

Research on the Impact of Investor Sentiment on Beta Anomalies in China's A Stock Market

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Abstract: Asset pricing is one of the research hotspots in the financial field. In classic asset pricing models, traditional asset pricing models assume that the market is completely efficient, investors are completely rational, and the expected return on stocks is positively correlated with systemic risk. However, due to overly strict assumptions, a large number of empirical studies have found that the greater the systemic risk of stocks, the lower the return. Due to the fact that systemic risk is usually measured in beta, this phenomenon is known as beta anomaly. With the rise of behavioral finance, scholars have found that behavioral finance theory has better explanatory power for stock market anomalies. More and more research has linked the occurrence of such anomalies to investor behavior. Therefore, there is the most research on explaining beta anomalies from the perspective of investor behavior. In view of this, on the basis of demonstrating the existence of beta anomalies in the Chinese stock market, this article explains beta anomalies from the perspective of investor sentiment, effectively expanding the analysis perspective of beta anomalies. All A-shares from January 1, 2015 to December 31, 2022 were selected as research subjects, and univariate group analysis was used to discover the existence of beta anomalies in the A-share market during the sample period. Subsequently, based on a multi factor model, the impact of investor sentiment on beta anomalies in the Chinese A-share market was tested. It helps to comprehensively evaluate the complete impact of investor irrationality on market price and yield fluctuations, enriches the research on the mystery of low beta anomalies in the Chinese stock market, and to some extent subverts the matching law of high risk and high return. This requires investors to have a correct understanding of the existence of anomalies between CAPM and Beta, abandon the simple strategy of asset portfolio selection based on a single risk scale, and make investment decisions in a more cautious, complete, and reasonable risk-return evaluation framework.

Keywords: Beta Vision, Investor Sentiment, Behavioral Finance

1 Introduction

Asset pricing is one of the research hotspots in the financial field. In classic asset pricing models, assuming that the market is completely efficient and investors are completely rational, the expected return of stocks is positively correlated with systemic risk. However, due to overly strict assumptions, a large number of empirical studies have found that stocks with higher systemic risk actually have lower returns. Due to the beta measurement of systemic risk is commonly used, this phenomenon is known as the Beta anomaly. Scholars have found that

behavioral finance theory has better explanatory power for stock market anomalies, so most of the research focus on investor behavior to explain Beta anomalies. Among them, investor sentiment, which refers to the systematic deviation of investors' future expectations, becomes an important starting point for explaining the Beta anomaly problem. Focusing on the Chinese stock market, some scholars have verified the existence of Beta anomalies and explained them from the perspective of lottery stock preferences based on investors' gambling preference theory. However, overall, the research on Beta anomalies in China still needs to be further improved. Studying whether the systematic bias of future expectations derived from individual investors' cognitive biases, information weaknesses, and risk preference structures can explain the formation of Beta anomalies, which not only helps to reveal the inherent logic of risk pricing in the Chinese stock market, but also helps to comprehensively evaluate the complete impact of investor irrationality on market price and yield volatility.

2 Literature Review

2.1 Literature review on Beta anomalies

The analysis of Beta anomalies begins with testing the effectiveness of the CAPM model. Stattman first pointed out that the premium of higher-order moment risk in systemic risk is quite weak, even under the premise of market risk neutrality, this conclusion still exists^[1]. On this basis, Kumar found that even after controlling for the time-varying characteristics of the Beta coefficient and the influence of individual company characteristics, there is a typical negative correlation between systemic risk and returns in some capital markets^[2]. This return risk deviation is not temporary, but rather exhibits a certain systematic and persistent characteristic, which is referred to as the Beta anomaly. Wang et al. once again confirmed the Beta anomaly based on previous research, and further confirmed the universality of Beta anomalies based on different capital market data. Karceski pointed out that when investing in stock funds, investors have a tendency to chase gains and kill losses, that is, they are more inclined to buy funds that have performed well in the past. When quantitatively comparing the historical performance of different stock funds, a performance indicator is often constructed by comparing the fund's performance with the return and risk of another asset as a benchmark for horizontal comparison. Specifically, in the Chinese stock market, many studies have also fully demonstrated the existence of beta anomalies and attempted to provide explanations for their emergence from multiple dimensions^[3]. Regarding the existence of beta anomalies, Qi Yuliu, Liu Shengyao, Li Yizong, Zhou Liang, and Wang Yinzhi have all found significant beta anomalies in China's stock market. Another part of the research focuses on analyzing the formation of Beta anomalies from the perspective of irrational decision-making by investors, and more specifically points to speculative trading strategies, such as excessive liquidity sensitivity, overestimation of heterogeneous volatility, heterogeneous beliefs, and investor attention to "chasing up and selling" in the Chinese stock market, which exacerbating the "speculative market" characteristics of the Chinese stock market, it also gave rise to the emergence of Beta anomalies^[4].

2.2 Literature Review on Investor Behavior

Investor sentiment is a very important concept. In economic activities, sentiment is an uncertain factor that affects investors' subjective judgments of future returns, which in turn affects their investment behavior^[5]. When combined, it will have a significant impact on the market. The logic behind the impact of investor sentiment on future market volatility lies in the gradual amplification of positive and negative feedback. Brown and Cliff believe that it is precisely due to irrational trading caused by investor sentiment that assets may be overvalued or undervalued. The level of investor sentiment can affect the degree of the deviation of stock prices from true value. The research results show that investor sentiment is positively correlated with the degree of stock mispricing, that is, when sentiment is high, the degree of asset mispricing is higher, and vice versa. The impact of investor sentiment is not only reflected in IPO pricing, but also in the price fluctuations after the stock goes public^[6]. Liu Shengyao and Li Yizong also reached a similar conclusion based on empirical testing in the Chinese capital market, believing that it is the pursuit of stocks with positive returns that drives up the prices of "lottery type" stocks while forming negative excess returns under high risk. Zhang Bing and Chen Xiaoying, based on empirical data from the Chinese capital market, confirmed the significant existence of low price preference, and concluded that stocks with low stock prices and small market capitalization exhibit higher returns while exhibiting low volatility. Research has shown that investor sentiment, as an important influencing factor in behavioral decision-making, has a strong correlation with asset prices and should be considered in asset pricing^[7]. Qi Yuliu, based on the perspective of overvaluation of idiosyncratic volatility, further confirmed that due to the existence of "bias preference" among investors, the abnormal enthusiasm for excess returns drove Chinese individual investors to excessively enter high-risk stocks, which compressed the level of systematic risk premium while forming a foam through price correlation.

2.3A literature review on investor sentiment and beta anomalies

With the development of behavioral finance theory, the characteristic of investor bounded rationality has been widely accepted, which has continuously challenged the assumption that investors are always able to make asset choices at the effective boundary required in CAPM. Correspondingly, research on Beta anomalies has also begun to consider whether it is due to investor irrational decision-making or investor risk pricing bias that leads to the emergence of Beta anomalies^[8]. The "prospect theory" proposed by Tversky and Kahnemann has become the theoretical starting point for relevant research to interpret Beta anomalies from the irrational perspective of investors. Kumar and Huang believe that lottery stocks with a high return bias will be understood by irrational investors as assets with higher potential returns, leading to concentrated buying of these stocks. These assets with negative return effects are severely overvalued and have lower future returns, leading to the formation of the anomaly of high beta stocks with low returns. Barberis defines investors' irrational psychology as "prospect selection preference" and believes that this prospect selection preference is mainly manifested in two types: overestimating the occurrence of small probability events (gambling psychology) and the existence of positive tail effects (chasing up and killing down). Essentially, investors' asset selection will simply rely on certain volatility characteristics, and gambling psychology is that investors will value assets based on historical returns^[9]. The positive tail effect refers to investors' preference for stocks that are in a period of price increase. At the same time, this preference for prospect selection arises from two psychological expectations: firstly, stocks with

a high yield bias often have abnormally high returns, which will amplify investors' profit expectations for trading; Secondly, stocks with high yield skewness also have relatively large price fluctuations, which can to some extent increase the space for obtaining returns through short-term trading^[10].

From existing research, explaining Beta anomalies from the perspective of investor prospect preference based on behavioral finance can effectively separate the two differentiated states of Beta's weak ability to explain returns and Beta's reverse pricing of returns, thus effectively distinguishing between the incomplete interpretation of CAPM and the inability of CAPM to explain the two reality situations^[11]. Therefore, based on the irrational psychological characteristics of investors, analyzing Beta anomalies from the perspective of investor emotions has become a more suitable analytical approach for investors' psychological characteristics, and therefore has been given more attention by researchers.

3 Data Source and Research Design

3.1 Data source

The data used in this article is from Guotai An Database, with a sample of all A-shares, covering the period from January 1, 2002 to December 31, 2022. In the process of data aggregation, data should be clear and missing values should be excluded. During the period marked as ST and PT, financial and trading data of stocks are significantly different from those of the same type, which is not of research significance. Therefore, this part of data should be removed from the study. This article selects the CICI index as a measure of investor sentiment.

3.2 Empirical Testing of Investor Sentiment on Beta Anomalies in China's Stock Market

3.2.1 Analysis of the Existence of Beta Anomalies in the Chinese Stock Market

The univariate sorting and grouping method is widely used in the field of empirical finance. The basic idea is to sort and group a single variable at the end of the holding period, construct different investment portfolios, compare the returns of each investment portfolio during the holding period, and finally summarize relevant conclusions. This study will use the univariate sorting grouping method to separately test the existence of Beta anomalies.

3.2.2 The impact of investor sentiment on beta anomalies in the Chinese stock market

At present, there is no consensus on the measurement methods related to investor sentiment. Some scholars have concretized investor behavior as the maximum daily return preference, and then analyzed its impact on beta anomalies. Alternatively, they have constructed a prospect TK index for prospect selection preference to test the relationship between investors' irrational pursuit of individual stocks and the relationship between prospect preference and changes in individual stock returns. Yi Zhigao and Mao Ning's method of measuring investor sentiment is to construct a CICI investor sentiment indicator by comprehensively considering a total of 6 sentiment related indicators, including current or previous period data. The specific calculation method is as follows:

$$CICST=0.231DCEE+0.224TURN+0.257IPON+0.322IPOR+0.268CCI+0.405NL4 \quad (1)$$

Where DCEF is the discount rate of the closed-end fund, TURN is the trading volume, IPON is the number of IPOs, IPOR is the first day return of IPOs, CCI is the consumer confidence index, and NIA is the number of new investor accounts opened. The transaction volume and the number of new investor accounts opened are based on the previous period's data, while other indicators are based on the current period's data. Based on the previous theoretical analysis, this article chooses to construct a CICI investor sentiment indicator and introduces market factor model variables (market value BM and book to market ratio MV) for analysis.

3.2.3 Research Assumptions

The research approach of this article follows a strict problem driven progression logic, with each part delving deeper and unfolding in an orderly manner according to the following questions:

At present, there is no consensus in the academic community on whether there is a Beta anomaly in the Chinese stock market. Based on this, this article proposes research question 1: Is there a Beta anomaly in the Chinese stock market?

The logical starting point of analyzing Beta anomalies is to confirm the existence of Beta anomalies. This article will use various methods to test the existence of Beta anomalies in the Chinese stock market based on different markets under various data structures. To ensure the accuracy and authenticity of the existence test of Beta anomalies, and to confirm that the existence of Beta anomalies is not a random phenomenon of specific data samples or markets, in order to avoid conclusions that are not robust due to excessive data mining. Based on the above literature analysis, hypothesis 1 is proposed for question 1. H1: There is a Beta anomaly in the Chinese stock market.

From existing research, it has become a core idea to explain Beta anomalies from the perspective of behavioral finance and investor prospect selection preferences. Compared to explaining the formation of Beta anomalies from the perspectives of risk compensation factors and market microstructure, the explanation of investor prospect selection preferences can more accurately focus on the fact that Beta is negatively correlated with expected returns. However, there is relatively little research on Chinese A-shares, Therefore, question 2 is raised: Can investor sentiment in the Chinese A-share market explain the Beta anomaly?

Based on various methods such as zero investment portfolio and multi factor regression, identify the causal relationship between investor sentiment and beta anomalies, and provide a basic answer to the causes of beta anomalies in the Chinese stock market.

Based on the above literature analysis, hypothesis 2 is proposed for question 2. H2: Investors' preference for outlook choices can explain Beta anomalies.

4 Empirical analysis

4.1 Analysis of the Existence of Beta Anomalies in the Chinese Stock Market

The univariate sorting and grouping method is widely used in the field of empirical finance. The basic idea is to sort and group a single variable at the end of the holding period, construct different investment portfolios, compare the returns of investment portfolios during the holding period, and finally summarize relevant conclusions. Based on the annual beta of individual

stocks, this article divides all stocks into four investment portfolios from large to small, namely p1, p2, p3, and p4 groups. Due to the close spacing between p1 and p2, this article constructs a zero investment portfolio p4-p1 based on p1 and p4, which is a portfolio of buying P4 groups of a certain amount and selling P1 groups of the same value at the same time. Calculate the returns of each investment portfolio and zero investment portfolio during the holding period, i.e. at the end of the month, using the method of equal weight. Repeat the first two steps and roll calculate the monthly returns for each investment portfolio and zero investment portfolio until the end of the sample period; Finally, compare the returns of each investment portfolio and observe the returns of the zero investment portfolio. If the return of the zero investment portfolio is positive and significant, it indicates a Beta anomaly. The specific results are as follows.

Table 1. Univariate grouping analysis method

| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|-------|--------|--------|--------|--------|--------|-------|--------|--------|
| P1 | 14.43% | 3.94% | 9.84% | -3.40% | 4.57% | 0.45% | 10.17% | 11.14% |
| P4 | 3.76% | 0.88% | 4.28% | 4.17% | 1.56% | 4.44% | 6.49% | 25.58% |
| P4-P1 | 18.19% | -3.06% | -5.56% | 7.57% | -3.01% | 3.99% | -3.68% | 14.44% |

From the estimated results in Table 1, it can be seen that, unlike the ascending beta performance of the P1 to P4 groups, the excess return of the asset portfolio under the hedging trading strategy shows a changing trend. The average excess return of the P4 group with the lowest Beta reached 25.58%, while the average return of the P1 group with the highest Beta during the same period was only 11.14%. The difference in return between the lowest and highest Beta groups was 14.44%. The negative correlation between systematic risk Beta and expected return was significantly established, which confirms the existence of Beta anomalies.

4.2 Empirical Testing of Investor Sentiment on Beta Anomalies in China's Stock Market

The first factor that arises from the beta anomaly is a negative correlation between the volatility of a stock's characteristics and the excess return of a stock. And the existence of a negative correlation is related to the degree of mispricing of the stock, and only a strong negative correlation in overvalued stocks. Whether a stock is overvalued or not is related to investor sentiment. From the perspective of behavioral finance, when investor sentiment is high, investors are more inclined to overvalue the price of stocks, and due to irrational trading behaviors of investors, overvalued stocks in the market are easy to be ignored, making it difficult to correct the mispricing of stocks back to the real level in time. Therefore, when investor sentiment is high, the increase in overvalued stocks in the stock market will enhance the negative correlation between the characteristic volatility and excess return that stocks as a whole, which in turn makes the beta anomaly more pronounced.

$$\text{Beta} = \beta_0 \text{Senti} + \beta_1 \text{BM} + \beta_2 \text{MV} + \varepsilon \quad (2)$$

Table 2 Multiple factor regression test

| variable | Beta | Beta | Beta |
|----------|----------------------|----------------------|----------------------|
| Senti | 0.0185** (0.0093) | 0.0202** [0.0093] | 0.0203** [0.0093] |
| BM | | 0.2054*** | 0.2060*** |

| | | | |
|--------------|-----------------------|-----------------------|-----------------------------------|
| | | [0.0225] | [0.0225] |
| MV | | | zero |
| Constant | 0.8590*** (0.0108) | 0.7586*** [0.0175] | [0.0000] 0.7539*** [0.0177] |
| Observations | 7272 | 7272 | 7272 |
| Numberofid | 2424 | 2424 | 2424 |

In order to test the Beta anomaly of investor sentiment in China's stock market, this paper introduces the market factors in the Fama-Macbeth multivariate model and constructs a multivariate regression model for testing. The model is shown in Equation 2. The regression results are shown in Table 2. By analyzing the results of multivariate regression, it is found that investor sentiment affects Beta. Therefore, through the perspective of behavioral finance, the cause of the Beta anomaly can be explained to a certain extent.

5 Conclusion and suggestions

This paper selects all A-shares from January 1, 2015 to December 31, 2022 as the research subjects, and uses univariate group analysis to discover beta anomalies in the A-share market during the sample period. Subsequently, based on a multi factor model, the impact of investor sentiment on beta anomalies in the Chinese A-share market was tested. The empirical results indicate that there is a typical Beta anomaly in the Chinese stock market, and this phenomenon is related to investor sentiment, proving that both Hypothesis 1 and Hypothesis 2 are valid.

This paper enriches the research on the mystery of low beta anomalies in the Chinese stock market, and to some extent subverts the matching law between high risk and high return. This requires investors to have a correct understanding of the existence of anomalies between CAPM and Beta, abandon the simple strategy of asset portfolio selection based on a single risk scale, and make investment decisions in a more cautious, complete, and reasonable risk-return evaluation framework. At the same time, investors should be able to correctly understand and evaluate the impact of irrational psychological characteristics on investment returns, strive to ensure the relative rationality of individuals under group irrationality, and improve risk awareness, investment decision-making scientificity, and stock selection rationality through continuous learning and experience accumulation, in order to overcome the influence of endogenous irrational preferences.

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