

# Research on the Development Status and Risk Management of Quantitative Investment- Based on Chinese Market

Shunji Fan

<sup>1</sup>School of mechanical and electronic engineering, Wuhan University of Technology, Hubei Wuhan, China, 430000

\*Corresponding author. Email: star075482@163.com

## ABSTRACT

With the development of the Internet, the quantitative investment market is expanding. At present, many developed countries have built a complete quantitative investment system, but due to the late start of China's financial market, the quantitative investment system still has more improvements to be made. Through the study of relevant literature and the analysis of the current market situation, this paper briefly describes the trading strategy of quantitative investment, the current status of quantitative investment in China and the possible risks: data risk, systemic failure risk and market risk, and puts forward risk control suggestions: follow the three regulatory principles of fair trade, qualitative regulation and classification regulation; clarify the regulatory process; improve the risk management defense line; improve the technical analysis system; standardize the quantitative investment process and investment manager behavior principles.

**Keywords:** *Quantitative investment, China, Risk, Regulation*

## 1. INTRODUCTION

In the developed countries, quantitative trading accounts for 70% of the total trading volume in financial markets. In contrast, quantitative investment in China is still in the exploratory stage, and the means of quantitative investment are relatively simple and the scope of quantitative investment is limited [1]. Through the analysis of the current situation of the Chinese market and the study of related literature, this paper briefly describes the trading strategy of quantitative investment, the current situation of quantitative investment in China and the possible risks, and puts forward risk control suggestions. Hopefully, this paper can improve the level of quantitative investment in the financial market, so as to reduce the possibility of capital market turmoil caused by quantitative investment risks and ensure the steady development of China's financial market.

## 2. TRADING STRATEGY

The so-called quantitative investment is actually an investment method that transforms the investment concept or observation of the market into a mathematical model, and after verifying and summarizing this

mathematical model based on historical data, it will use the computer technology to analyze the profitability method and then conducts automatic trading [2]. However, specifically, the quantitative investment varies significantly from different strategies.

In current A-share market, multi-factor strategy, arbitrage strategy and CTA strategy are the three most important quantitative investment methods. Meanwhile, with the development of artificial intelligence technology in recent years, many investors hope to optimize their investment methods and increase their investment returns by means of autonomous machine learning [3].

### 2.1. Multi-factor Stock Selection

The essence is to collect historical data (macro indicators, financial indicators), find out the correlation between the above data and the rise and fall of stock prices, and then assign a certain weight (i.e., ratio) according to the strength of the correlation. Multi-factor has developed into a widely used stock selection strategy. According to the perspective of factor analysis, it can be divided into fundamental factors (value factor, earnings factor, growth factor), technical level factors (momentum factor, market capitalization factor, volume

factor), and market level factors (external environment factor, industry factor).

## **2.2. Arbitrage**

Arbitrage refers to the difference in price between two markets for the same commodity, where the investor can buy low and sell high to gain profit. For example, a bottle of the same brand of beverage is sold for RMB 3.50 in the city center, while it costs only RMB 3 in the supermarket down the street. If you buy just one bottle, the RMB 0.5 difference will not take consumers far, but if you buy hundreds or thousands of bottles, the difference will be very significant.

In financial markets, an arbitrage investor usually looks for the spread of the same financial product in different markets, while a quantitative investor expands arbitrage gains through high-frequency trading (more transactions) and high leverage.

## **2.3. CTA Strategy**

In simple terms, CTA detects commodity prices and profit by judging future price trends. It should be noted that the domestic futures market can be traded "T+0", which provides convenience for intraday short term trading, so quantitative investors can make a profit by holding long and short orders of futures (financial futures + commodity futures).

# **3. CURRENT SITUATION OF QUANTITATIVE DEVELOPMENT IN CHINA**

## **3.1. High Net Worth Investors Favor**

The performance of funds using quantitative investment strategy is significantly better than the funds without quantitative investment strategy [4]. In recent years, due to the influence of economic globalization and anti-globalization, the stock market in China has experienced relatively large fluctuations. The performance and the effectiveness of traditional investment strategies are not significant, in contrast, quantitative investment strategies have attracted more and more attention with their stable investment returns and rational investment strategies [5].

Despite the recent tighter regulatory trend in the quantitative private equity industry, the attractive performance returns of quantitative private equity products have attracted many high-net-worth investors. According to public data, as of September 10, the average return of CSI 500 index enhanced quantitative strategy private equity products under 10 billion quantitative private equity institutions has reached 42.44% this year, and the excess return is 23.24% [6].

## **3.2. Competition for Talents**

In recent years, quantitative private equity firms have made great efforts to compete for talents, both in terms of improving compensation packages and in terms of "poaching" from competing firms. The competition for talents, not the technology, is at the heart of quantitative trading; only a strong professional talent can ensure that the technology advances to a higher level.

Many investment research links in the quantitative industry are executed by computers. In addition to some professional financial talents in factor mining, data back-testing, machine deep learning, and algorithmic trading, professional talents in artificial intelligence, computers, mathematics, and even physics are needed, and talent diversification is a major trend in the future development of the quantitative industry [7]. Under the trend of booming the domestic quantitative industry, high quality professionals will also be the target of the quantitative institutions to hire with high salary, and even spare no effort to compete for them.

## **3.3. Strategy Homogenization**

With the rapid expansion of quantitative private equity products, the whole market is becoming highly homogenized. Specifically, the underlying assets of many quantitative private equity products - the CSI 500 index basket of stocks - are "highly homogeneous", and the selection of individual stocks in the enhanced part of the index also shows a higher degree of similarity.

Many quantitative investment institutions have also realized the problem of high homogeneity of quantitative strategies and started to adjust their quantitative strategies, choosing low and medium frequency quantitative investments, i.e. gaining considerable performance through stock picking and trading (selecting individual stocks for long-term holding) strategies; or adding timing hedging, CTA and other strategies to their existing quantitative investment models to minimize the net value retracement during the periods of severe market volatility. In addition, some quantitative private equity institutions with strong R&D capabilities are introducing fundamental quantitative strategies and combining different investment strategies with long-term high return potential and low correlation to build new quantitative investment models to replace quantitative strategies that show signs of high homogeneity such as algorithmic T+0 [6].

# **4. RISKS OF QUANTITATIVE INVESTMENT**

## **4.1. Data Risk**

Although quantitative investment strategies can reduce the influence of human factors on investment

decisions to some extent, they cannot ensure the authenticity and safety of data sources. In the context of the prevail of the big data, the information data on the Internet are in a period of explosive growth. The mixture of real and fake data makes it much more difficult to do the data analysis work. Once investors make mistakes in the data screening and data inspection stage, it will inevitably cause the accuracy of data analysis and modeling results to be significantly reduced, eventually leading to the capital losses of the investors.

#### **4.2. System Failure Risk**

System failure can also directly lead to the increase of the investment risk. The risk of system failure is mainly caused by the following three points:

First, the system hardware and the network equipment failure will result in the disconnection, computer downtime, lagging and other phenomena. Second, when performing investments, investors do not have proper arrangements in terms of positions and capital allocation, which will lead to a mismatch between capital and positions and a blowout. Third, due to the lack of systematic trading standards in China currently, most investment institutions and individual investors set up trading systems based on their own conditions, which not only lacks scientificity, but also will easily lead to trading loopholes.

#### **4.3. Market Risk**

Quantitative fund fire sales have a much larger impact on market instability than fire sales by traditional mutual funds. For the same magnitude fire sale, the impact of quantitative funds is over eight times as large. The larger impact is due to quantitative funds' reliance on similar trading strategies and their strategies' sensitivity to the time-series of returns [8].

There are different levels of investors in the current domestic capital market, such as institutional investors, corporate investors, individual investors. Among the investors at various levels, institutional investors basically determine the direction of the capital market to some extent because of their advantages such as strong capital and professional talents. In addition, most domestic quantitative investment institutions exist in the form of retail investors, whose comprehensive strength and professional technical level are low. Moreover, the existence of a large number of retail investors has caused confusion in the investment market, and the whole investment market lacks control and official guidance. Some individual investors or institutional investors even try to exploit the loopholes of the capital market and use illegal means to manipulate the market in order to obtain high profits.

## **5. RISK CONTROL**

### **5.1. Follow the Regulatory Principles**

When controlling the risk of quantitative investment in the capital market, it is necessary to follow the three regulatory principles of fairness, qualitative regulation and classification regulation. Firstly, Fairness and reasonableness are the foundation for maintaining the healthy and effective operation of the capital market. For a large number of investors in the securities market, only by eliminating their worries about uncertainty, can the market better developed better. Therefore, the regulatory authorities should make a difference, practice fair and reasonable transaction principles at all times [9]. Secondly, since most of the current quantitative investment trading rules are prepared based on previous financial and mathematical theories, but the Internet technology is developing and spreading very fast, thus the quantitative investment system is updated equally fast, it is difficult to implement the regulation by quantitative means. Therefore, quantitative investment should be regulated by means of qualitative analysis, and the qualitative analysis criteria should be updated in a timely manner in accordance with the development of the capital market. Moreover, quantitative investment can be widely applied in various fields of the capital market, so it should be differentiated according to the nature and types of quantitative investment objects, and should be regulated in a categorical manner to control the behaviors that undermine the security and fairness of transactions and reduce the incidence of risks.

### **5.2. Clarify the Supervisory Units and Supervisory Process**

In terms of supervisory units, the exchange supervision should be taken as the first line of defense for supervision, and the CSRC should be taken as the last line of defense and control to carry out layers of supervision. In terms of specific regulatory content, the exchange supervisor should be in charge of the real-time monitoring of abnormal situations of quantitative investment, and to formulate corresponding response measures in a timely manner according to the actual situation, while informing the regulator of the latest situation. Local securities regulators should focus on managing capital market trading issues within their jurisdictions together with the other two parties. The development of regulations and rules related to quantitative investment in capital markets and the establishment of risk warning mechanisms should be mainly led by the CSRC.

In terms of the regulatory process, the regulatory responsibilities of each department should be clarified. As the first line of defense for risk supervision, when the abnormal trading is discovered in the market, firstly,

the risk level should be classified, significant elements should be reported to the relevant regulators in a timely manner, and an emergency disposal team should be quickly set up and then formulate an emergency treatment plan; secondly, whether the event violates relevant laws and regulations should be judged, and for illegal quantitative investment behaviors, it should report to the CSRC in a proactive and timely manner and publicize the punishment results to the society.

### ***5.3. Improve Risk Control Defense Line***

Risk management, as an indispensable link in the quantitative investment business in the capital market, should always be put in the first place in the process of investment business and control all kinds of influencing factors before the risk triggers a crisis as far as possible. To effectively avoid risks and minimize the losses caused by the risks already incurred, the construction of a risk prevention and control system involving quantitative investment before, during and after the event should be accelerated, and centralized management of various quantitative investment businesses should be implemented.

### ***5.4. Improve the Technical Analysis System***

To effectively avoid the risks caused by data defects and system failures, the first thing is to pay attention to the improvement of computer technology, and to enhance the degree of fit between computer technology and the mathematical model constructed, and to strengthen the system's analysis and update efficiency of the data. For the application of the computer technology, it is necessary to consider a mixture of big data, cloud computing, artificial intelligence and other technologies, and to strive to expand the depth and the breadth of data analysis. At the same time, for the technical analysis module in the system, stock valuation indicators, fundamental analysis indicators, trading trends and arbitrage should be added to improve the accuracy of the analysis results.

### ***5.5. Standardize Quantitative Investment Process and Investment Manager Behavior Principles***

The quantitative investment business mainly consists of five aspects, including strategy development and research, strategy decision-making, implementation of investment behavior, investment performance reporting and investment fund management. The development and the research of investment strategies should be proposed by those who are in charge of quantitative investment business, and then professional quantitative investment personnel should be arranged to conduct detailed research, analyze the principles and feasibility of the strategies, and to forecast the implementation effect of

the strategies by combining the historical back-testing results and the historical performance of the strategies. And the investment manager should always follow the following principles: firstly, it should follow the principle of maximizing the interest of the company while the risk is under control. Secondly, the relevant regulations on quantitative investment in the market and the relevant systems of the company should be strictly followed. The specific measures of the quantitative investment strategy should be entrusted to professionals to implement, and should also be operated in strict accordance with the regulations of the quantitative investment strategy, and strictly monitor and analyze the implementation process of the strategy in real time [10].

## **6. CONCLUSION**

This paper systematically describes the quantitative investment trading strategies and the development status of the Chinese financial market, it is found that the risks of quantitative investment at this stage mainly include: the data risk, system failure risk, and market risk, and these risks can be regulated through the five measures of following the principles: clarifying the regulatory process, improving the risk control defense line, improving the technical analysis system, and standardizing the quantitative investment process and investment manager behavior principles in order to promote the development of quantitative investment methods and create a healthy and good market investment environment. Meanwhile, there are many shortcomings in the research of this paper. First, due to the large amount of data and mixed quality, and some data have never been disclosed, the article lacks analysis of the data; in addition, due to the hasty completion of the article, some of the relevant literature may not be involved in this paper, so there may be some omissions.

As more and more people are entering the quantitative investment, its benefits are gradually decreasing, and some institutions with technical problems in quantitative investment are facing the risk of being eliminated at any time. Therefore, in order to truly occupy a place in the field of quantitative investment, it is necessary to continuously strengthen the research on quantitative investment techniques and pay close attention to the latest trends of the capital market to strengthen competitiveness.

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