Original Research Article

Research on the path of financial market reform in the new era -- Analysis of investment strategy

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Abstract: In response to the first question, the core elements of China's stock valuation system are analyzed first, including the following four parts: policy orientation, value investment, asset reorganization and risk management. In other words, under China's stock valuation system, stocks with high valuation meet one or more of the following conditions, are policy-oriented and have considerable growth potential. In other words, the stock price is in the key areas and enterprises with stable growth and state support in the long run, and can pursue higher returns with the lowest risk as possible. In this way, the characteristic indicators of the valuation system model with Chinese characteristics can be established. For problem 2, we classify the indicators established in problem 1. We consider using K-means clustering algorithm and ARIMA time series to construct forecast profit rate indicators, classify and judge the 12 specific indicators after conversion**,** and analyze their characteristics based on the results of different classifications. The characteristic of this analysis is to conduct an analysis according to the mean value or distribution of the features after clustering.

Keywords: Valuation system with Chinese characteristics; K-means; Markowitz; ARIMA time series; Portfoli

1. Problem background and problem restatement

1.1. Restatement of problems

Question 1: Construct the characteristic index of the medium valuation stock and give the portrait of the medium valuation stock to answer what is the medium valuation.

Question 2: According to the characteristic index of the established model, the Shanghai and Shenzhen A-shares are classified, and the investment characteristics of the classified stocks are analyzed.

Problem 3: Combining the hot spots of value investment, asset reorganization, international environment and influence of public opinion, design a short-term stock portfolio based on the special valuation, and carry out actual measurement.

Question 4: Based on the comprehensive analysis of the first three questions, design a long-term stock portfolio model, and analyze the return of the portfolio.

2. Problem Analysis

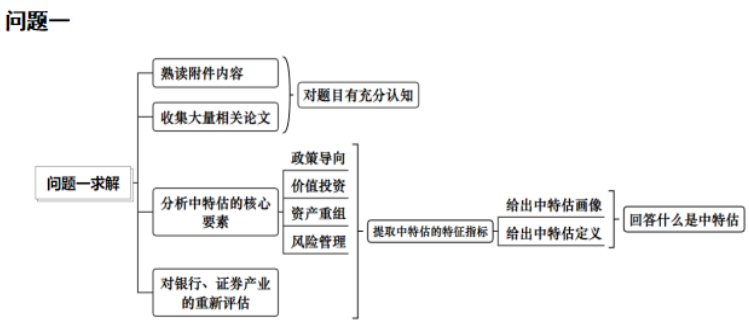


Figure 1. General flow chart of problem analysis.

3. Model assumptions

1.Ignoring the impact of packet loss and retransmission on data download in network transmission;

2.In the process of data processing, assuming that the error is within a reasonable range, the impact on the data result can be ignored;

3.It is assumed that the occurrence of emergency has developmental stability; Do not consider the future inflation and other issues;

4.No major crisis occurred in the financial industry in the selected survey years, and the data were stable;

Note: Each definition and symbol has been detailed in the specific application of the paper, so it will not be repeated here.

4. Modeling and solving of problem 1

4.1. Answer what is a special valuation stock

A special valuation stock is a stock that is closely related to the capital market with Chinese characteristics and the national strategy, and is supported by government policies. Its various business development is supported by national policies. The stock has strong market competitiveness in market competition, as well as strong financial strength and development potential. These stocks generally have a high growth rate and are suitable for long-term investment.

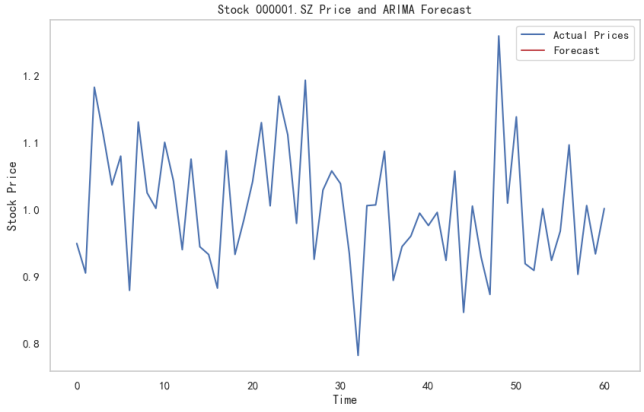
5. Modeling and solving of the second problem

For problem 2, first of all, this paper exports the relevant characteristic index data of Shanghai and Shenzhen A-shares from the Flush Stock Research and Report Center, Wind platform and database, climbs and searches the relevant data platform, extracts as much as possible from the medium characteristic index data, and carries out data sorting and cleaning and missing value processing. Finally, the characteristic information of 12 specific data is obtained for classification analysis.

5.1. Data preprocessing

5.1.1. Risk level index extraction

Extract the characteristic information of each stock from the discovered data, first evaluate the risk status of each stock, and then calculate the average and variance of its increase based on the stock price trend in the past five years. If the variation is large, it indicates that the risk of this stock is relatively large, and then the difference is normalized. The visualization result of the risk rate is as follows:



	证券代码	forecast_profit_rate
0	000001.SZ	-0.601236
1	000002.SZ	-1.038897
2	000004.SZ	0.331060
3	000005.SZ	-0.372407
4	000006.SZ	0.052337
...	...	...
5043	688798.SH	-1.418201
5044	688799.SH	1.090782
5045	688800.SH	-1.108924
5046	688819.SH	-0.433274
5047	688981.SH	0.241879

Figure 2. predicts the profit rate of each stock.

5.2. Feature indicator extraction integration

Combine the above risk situation with the profit rate situation and the data of the special assessment policy indicators, export the table and combine the other digital data feature table, and get the processed 12 special assessment feature information.

Table 1. 12 intermediate assessment characteristics information.

Serial Number	Indicator information
1	Price-to-earnings Ratio (PE,TTM)
2	Month-end stock value
3	Debt ratio
4	R&d investment rate
5	Net profit growth rate
6	Risk rate
7	Growth potential
8	Low valuation
9	Policy support
10	Special categories
11	Medium special assessment value
12	Forecast profit value

5.2.1.Principal Component Analysis

Look at the variance ratio of interpretation through principal component analysis (PCA) to determine how much principal component we need to explain most of the data changes, as shown in Figure 3.

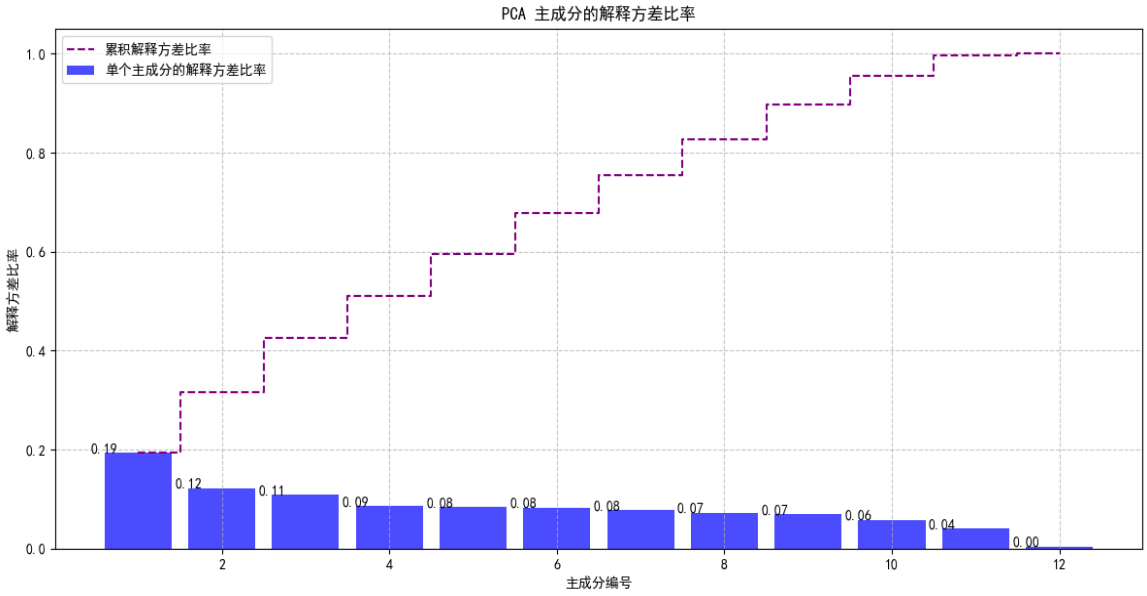


Figure 3. Interpretive variance ratio for PCA.

5.3. K-means clustering algorithm

Next, we will use K-means clustering to classify these stocks. To determine the optimal number of clusters, we can use the elbow rule to determine the optimal number of clusters by plotting an elbow plot, which means we will try different number of clusters and look at the total internal sum of squares for each number, choosing the point at which it begins to decrease rapidly but then becomes flat.

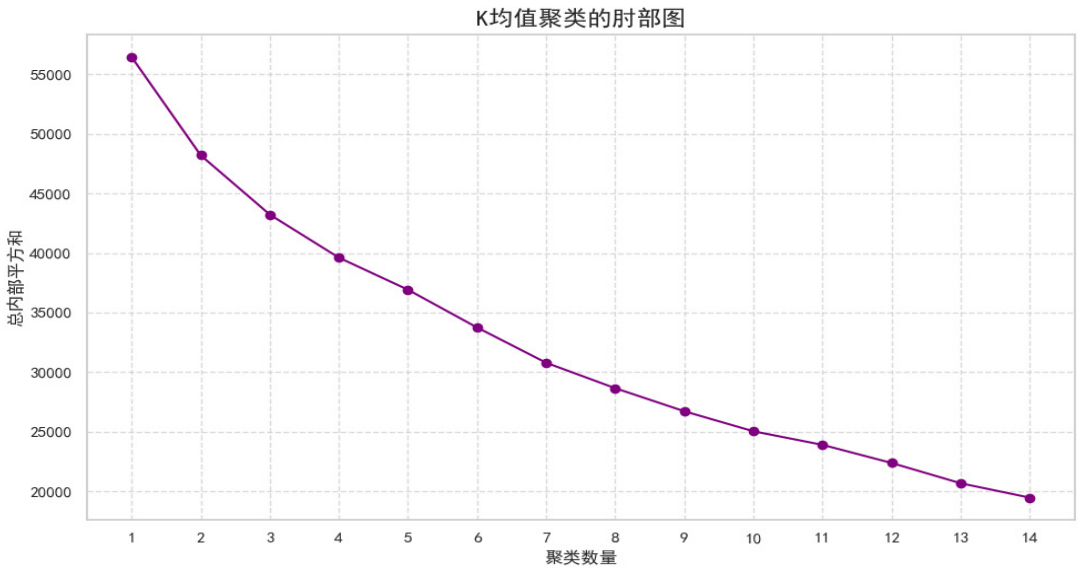


Figure 4. Elbow Rule diagram for K-means clustering.

6. Modeling and solving of problem 3

6.1. The solution of problem 3

Evaluate portfolio performance by using statistical methods such as the Sharpe ratio.

6.2. Set hot indicators

We define (PE,TTM) as an indicator of value investing. The reconfiguration metric represents the amount of asset restructuring or merger and acquisition activity undertaken by the company within the past year. environment_factor and public_opinion_influence indicate the negative or positive impact of the international environment and public opinion on the company. The value ranges from -1 to 1.

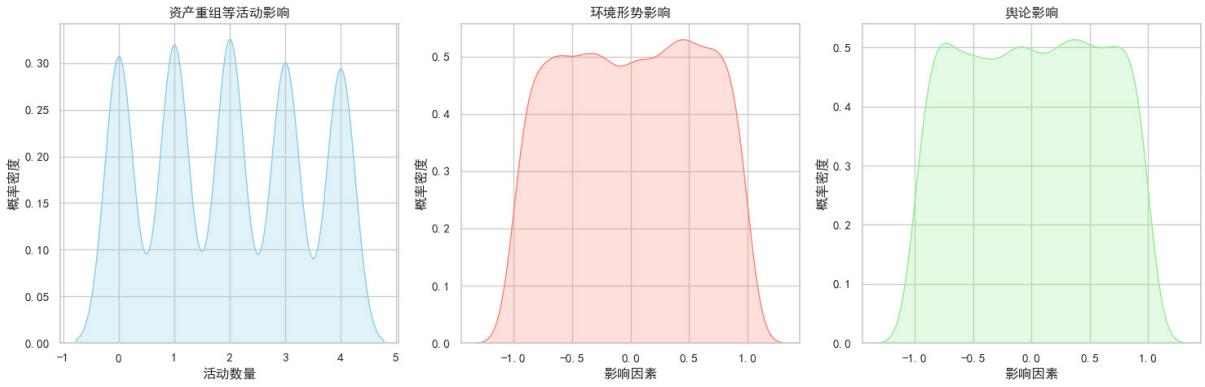


Figure 5. Market hotspot indicator chart.

6.3. Measured portfolio

In order to simulate the actual situation, this paper will randomly generate an influence coefficient for each market hot spot, and calculate the expected return of the portfolio under these influences. The result of the operation is shown in Figure 6.

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原始预期收益：0.9101252819446495
结合市场热点后的预期收益：13.128356462084414
实测的预期收益：0.8179786804594338
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Figure 6. Portfolio expected return graph.

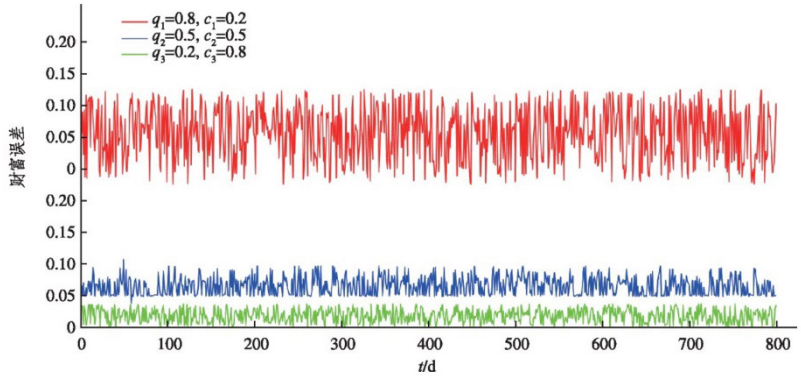

Figure 7. Square of error between actual portfolio wealth and reference portfolio wealth.

(1) portfolio_expected_return: 0.9101

This is the expected return of the portfolio calculated based on the defined data and the optimal weights. It represents the average expected return of the portfolio in the absence of any external market hot spots.

(2) adjusted_expected_return: 13.1284

This is adjusted expected returns after taking into account four major market hot spots, which can increase significantly when they have a positive impact on the portfolio. Here the effect of these hot spots on the portfolio is very positive, resulting in an increase in expected return to 13.12844.

(3) simulated_expected_return: 0.8180

7. Modeling and solving of problem 4

7.1. Improved investment strategy

To sum up, the investment strategy of the selected 10 stocks can be briefly summarized as follows: ① add a small position: Zhuhai Zhongfu, Zhouming Technology, Xianfeng Holdings; ② Continue to hold: Cazenove International, Guangzhou Port, Suiheng Yun A, Tomson BiHealth; ③ gradually reduce or close positions: Merchants Shekou, Yuetai Shares, Hengji Daxin.

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