_{ij}.

$$p_{ij} = \frac{z_{ij}}{\sum_{i=1}^{n} z_{ij}} \tag{2}$$

Calculate the information entropy of the j-th special evaluation indicator and calculate the corresponding information utility value. The reason for conversion here is that the greater the

information entropy, the fewer indicators of the stock. Introducing the information utility value can positively measure information quantity.

$$e_{ij} = -\frac{1}{\ln n}\sum_{i=1}^{n} p_{ij}\ln(p_{ij}) \tag{3}$$

$$dj=1-ej \tag{4}$$

The final normalization yields the entropy weight of each indicator ω_j.

$$\omega_j = \frac{d_j}{\sum_{j=1}^{n} d_i} \tag{5}$$

The weights of the eight indicators are obtained as Table 5:

Table 5 Corrected feature index weights.

Fit strategy	Reform potential	P/E	ROE
0.2026	0.2624	0.0113	0.0101
Subsidies	Enterprise-owned	Industry concentration	Initial investment
0.2634	0.0529	0.1304	0.0668

3. Conclusions

To describe the portrait of Chinese Characteristic Evaluation stock, the CCE stock valuation system constructed in this article believes that stocks that meet the following characteristics have good potential and belong to CCE stock.

First, CCE stocks need to comply with policy, national strategies and have reform potential.

Second, CCE stocks emphasize value investment. Stocks with low price-to-earnings ratios may bring more benefits to investors, while companies with high return on assets have good growth potential and stronger profitability.

Third, CCE stocks often belong to industries and fields supported by the country. These fields often require large initial investment and feature high industry concentration.

Fourth, CCE stocks focus on the rationality of capital allocation. State-owned enterprises or other enterprises that receive government subsidies have higher potential development possibilities.

To sum up, CCE stock is a stock that is in line with national policy, has the advantage of low valuation, and will achieve high-quality development in the future. Investing in CCE stock is expected to bring objective benefits to investors. The valuation system with Chinese characteristics is an important part of building a capital market with Chinese characteristics. Only by allowing good companies that can provide investors with real dividend income to obtain reasonable valuations can we establish positive incentive feedback and realize the positive mutual promotion of the development of the real economy, the improvement of the quality of listed companies, and the growth of investor returns in the capital market.

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