Analysis of Impact Weights of China's Quantitative Trading Industry

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Abstract: By studying the influencing factors and weight analysis of the quantitative trading industry in China's financial sector, collecting official data from 2019 to the end of 2022 and data publicly disclosed by some quantitative trading institutions and using SPSS software for data analysis, it was found that factors such as macroeconomic and financial market fluctuations, changes in policies and regulations, advancement of technological innovation, and changes in investor behavior have had varying degrees of impact on the quantitative trading industry.

1. Introduction

Based on the weight analysis of these influencing factors, this article proposes a series of countermeasures and suggestions, including strengthening regulatory efforts, improving policy systems, enhancing technology research and development capabilities, and optimizing investor services, to promote the healthy progress of the quantitative trading industry in the financial sector in China.

2. Overview of Impact Weights of China's Quantitative Trading Industry

2.1 Current Situation of Quantitative Trading Industry in China

The quantitative trading industry in China's financial sector has developed rapidly in recent years. Here are some specific data to illustrate its current situation:

Transaction Size: According to data released by the China Securities Investment Fund Industry Association, the quantitative transaction size of China's public funds in 2019 was approximately 1.04 trillion yuan, accounting for 9.6% of the total size of public funds. By the first half of 2021, the quantitative trading scale of public funds in China has exceeded 1.6 trillion yuan.

Trading strategies: According to Wind data, the common quantitative trading strategies in China's public funds currently include momentum strategies, value strategies, low volatility strategies, and multi-factor strategies.

Market performance: According to data from Tianxiang Investment Consulting, in the first half of 2022, about 70% of the A-share market in China was held by public funds, of which about half were held by quantitative funds. In 2021, four of the top five funds in China's market were quantitative funds.

Policy environment: In 2019, the China Securities Regulatory Commission issued the *Measures for Quantitative Investment Management of Securities Investment Funds*, providing legal basis and regulatory norms for quantitative investment. In addition, in June 2019, the Central Bank issued the *Notice on Strengthening Quantitative Investment Management*, which regulates the qualification requirements and business operations of quantitative investment institutions [1].

Talent Status: According to Wind data, as of the end of June 2022, there were 58 quantitative investment institutions in China, among which the top 5 institutions were Guangdong Development Fund, Harvest Fund, Huaxia Fund, Huitianfu Fund, and E Fund. At the same time, the demand for high-end talents in the field of quantitative investment continues to increase, attracting a large number of outstanding graduates and talents from finance, mathematics, computer, and other majors to join [2].

2.2 Significance of Impact Weight

The impact weight analysis of the quantitative trading industry can help people better understand the operation and changes of the quantitative trading market. In this field, impact weight refers to the degree to which different factors affect market prices and trading volumes. These factors may include market data, technical indicators, macroeconomic changes, etc. When analyzing the impact weights, you can rank and allocate the weights of these factors to more accurately predict market trends and prices[3].

The significance of studying impact weights can be embodied as follows: First, improve the accuracy of investment decisions. Through weight analysis of influencing factors, it is possible to better understand the impact of each factor on the market, thereby more accurately predicting market trends and prices, and providing a more reliable basis for investment decisions. Second, help investors better recognize market changes. By analyzing the weights of various factors, investors can better know market changes and better grasp market opportunities and risks. Third, provide support for quantitative trading[4]. Quantitative trading relies on a large amount of data and algorithms, and research on impact weights can provide more reference and support for quantitative trading, thereby improving trading efficiency and accuracy. Fourth, promote the progress of quantitative trading. With the continuous progress of quantitative trading, the research on impact weights will continue to deepen, which will provide more impetus and support for the progress of this field[5].

3. Research Methods and Data

3.1 Research Description

The impact factors of the quantitative trading industry in China's financial sector can be analyzed from multiple perspectives. The following are some possible factors:

① Macroeconomic environment: Changes in the macroeconomic environment may have a significant impact on financial markets, thereby affecting the effectiveness of quantitative trading. For example, inflation rate, economic growth rate, interest rate level, and other vital indicators of the macroeconomic environment may have a significant impact on quantitative trading.

② Investor behavioral demand: The behavioral demand of investors for quantitative trading is also a vital influencing factor. If investors' demand for quantitative trading increases, it may encourage more funds to flow into this field, thereby affecting the operation of the market. On the contrary, if investors' demand for quantitative trading decreases, it may cause market operation to be hindered.

③ Investment strategy and technological innovation: The effectiveness of quantitative trading depends largely on the investment strategy and technological innovation adopted. For instance, momentum strategies, value strategies, low-volatility strategies, and multi-factor strategies are common quantitative trading strategies. The effects and application scenarios of each strategy are different, and technological innovation capabilities may have an impact on the market.

④ Data acquisition and processing technology: Another vital aspect of quantitative trading is data acquisition and processing technology. Efficient and accurate data acquisition and processing technology can improve the efficiency and accuracy of quantitative transactions, thereby affecting the operation of the market. Conversely, if data acquisition and processing technology is not advanced enough, it may lead to a decline in the effectiveness of quantitative trading.

⑤ Policy environment: The policy environment is also a vital influencing factor. For example, changes in regulatory policies may have a significant impact on quantitative trading. In addition, changes in the policy environment may also affect the overall operation of the capital market, thereby affecting the effectiveness of quantitative trading.

In summary, the above factors may have an impact on quantitative trading in the financial sector of China, and need to be comprehensively considered[6].

3.2 Data Sources

The data used in this article are mainly from relevant data released by official institutions such as the China Securities Investment Fund Industry Association, the China Securities Regulatory Commission, the People's Bank of China, the National Bureau of Statistics, and some publicly disclosed data from quantitative trading institutions. The data period used in this article is from 2019 to the end of 2022. Data collection and processing are analyzed using SPSS software.

4. Data Analysis and Discussion

4.1 Data Analysis

This AHP analytic hierarchy process is used to study official data and expert scoring weight calculation.

First, AHP is used to calculate the weight, and consistency testing is required. It is only valid if it is passed.

Second, describe the weight of each indicator one by one.

Third, SPSS uses the product method to conduct AHP analytical hierarchy process research. As shown in Tab. 1.

Table 1 AHP Data Analysis

AHP data					
	Macroeconomic environment	Investor behavioral needs	Investment strategy and technological innovation	Data acquisition and processing technology	Policy and regulatory environment
Macroeconomic environment	1.000	0.833	0.909	1.111	1.000
Investor behavioral needs	1.200	1.000	1.111	1.250	1.250
Investment strategy and technological innovation	1.100	0.900	1.000	1.429	0.833
Data acquisition and processing technology	0.900	0.800	0.700	1.000	0.769
Policy and regulatory environment	1.000	0.800	1.200	1.300	1.000

It can be seen from the above table that a total of 5 items are constructed for the macroeconomic environment, investor behavior needs, investment strategies and technological innovation, data acquisition and processing technology, and policy and regulatory environment to conduct AHP hierarchical analysis (the calculation method is the sum product method). The analysis results show that the characteristic vectors are (0.958, 1.150, 1.029, 0.823, 1.040), and the corresponding weight values of the total 5 items are: 19.158%, 23.005%, 20.576%, 16.454%, and 20.807%, respectively. In addition, the maximum feature root (5.017) can be calculated by combining the feature vectors, and then the CI value (0.004) [CI= (maximum feature root-n)/(n-1)] can be calculated using the maximum feature root value. The CI value is used for the following consistency check. As shown in Tab. 2.

Table 2 Random Consistency RI Table

Random Consistency RI Table														
Nth order	3	4	5	6	7	8	9	10	11	12	13	14	15	16
RI value	0.52	0.89	1.12	1.26	1.36	1.41	1.46	1.49	1.52	1.54	1.56	1.58	1.59	1.5943
Nth ord	17	18	19	20	21	22	23	24	25	26	27	28	29	30

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RI value	1.6064	1.6133	1.6207	1.6292	1.6358	1.6403	1.6462	1.6497	1.6556	1.6587	1.6631	1.6670	1.6693	1.6724

When using AHP analytic hierarchy process to calculate the weight, it is essential to conduct consistency testing analysis.

This study has constructed a 5-order judgment matrix, corresponding to the above table, which can be queried to obtain a random consistency RI value of 1.120. The RI value is used for the following consistency test calculations. As shown in Tab. 3.

Table 3 Summary of conformance inspection results

Summary of conformance inspection results				
Maximum characteristic root	CI value	RI value	CR value	Consistency inspection results
5.017	0.004	1.120	0.004	Pass

From the perspective of CR value, the CR value in the above table is less than 0.1, which can be judged that the matrix meets the consistency test. The CI value calculated for the 5th order judgment matrix is 0.004, and the RI value is 1.120. Therefore, the calculated CR value is 0.004<0.1, which means that the judgment matrix in this study meets the consistency test, and the calculated weights have consistency. As shown in Fig. 1.

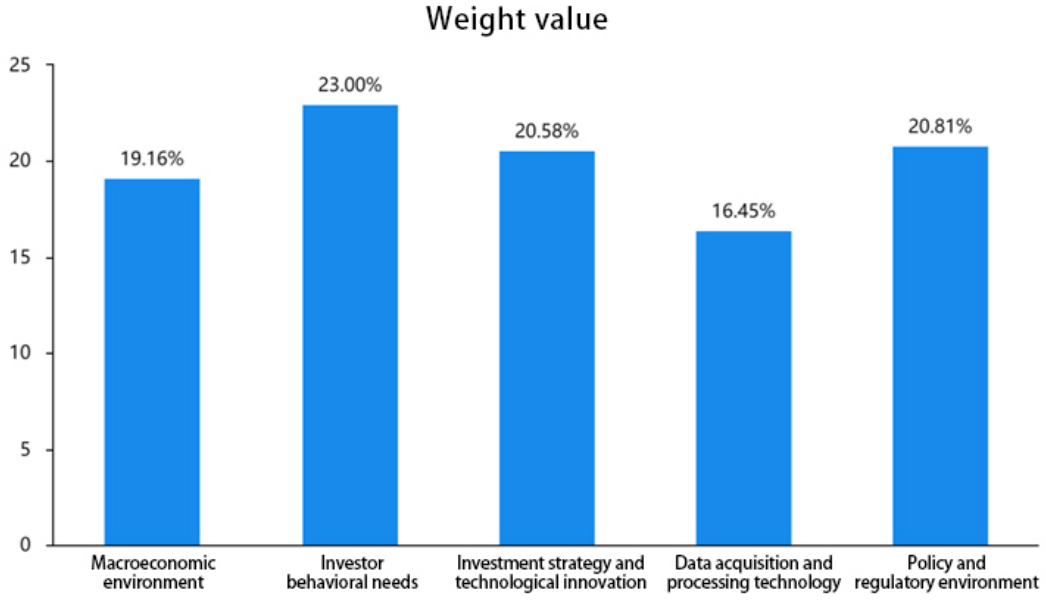

Figure 1 Weight Value Structure Chart

4.2 Discussion

According to the analytic hierarchy process (AHP) results, investors' behavioral needs, investment strategies and technological innovation, as well as the policy and regulatory environment, rank among the top three in terms of weight. It can be seen that China's quantitative trading industry needs to work hard in these three aspects, while the volatility of the financial market is relatively large. From the perspective of other two data acquisition and processing technologies, and the macroeconomic environment, the weight value is not low. Overall, the five weight impact factors are all shown as impact.

5. Countermeasures and Suggestions

Based on the weights of the above impact factors, countermeasures and suggestions can be proposed for each factor, as follows:

Macroeconomic environment: Changes in the macroeconomic environment have a significant impact on quantitative trading, so it is essential to closely focus on changes in the macroeconomic

environment and adjust investment strategies in a timely manner. It is recommended that quantitative trading institutions establish a complete macroeconomic research team, track and study macroeconomic indicators, and timely adjust investment strategies.

Investor behavior demand: Investor demand is a vital factor affecting quantitative trading, so it is essential to closely focus on changes in market demand and develop quantitative trading strategies that are more responsive to investor demand. It is recommended that quantitative trading institutions strengthen communication with investors, understand their needs, and develop quantitative trading strategies based on their needs.

Investment strategy and technological innovation: Investment strategy and technology are vital factors that affect the effectiveness of quantitative trading, so it is essential to continuously innovate and enhance investment strategy and technological innovation to strengthen the efficiency and accuracy of quantitative trading. It is recommended that quantitative trading institutions strengthen the research and development of investment strategies and technologies, focus on innovation and improvement, and improve the effectiveness of quantitative trading.

Data acquisition and processing technology: Data acquisition and processing technology is a vital factor affecting the effectiveness of quantitative trading, so it is essential to strengthen the research and development of data acquisition and processing technology. It is recommended that quantitative trading institutions establish professional data acquisition and processing teams and adopt advanced technical means to enhance the accuracy and efficiency of data acquisition and processing.

Policy environment: Changes in the policy environment can also have an impact on quantitative trading, so it is essential to closely focus on changes in the policy environment and adjust investment strategies in a timely manner. It is recommended that quantitative trading institutions establish a policy research team to track and study policy changes and adjust investment strategies in a timely manner.

In summary, in response to the above factors, quantitative trading institutions should take corresponding countermeasures and suggestions to enhance the effectiveness and benefits of quantitative trading.

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