The Influence of Asymmetry of Positive Feedback Trade on Expected return: An Empirical Study of China Securities 800

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Abstract: Using the measurement and empirical research on the asymmetry of the stock market, this paper confirms risk premium of positive feedback trading asymmetry and its impact on expected returns in China. Through correlation analysis, it is confirmed that the asymmetry factor can represent the trading intensity of retail investors. The A-CAPM model is constructed by incorporating the asymmetry factor into the explanatory framework of stock expected return, and through the significant change of the improved regression intercept term, it is confirmed that the asymmetry factor can better explain the risk premium. Finally, according to the value of the asymmetric factor, the data are divided into four parts, and it is found that the influence of the asymmetric factor on the expected return is opposite to the sign of the factor, and the influence increases with the increase of the absolute value of the factor.

Keywords: Positive Feedback Trading, Asymmetry, A-CAPM Model, Expected Return, Risk Premium

1 INTRODUCTION

Positive feedback trading, also known as "Chasing gains and Selling losses" in the stock market, is an irrational behavior of making trading decisions based on past stock information, which is specifically manifested as buying stocks when they rise and selling stocks when they fall. The asymmetry of the positive feedback trade is reflected in the difference between the intensity of the chasing and the killing.

However, the current Chinese stock market is still not mature market, and the large number of retail investors is a prominent feature of China's stock market. Ma(2016) proposed that retail investors are prone to dependence on policy guidance, and the inadequacy of the existing disclosure mechanism and supervision means leads to a typical herding effect. At the same time, compared with foreign markets, due to the restriction on short selling in Chinese markets, retail investors are more inclined to chase stocks with rising stock prices, rather than immediately sell down stocks, which reflects the characteristics of chasing gains. Zhao et al. (2001), through empirical analysis of China's stock market, confirmed that China's stock market has a more significant disposal effect than that of foreign countries, that is, it is more inclined to sell winners and hold losers, which will further weaken the intensity of the killing and make the chasing more significant.

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For institutional investors, under adverse market conditions, their risk control strategy requires them to further reduce risks through short selling, showing the characteristics of killing. As early as in the last century, Sentana and Wadhwani(1992) had found that in the British and American markets dominated by institutional investors, there was a general phenomenon that the killing was stronger than the chasing. Due to the difference in investor structure, the number of individual investors in China's stock market is far more than that of institutions. Wan et al. (2016) found that Chinese stock market has a remarkable feature of chasing gains rather than selling losses by using empirical data.

Therefore, the positive feedback trading asymmetry reflects the trade intensity balance between retail investors and institutional investors. When the trading intensity of one side is significantly stronger than that of the other side, it will show asymmetry.

Traditional capital asset pricing model (CAPM) explains the relationship between expected rate of return and risk assets, and believes that market risk can fully explain expected rate of return. Later, with the development of empirical research, scholars gradually found that there was still some unexplained market risk in the expected rate of return. Such as size effect (Banz, 1981), value effect (Rosenberg et al.,1985), liquidity risk premium (Amihud and Mendelson, 1986), etc. Since then, there have been many scholars (Wang and Zhou, 2002; Yi, 2005; Zhu and Chen, 2021) verified that the expected rate of return was indeed affected by the above factors through empirical research. However, few studies have explored whether retail trading intensity affects expected returns. Retail trading intensity may affect stock price and stock price volatility through influencing investors' investment expectations, and then affect expected return rate. The research objective of this paper is to explore the impact and path of positive feedback trading asymmetry on expected return rate.

In this paper, the actual data of 800 constituent stocks in China Stock market in the past 20 years will be used as samples to measure and measure the asymmetry of positive feedback trading, and the correlation analysis will be conducted between the positive feedback trading asymmetry factor and the retail preference index. After that, the A-CAPM model is constructed to explain the expected returns by testing the risk premium in the Chinese market and introducing the positive feedback trade asymmetry factor. Finally, according to the positive feedback trade asymmetry factor, the stock is divided into classes, and analyzes the specific impact of positive feedback trade asymmetry factor on expected returns and the reasons.

The innovation of this paper lies in:

1. Improve the CAPM model by using the positive feedback trade asymmetry factor, and construct the A-CAPM model, which can better explain the risk premium other than market risk.

2. Use positive feedback trading factors to divide the samples and obtain different impacts of positive feedback trading factors on expected returns under different positive feedback trading states.

2 LITERATURE REVIEW

DeLong and Shleife(1990) showed that positive feedback trading would lead to sharp price fluctuations. Fang and Meng(2019) believed that herding effect would increase stock price fluctuations caused by positive feedback trading in a short time. Sentana and Wadhwani(1992) found through empirical analysis that when volatility was low in the British and American markets, short-term stock returns showed a positive series correlation. However, when volatility is high, short-term stock returns will show negative serial correlation. And as volatility increases, positive feedback traders will have more influence on stock prices. Wang and Zhou(2009) found similar conclusions in the Chinese market through the empirical analysis of the stock market, that is, there is a reverse change relationship between the volatility of the stock market and the autocorrelation.

To sum up, positive feedback trading and its asymmetry are universal phenomena in the market. When the positive feedback transaction occurs, it will affect the volatility of stock prices, and the volatility will affect the correlation between stock returns, and ultimately affect the risk premium and expected return of stocks. However, when the retail investors chase up too fast, whether it will lead to too fast growth of the stock price bubble, resulting in subsequent stock price reversal decline; Or will rising volatility raise the risk premium and eventually lead to higher stock prices? At the same time, how will this ultimately affect expected returns in the event of a fall? The impact of positive feedback trade asymmetry on expected returns under the two conditions of rally and sell-off is still unclear, therefore, this paper will focus on the discussion of the above problems.

3 METHODOLOGY

From the Wind database, this paper selects the 20-year trading week data of 800 constituent stocks of China Securities Exchange from January 2003 to January 2023, totaling 800 stocks and 1,017 trading weeks. After excluding the data of late listed stocks with missing values, there are a total of 513838 effective weekly return rate data. In addition, weekly and annual data of the A-share index and the spot rate of 10-year Treasury bonds were used from March 2006 to December 2022.

3.1 Models

3.1.1 Model of Positive Feedback Transaction Asymmetry

According to Sentana and Wadhwani's (1992) model, there are two types of investors in the market: rational investors and positive feedback traders. The market shares of the two are respectively Q_t and $\mathrm{Y_t}$, which meet

$$Q_t + Y_t = 1 \tag{1}$$

Rational investors are always risk averse, so their share comes from the trade-off between risk and return:

$$Q_t = \frac{E_{t-1}(r_t) - r_f}{\alpha_0 + \alpha_1 \sigma_t^2} \tag{2}$$

Among, $E_{t-1}(r_t)$ is the investor's expected return of time t at time $t-1$, r_f is risk-free yield, σ_t^2 is Conditional fluctuation rate. Because the investors are risk averse, $\alpha_1 > 0$ always established.

According to the positive feedback trading model built by Wan and Yang(2017), positive feedback traders trade according to the previous yield, buy when the stock rises, and sell when the stock falls. If the coefficient of pursuing the rise is γ, and the coefficient of selling down is $\gamma + \gamma_1$, then it is satisfied

$$Y_t = \gamma r_{t-1} + \gamma_1 r_{t-1} \mathbb{I}\{r_{t-1} > 0\} \tag{3}$$

r_{t-1} is the previous yield. $\mathbb{I}\{r_{t-1} > 0\}$ is virtual variables that distinguish between up and down, Taking 1 when the price rises and 0 when it falls. Therefore, $-\gamma_1$ can indicate the asymmetry of positive feedback trading. The greater the value, the greater the intensity of chasing up is stronger than killing the fall, and the same increase will lead to more trading volume.

By substituting equations (2) and (3) into Equation (1), the regression equation can be obtained:

$$r_t = \beta_0 + \beta_1 r_{t-1} + \beta_2 r_{t-1} \mathbb{I} + \beta_3 \sigma_t^2 + \beta_4 r_{t-1} \sigma_t^2 + \beta_5 r_{t-1} \mathbb{I} \sigma_t^2 + u_t \tag{4}$$

Then GARCH(1,1) model was used to estimate the conditional volatility σ_t^2, and Equation (4) was taken as the mean value equation, then obtained:

$$\begin{cases} u_t = \sigma_t \varepsilon_t \\ \sigma_t^2 = \theta_0 + \theta_1 u_t^2 + \theta_2 u_{t-1}^2 \end{cases} \tag{5}$$

Parameters in equations (4) and (5) are obtained by using maximum likelihood estimation method. Among them, the asymmetry index of positive feedback transaction can be obtained by dividing the two.

3.1.2 CAPM Model

$$E(r_{it}) = \alpha_i + r_{ft} + \beta_{im}[E(r_{mt}) - r_{ft}] + \varepsilon_{it} \tag{6}$$

Among, r_{ft} is the risk free rate at moment t, $E(r_{it})$ is the return rate of stock i at moment t, $E(r_{mt})$ is the return rate of market portfolio at moment t, β_{im} presents the sensitivity of the return rate of stock i to market risk.

The CAPM model can be rewritten into

$$E(r_{it}) - r_{ft} = \alpha_i + \beta_{im}[E(r_{mt}) - r_{ft}] + \varepsilon_{it} \tag{7}$$

If the test result significantly has $\alpha_i \neq 0$, then it means that the market has a risk premium besides the market risk.

3.1.3 A-CAPM Model

Based on Zhou Fang and Zhang Wei(2011)'s improved LACAPM model, this paper added positive feedback trade Asymmetry factor to the CAPM model to form A two-factor model named A-Capm (Asymmetry-CAPM) model:

$$E(r_{it}) = \alpha_i + r_{ft} + \beta_{im}[E(r_{mt}) - r_{ft}] + \beta_{ia}\{ASY_{it} - \beta_{am}[E(r_{mt}) - r_{ft}]\} + \varepsilon_{it} \quad (8)$$

Among them, ASY_{it} is positive feedback trading asymmetry factor of stock i at year t, β_{im} and β_{ia} respectively represent the sensitivity of stock i's return rate to market risk and positive feedback trading asymmetry. β_{am} represents the sensitivity of positive feedback trading asymmetry to market risk.

The advantage of such improvement is that the possible correlation between market risk premium and positive feedback trading asymmetry is taken into account, and the premium of the part related to positive feedback trading asymmetry and market risk is attributed to market risk premium to eliminate this correlation, so as to more clearly discover the impact of positive feedback trading asymmetry on stock returns.

The above A-CAPM model can be rewritten into

$$E(r_{it}) - r_{ft} = \alpha_i + \beta_{im}[E(r_{mt}) - r_{ft}] + \beta_{ia}\{ASY_{it} - \beta_{am}[E(r_{mt}) - r_{ft}]\} + \varepsilon_{it} \quad (9)$$

If the test result α_i is not significantly different from 0, it means that the model can explain the stock return well.

4 EMPIRICAL ANALYSIS

4.1 Measurement of Positive Feedback Trading Asymmetry

First of all, this paper makes a descriptive statistical analysis of the weekly rate of return data of 800 constituent stocks from 2003 to 2022, the results are shown in Table 1.

Table 1: Descriptive statistics of 20 years' weekly return rate of CSI 800 constituent stocks.

Stockcode	Mean	σ	min	max
000001.SZ	0.0034	0.0569	-0.2226	0.3576
000002.SZ	0.0053	0.0584	-0.2325	0.3310
000009.SZ	0.0047	0.0730	-0.2935	0.3867
000012.SZ	0.0039	0.0677	-0.2284	0.4928
000021.SZ	0.0033	0.0663	-0.3059	0.4983
000027.SZ	0.0028	0.0527	-0.3281	0.3182
000031.SZ	0.0033	0.0688	-0.3042	0.4667

000039.SZ	0.0034	0.0582	-0.2046	0.2489
000050.SZ	0.0043	0.0760	-0.3131	0.4263
000060.SZ	0.0044	0.0705	-0.3153	0.4010
……				
002831.SZ	0.0028	0.0578	-0.1473	0.5246
002841.SZ	0.0062	0.0656	-0.2293	0.4822
002850.SZ	0.0078	0.0890	-0.2144	0.6105
002867.SZ	0.0025	0.0589	-0.1717	0.4139
002901.SZ	0.0062	0.0870	-0.2315	0.6114
002916.SZ	0.0091	0.0856	-0.1883	0.6106
002920.SZ	0.0077	0.0734	-0.1641	0.3310
002925.SZ	0.0027	0.0774	-0.2156	0.4641
002926.SZ	-0.0010	0.0485	-0.1682	0.1859
002936.SZ	-0.0030	0.0402	-0.1587	0.2103

According to the method of constructing the trading asymmetry index of positive feedback, the asymmetry index value of 800 constituent stocks in the past 20 years is obtained. As can be seen from Table 2, in the past 20 years, there has been a difference in the listing time of the current 800 constituent stocks. Over the 20-year period, eight of China Securities 800's positive feedback trading asymmetry indicators were positive and 12 were negative.

Table 2: Descriptive statistics of positive feedback trading asymmetry index.

year	Mean	σ	min	max
2003	-673429.1	1.22E+07	-2.05E+08	1.41E+07
2004	222.4684	3394.575	-5865.731	44503.07
2005	-469.7953	7247.681	-126814.1	11275.41
2006	-658634	1.19E+07	-2.14E+08	88301.04
2007	2094356	3.95E+07	-1165373	7.43E+08
2008	-31.40909	460.3631	-8421.11	1793.248
2009	20765.05	354059.3	-34732.09	7047710
2010	34.89687	12807.52	-157469.7	191130.1
2011	957.0581	43519.47	-399105.2	894570.7
2012	-13084.42	300978.2	-6999752	37097.39
2013	1260299	2.94E+07	-3924.866	6.87E+08
2014	-114.1202	3171.3	-44974.58	39718.7
2015	-11.23797	858.0093	-11387.82	10525.56
2016	1.68E+07	4.16E+08	-24071.54	1.03E+10
2017	-122.2764	1211.874	-20195.14	7621.685
2018	-94.16075	2591.331	-38665.5	35482.82
2019	13786.72	1083030	-1.41E+07	2.53E+07
2020	-13169.82	368897.3	-1.02E+07	50276.45
2021	-40.19519	321.5759	-6592.066	1759.1
2022	-52.5561	513.227	-11951	2026.443

As there are late listed stocks in the 800 constituent stocks of China Securities Exchange, the positive feedback trading asymmetry index is extremely large or small, and the existence of extreme value is often not of good practical significance. Therefore, in this paper, the value of the asymmetry factor is divided by its own largest value to show its distribution more intuitively. As can be seen from Figure 1, most of the positive feedback trading asymmetry

factors are distributed on both sides of 0, indicating that the intensity of chasing and killing are generally comparable, and there may be significant differences in the short term.

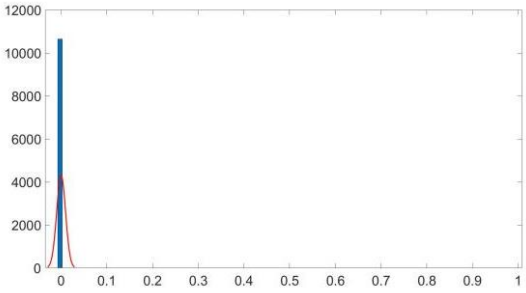

Figure 1: Positive feedback trading asymmetric factor distribution.

This paper uses correlation analysis to verify the relationship between positive feedback trade asymmetry and retail trading intensity. If there is a significant positive correlation between positive feedback trading asymmetry and retail preference indicators, it can be considered that positive feedback trading asymmetry contains information related to retail trading intensity. Indicators selected in this paper to represent retail preference are: P/E ratio, volume, turnover rate and total market value.

According to the results of the correlation matrix shown in Table 3, the positive feedback trading asymmetry is positively correlated with the selected retail preference indicators, and the trading volume and turnover rate have a greater impact on the results of the positive feedback trading asymmetry, while the P/E ratio and total market value have a smaller impact on the results of the positive feedback trading asymmetry. This may be because positive feedback traders pay more attention to the historical data information and market sentiment that can be extracted from the stock market, and pay less attention to the operating conditions of the issuing companies themselves.

Table 3: Correlation between asymmetry and retail preference indicators.

	Asy	P/E	vol	turn	total
Asy	1				
P/E	0.0193	1			
vol	0.158*	-0.0944	1		
turn	0.089*	0.0701	0.1062	1	
total	0.0105	-0.0132	0.2257*	-0.1699*	1

Note: Table 3 reports the Pearson correlation coefficient between asymmetry and retail preference, and * indicates that it is significant at the 10% level.

4.2 Use CAPM to test risk premium in A-share market

This paper uses the spot rate of 10-year Treasury bonds as the risk-free rate of return and the A-share index as the market rate of return to test the CAPM model. The data of risk-free rate of return can be obtained from June 2006. The weekly rate of return data of China Securities 800 component stocks and the above variables were used to test the regression results of CAPM model.

As can be seen from the regression significance results in Table 4, most of the intercept term coefficients obtained by CAPM model regression are significantly different from 0, among which 688 are very significant, 34 are very significant and 30 are significant, while only 48 are not significantly different from 0. As can be seen from the regression results, the CAPM model can not explain the expected returns of the component stocks of China Securities 800 well, which means that there are other risks in the intercept term that cannot be explained by the market risk, that is, there are other risk premia besides the market risk.

Table 4: Statistical significance results of CAPM model.

Significance condition	Number
Extremely significant(P<0.001)	688
Very significant(P>0.001&P<0.01)	34
Significant(P>0.01&P<0.05)	30
Not signifacant(P>0.05)	48
Total	800

4.3 Use A-CAPM to test risk premium in A-share market

In this paper, the improved CAPM model containing the positive feedback trading asymmetry factor is used to further regression test the return rate of China Securities 800. Since the value of the positive feedback trading asymmetry factor is often large, there is a magnitude difference between it and other variables in the model. In order to make the regression coefficient easier to observe and thus easier to summarize the rule, this paper carries out standardization processing on the positive feedback trade asymmetry factor:

$$ASY_{tn} = \frac{Asy_{tn} - \overline{Asy_n}}{\sigma_n} \tag{10}$$

The positive feedback trading asymmetry factor after standardization is substituted into A-CAPM model for testing.

Table 5: Statistical significance results of A-CAPM model.

Significance condition	CAPM	A-CAPM
Extremely significant(P<0.001)	688	0
Very significant(P>0.001&P<0.01)	34	0
Significant(P>0.01&P<0.05)	30	13
Not signifacant(P>0.05)	48	714
Total	800	727

In Table 5, due to the late listing time of some stocks, the number of asymmetric factors is small, and the regression test results lack value. Therefore, this paper finally obtained 727 effective regression results of A-CAPM. Among them, there are 714 intercept items that are not significant, and 13 intercept items that are significant. Compared with the CAPM model, A-CAPM model can well explain the expected returns of the constituent stocks of China Securities 800 after adding the positive feedback trading asymmetry factor into the model. It means that the positive feedback trading asymmetry factor can better explain the risk premium except market risk and has an impact on expected returns.

4.4 Testing the effect of positive feedback trading asymmetry factor on expected return

According to the above definition, when the positive feedback trade asymmetry factor is greater than 0, it means that the market's chasing strength is greater than the killing strength. When the value is less than 0, it means that the killing strength is greater than the chasing strength. In order to more directly test the impact of positive feedback trading asymmetry on expected earnings respectively under the two states of rally pursuit and sell-off, this paper divides the 800 constituent stocks of China Securities Securities into four categories according to the positive feedback trading asymmetry factor obtained: chasing>>killing, chasing>killing, chasing<killing, chasing<<killing. Each category contains 200 stocks.

Table 6 shows the regression coefficients of four categories of positive feedback trade asymmetry factors. It can be seen that when the chasing strength is much less than or less than the killing strength, the positive feedback trade asymmetry factor has a positive impact on the expected return, and the former has a greater impact than the latter. When the chasing strength is much greater than or greater than the killing strength, the positive feedback trading asymmetry factor has a negative impact on the expected return. Similarly, the former has a greater impact than the latter. From a practical point of view, when the intensity of chasing gains is greater than the intensity of killing losses, the stock market sentiment is high and the trading intensity of individual investors is increased. The continuous chasing gains trading is easy to lead to the bubble in the stock market, and the stock price is greater than its value, which eventually leads to the fall of the stock price. However, when the intensity of killing is greater than that of chasing, the sentiment of the stock market will be depressed, the trading intensity of institutions will increase, and the risk control strategy of institutions will require them to make selling measures, while the continuous decline of stock prices will lead to the breach of the risk control warning line among various institutions one by one, leading to the further decline of stock prices, until the situation that the stock price is lower than its value itself, eventually lead to the rise of stock prices.

Table 6: Descriptive statistics of positive feedback trading asymmetry categories.

Category	Number	Mean	σ	Min	Max
C<<K	200	0.0341	0.2643	-0.5400	2.6552
C<K	200	0.0243	0.2185	-1.0884	1.2617
C>K	200	-0.0059	0.9690	-4.3759	11.720
C>>K	200	-0.0677	0.1969	-0.7365	0.5216

Where, C represents chasing strength, K represents killing strength.

5 CONCLUSIONS

This paper takes the weekly trading data of China Securities 800 constituent stocks as the research object, and constructs the positive feedback trading asymmetry index of each stock for 20 years. Pearson correlation test is used to analyze the correlation between the positive feedback trading asymmetry index and the retail preference index. The results show that the positive feedback trading asymmetry can represent the trading intensity of retail investors. By

using the methods of multiple regression and significance test, this paper tests the risk premium of the Chinese market, and confirms that the CAPM model cannot explain the expected rate of return of stocks well, and there is risk premium that cannot be explained by market risk in the market.

Therefore, this paper introduces the positive feedback trading asymmetry factor into the CAPM model to build the A-CAPM model. The significance results show that the improved model can better explain the expected return, and the positive feedback trading asymmetry factor has an important impact on the expected return of stocks. Finally, we classify the stocks according to the positive feedback trading asymmetry factor, and find that the positive feedback trading factor has different effects on the expected returns of stocks under the two states of chasing up and selling down. When the positive feedback trading factor is greater than 0 (chasing intensity is greater than killing intensity), the positive feedback trading factor has a negative impact on the expected return. When the positive feedback trading factor is less than 0 (the chasing intensity is less than the killing intensity), the positive feedback trading factor has a positive impact on the expected return, and the degree of impact on the expected return increases with the increase of the factor in both cases.

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