

Research on Problems and Solutions of Quantitative Investment in the Chinese Market

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Abstract. Quantitative investment has gradually become increasingly important in the Chinese finance market in recent decades. It improves the efficiency of investment, reduces the risk of investment, enhances the liquidity of some market assets and provides new opportunities to accumulate wealth for investors. As a new investment method, it raises some problems which lead to the turmoil of the market when it keeps developing and gaining traction. This paper will review the current situation of quantitative investment in the Chinese market from its development history and the sizes of funds. This study shows that there are mainly four problems existing in the application of quantitative investment in China. Listed below are problems. The evident government intervention in the market has a negative impact on the fitting effectiveness of quantitative models. Some kinds of assets and commodities face poor liquidity and for them, quantitative investment strategies can hardly be conducted accurately. The accuracy of quantitative analysis can be unreliable for the financial data is sometimes incomplete and unreliable in the Chinese market. The high-frequency trading affects the stability of the whole market because of lack of market supervision. This paper also puts forward relevant countermeasures and suggestions according to these problems. This study has great significance to the healthy development of quantitative investment in the Chinese market.

Keywords: Quantitative investment, Chinese market, financial technology.

1. Introduction

For a long period, how to measure and control the risk of investment is an important topic in financial field. By 1964, Sharpe proposed the capital asset pricing model (CAPM), which was applied to explain the market equilibrium theory of capital prices under risk conditions [1]. It provides a theoretical framework and method that is applied to understand and predict the capital market through quantitative analysis. The following research go a step further in it. Fama and French established the three-factor model by researching the cross-sectional differences in stock returns and bringing in new factors based on CAPM. It performs better than CAPM in explaining the return of investment to some extent [2]. The development of the three-factor model pioneers' multi-factor quantitative investment which is the foundation of modern quantitative investment. Research keeps developing and lead to the application of advanced technologies in this field. There are lots of research on the application of artificial intelligence in many aspects, including portfolio optimization, stock market prediction, financial sentiment analysis [3]. Furthermore, practices in investment verifies the advantage of quantitative analysis in return prediction, risk management and portfolio selection and many other fields, which leads to the growing prevalence of quantitative investment, including in the Chinese market. Quantitative investment promotes efficient allocation of market resources, improves the efficiency and liquidity of the Chinese market. It helps investors and enterprises allocate assets and manage risk better. The introduction of quantitative tools and strategies stimulate the vitality of innovation of investors and institutions, accelerating the advanced development of financial technology. However, as a continuously developing investment method, the problems it is facing are becoming increasingly prominent, bringing a series of challenges to the financial market and public, especially when the Chinese market is still immature, and fragility compared to Western countries. Therefore, it is imperative to conduct research on the problems and put forward relevant solutions, which plays an significant role in ensuring the continuous play of advantages of quantitative

investment and realizing its public benefits. This paper will pay attention to the current situation, potential problems and relevant solutions of quantitative investment in the Chinese market.

2. Current Situation

Quantitative investment has been gradually developing and growing in the Chinese market in recent years. Increasing number of investors and institutions has realized the advantages of quantitative investment in improving the efficiency of investment and managing its risk over traditional investment methods. Therefore, quantitative investment strategies become indispensable in investment field and quantitative funds become an important part of funds.

Everbright Pramerica Fund Management Co., Ltd. set up its first quantitative fund and quantitative investment become increasingly popular in the Chinese market after that. The development of quantitative investment in China can be divided into three stages. The first stage is the embryonic stage. Limited by insufficient quantitative tools and limited quantitative techniques, the strategies of quantitative funds are limited to quantitative market timing, stock selection and other basic application. The second stage is the developing period from 2010 to 2014. The symbol of this period is the SSE 300 Stock Index Futures listed on the A-share Market, which provide an opportunity for quantitative hedging strategies to play an advantage. The quantitative strategy mainly focuses on medium and low-frequency trading, getting returns mainly through arbitrage, hedging and multi-factor strategy. The third stage is the flourishing period from 2015 to present. The symbol of this stage is the CSI 500 Index Futures listed on the A-share market, which provides more opportunities to apply quantitative strategies. Meanwhile, with the increasing number of stocks available for margin trading and short selling, quantitative strategies enter precision and high-frequency trading period. Moreover, artificial intelligence is also largely applied to quantitative investment.

For now, the development trend of quantitative investment in the Chinese market is positive. The top quantitative funds in the US mostly have a scale of over 10 billion dollars and there are also many funds worth more than 50 billion dollars. By contrast, there are 32 private equity quantitative funds over 10 billion yuan, which indicates the vast development space for quantitative finance. Meanwhile, competitions between funds will be fiercer in the future. To gain an advantage, the competition for talent, the continuous application of new technologies and the development of new quantitative tools to adapt to the future are predictable. Furthermore, as quantitative investment become increasingly popular, the Chinese government encourages and supports the innovation and development in the field of quantitative investment. Through policy support, technological assistance, and other means, the Chinese government promotes the healthy development of financial market. Although the development trend of quantitative investment in China is positive, it still faces some problems whether in the past of future.

3. Problems

3.1. Government Intervention

Compared to the international financial market, the Chinese government frequently takes measures to reduce prices fluctuate, including directly trading and carrying out diverse and universal policies, which may even lead to the development of government-centered market, instead of market based on asset fundamentals in extreme situations [4]. Thus, in order to curb inflation and ensure basic livelihoods, the Chinese government implements a series of abundant and stringent policies. Under the circumstances, the fitting effectiveness of quantitative models that developed based on financial markets in the Western countries is sometimes not satisfactory and even somewhat biased, which leads to the effectiveness of quantitative investment unsatisfactory.

3.2. Poor Liquidity

Some assets and commodities in the Chinese market face poor liquidity, such as some newly listed stocks, small-cap stocks and a few agricultural futures. There are various reasons and consequences. For example, the market depth is insufficient and there are few buy and sell orders posted, leading potential price slippage when large trades happen. Limited understanding of the market by investors because of information disclosure in newly listed stocks, small-cap stocks or a few futures leads to information asymmetry among investors. Some investors may not access accurate and timely information, which affects their decision-making and leads to low trading activity, and leads to delay in trading in the end. The above phenomena affect the efficiency of quantitative trading strategies relying on executing trading rules and signals accurately and rapidly.

3.3. Financial Data

The Chinese financial market is still in its early stages of development. Regulatory systems and market mechanisms are imperfect. Limited data sharing and integration capabilities exist in and between various departments. Consequently, publicly available financial data in the Chinese market may be more incomplete and inaccurate compared to the markets of Western countries, which leads to inaccuracy and unreliability in model analysis when investors applying such data. Therefore, the accuracy and reliability of quantitative investment decision-making is affected. Cornell points out that information asymmetry can potentially causes unbalanced decision-making situations [5].

3.4. Insufficient Regulations

High-frequency trading is a type of algorithmic trading in finance characterized by high speeds, high turnover rates, and high order-to-trade ratios that leverages high-frequency financial data and electronic trading tools. Previous study points out that high-frequency trading leads to the turmoil of the whole market because of rapid trading speed, large trading volume and uncertain trading direction [6]. For example, malicious market participants can create false market trading sentiments through high-frequency, leading unwise decision-making of other investors and disrupting market order. Herd is a potential situation that investors all focus on the same signal, synchronize and leads to large volatility [7]. Large number of investors conduct high-frequency trading for the same commodities or stocks as a reaction to the same signal, leading to unusual sudden surge and plummeting of prices. Also, high-frequency traders with advanced technology have a large advantage over regular investors, causing the withdrawal of investors of modest income [8]. Due to advanced technology and brilliant capability of data analyzing, high-frequency trading has an overwhelming advantage over individual retail investors, which leads to individual retail investors' financial losses and a decrease in their investment enthusiasm, even fierce volatility of the whole market. In extreme situations, the market can be controlled by this method. High-frequency traders have the power of deciding when to provide liquidity for stocks they selected and the price that they want [8].

4. Solutions

4.1. Solution for Government Intervention

Researchers and quantitative investors can develop new factors related to government policies into their quantitative models to improve the fitting efficiency and predict capability of the models. To be specific, the researches can establish a policy database through collecting the information of historical policies and studying past government intervention phases. Conducting associated analysis with market data and the policy data can help to identify the influence rule of policies on market and provide more references for researchers. Meanwhile, the policies are dynamically changing. Therefore, researchers and investors should pay close attention to the latest adjustment and evolution of policies, based on which to update policy database and factors in models, so that the latest situation can be reflected and the efficiency of models can be ensured.

Researchers and quantitative investors can conduct text mining on policy documents and official statements through natural language processing (NLP) techniques and sentiment analysis methods in order to identify the policy trend and expected changings.

Based on the research above, reasonable adjustments to models to adopt to the changes of policies can be conducted.

4.2. Solutions for Poor Liquidity

Quantitative investors can deal with the problems through optimizing trading in some cases. Firstly, orders can be divided to different trading platforms to make trading faster through smart order routing technology. Secondly, Investors can better grasp the market liquidity condition when have a better understand of the buy and sell book situation and order structure through analyzing the market depth data. Finally, different types of orders such as limit orders, market orders, trigger orders and others should be applied and investors can select the most suitable order type based on current market liquidity condition.

Also, investors can reduce risk through diversifying investment portfolios in multiple stocks or commodities with high liquidity instead of concentrating investment in assets with poor liquidity, which helps to reduce the liquidity risk of a single asset.

Specific regulatory department in the government can take measures to prevent serious consequences caused by liquidity issues in trading. Regulatory indicators and thresholds should be set up for supervising the changing situation of the market liquidity. Once the indicators exceed the set range, the risk warning and intervention mechanisms will be triggered such as trading suspension, leverage restrictions, and adjustment of trading mechanisms so that the market order and liquidity can be stabilized.

4.3. Solutions for Data

Investors should hand the publicly available data carefully and there are some measures can be taken. Firstly, making a comparison between data from different sources can help to obtain accurate and comprehensive information to some extent. Secondly, to improve the quality of data, data cleaning including removing duplicate values and filling in missing values can be conducted through various techniques and tools. Thirdly, artificial intelligence and machine learning can be applied to process large amount of data automatically. While technical indicators are unreliable for they can't reflect the situation and conventional econometric equations od not perform well in the face of high-dimensional, complex and noisy financial market data, deep-learning-based data mining models can probably supple a more desirable outcome [9].

There are also some measures can be taken by government to improve data quality. Firstly, more stringent and standardized information disclosure standards should be established and enterprises should be required to disclose relevant financial and operational data according these standards to enhance the fairness of market participant's access to information and ensure consistency and comparability of various financial data. In this way, profiting from excessive use of information asymmetry can be prevented. Secondly, government can advocate for all parties in the financial market to establish a financial data sharing platform and encourages financial institutions, research institutions and regulatory department to share data, facilitating the flow of information. Thirdly, government can set up courses on data processing for market participants to help them perform better in understanding and using data. Improving market participants' data literacy plays an important role in reduce risk of unwise decision-making based on incomplete and inaccuracy data and possibility of market volatility caused by unwise decision-making.

4.4. Solutions for Supervision

Firstly, for funds and institutions applying quantitative investment, increasing the cost of trading like increasing trading commission and setting some trading limits like limiting their volume of trading can be effectual in limiting their frequency of trading. Secondly, investors and institutions

applying quantitative investment should disclose their trading strategies, positions, and other relevant information timely and comprehensively to enhance market transparency. The reliable information of high-frequency trading should be generated in real time in order to reconstruct all trading activities and identify the responsible parties to every trading orders. Moreover, such a database plays a significant role in identifying new risks and implementing new regulatory measures [10]. Thirdly, regulatory departments should cooperate closely with parties in the industry such as financial institutions, technical corporations, academic community and other market participants to obtain more market information and professional suggestions. Therefore, government can keep abreast of market changes and take the needs of different market participants into account when generating new strategies so that the strategies can be more targeted and effective.

5. Conclusion

This paper discusses some problems raised by quantitative investment affecting the efficiency of investment and causing turmoil of market when it keeps developing and gaining traction in the Chinese market. The problems include the following four items. Firstly, the fitting effectiveness of quantitative models is affected by the government intervention in the market. Therefore, the analysis becomes inaccurate and the efficiency of investment is affected. Secondly, quantitative investment strategies can hardly profit some stocks and commodities with poor liquidity. Thirdly, some of the publicly available data is incomplete and inaccurate which leads to the results of quantitative analysis undesirable. Fourthly, a lack of regulation on high-frequency trading leads to volatility in market. Meanwhile, this paper puts forward relevant countermeasures and suggestions.

This study mainly relies on the phenomena observed by the author in the Chinese market. Therefore, there are limitations and deficiencies in this study. To be specific, this study does not collect samples to conduct quantitative analysis and support opinions and arguments, which makes this study lack of objectiveness to some extent. In future studies, researchers should collect enough data and conduct both quantitative and qualitative analysis so that the studies can be more scientific.

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