

An Empirical Study on the Return Rate of Listed Companies in My Country's A-share Retail Industry

-- Based on the Fama-french Three-factor Model

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Abstract

This paper selects 43 retail stocks in my country's A-share market as the research object, divides the 43 stocks into 4 groups according to their size and book-to-market ratio, and uses the Fama-French three-factor model for empirical analysis. The study found that the Fama-French three-factor model has good applicability in the retail sector of my country's A-share market, and empirical evidence found that small-scale companies have a positive regression coefficient on the scale factor, while large-scale companies have a negative scale factor. The regression coefficient of value stocks generally has a positive regression coefficient to the book-to-market ratio factor, while the regression coefficient of growth stocks to the book-to-market ratio factor is negative.

Keywords

FAMA-FRENCH three-factor model; Retail stocks.

1. INTRODUCTION

In modern financial theory, the discussion of the relationship between return and risk has become a core content. Related research and models originate from the modern portfolio theory proposed by Markowitz (1952), which provides an initial quantitative expression of returns and risks. With the continuous development of research, William Sharpe (1964) derived the CAPM model on the basis of the mean-variance model, which pioneered the use of a linear model to describe the price of securities; Fama and French (1992) passed the US Research on the stock market found that the beta value of the stock market cannot explain the difference in the return of different stocks, while the market value, book-to-market ratio and price-earnings ratio of listed companies can explain it. Then in 1993, the Fama-French three-factor model was proposed. On the basis of the CAPM model, FF3 adds market value scale and book value ratio, two factors that have strong explanatory power on stock returns, to make up for the lack of explanatory power of the CAPM model, and it is also a determinant of subsequent stock asset returns. research laid the foundation. In the international capital market, the asset pricing model has been developed relatively maturely. With the continuous increase of related research, more and more abnormal stock returns have been discovered. Based on this, scholars have continuously revised the three-factor model, and the construction of the multi-factor model has also become a research hotspot for scholars from all walks of life. The five-factor pricing model proposed by Fama and French in 2015 introduces the addition of profit and investment factors, and has been widely used. The development of domestic factor models is not mature enough, and there is a lack of research on specific industries. Therefore, the applicability of the three-factor model to specific industries deserves further exploration.

By the end of 2019, there were 86 listed companies in the retail industry in my country's A-share market, with a total market value of 823.176 billion. The retail industry belongs to my

country's tertiary industry and has made important contributions to promoting my country's economic development. In 2019, the total retail sales of consumer goods in my country was 4.12 billion yuan, an increase of 8%, maintaining a stable and rapid development momentum. The contribution rate of consumption to economic growth was 57.8%, maintaining the first driving force of economic growth for six consecutive years. At present, my country's retail industry is in an important stage of development and its transformation and upgrading. With the continuous improvement of the living standards of Chinese residents and the advent of the digital economy era, the domestic retail industry is undergoing reform and upgrading in terms of operation methods and business forms. Especially with the development of the new retail industry and the emergence of new retail methods, the impact of the development of the retail economy on my country's economy has become more and more important. This paper hopes to analyze the stocks of listed companies in the retail industry in the A-share market through the Fama-French three-factor model, so as to provide a reference for stock investors to rationally respond to market changes.

2. LITERATURE REVIEW

my country's stock market developed relatively late, and the share-trading reform was basically completed in 2006, and the research on asset pricing is still at an immature stage. The establishment of the Fama-French three-factor model makes up for the deficiency of the insufficient explanatory power of the CAPM model. At present, most of the domestic academic research stays on the empirical test of the three-factor model. However, due to possible differences in the sample interval, sample range, factor construction method, grouping method, etc., the research conclusions of the early literature are inconsistent.

Chen Zhanhui (2004), based on the sample data of the A-share market from 1995 to 2001, found that the Fama-French three-factor model is suitable for the China A-share market, but it still has certain limitations and cannot fully explain the excess returns of inertia and reversal investment strategies. On the other hand, Wu Shinong and Xu Nianxing (2004) studied the explanatory power of CAPM model, Fama-French three-factor model and characteristic model for Chinese stock market based on the data samples of A shares from 1995 to 2002, and the explanatory power of Fama-French three-factor is better than CAPM model, and found in the study that although the Chinese stock market has significant book-to-market effect and scale effect, there is no "January effect" for small-scale companies. Deng Changrong and Ma Yongkai (2005) based on the Shenzhen stock market data samples from 1996 to 2003, found that the Fama-French three-factor model was suitable for the Shenzhen market, which further proved the applicability of the three-factor model to the Chinese stock market. (2014) selected the stock market data of China and the United States from July 1994 to June 2013 to conduct a comparative study on the differences in the application of the Fama-French three-factor model in the stock markets of China and developed countries. There is a significant scale effect, but the book-to-market ratio effect is not significant.

In addition, some domestic scholars limit the sample range to a certain industry sector of A shares, and conduct empirical research on the Fama-French three-factor model for a specific industry in my country. You Dan (2008) made an in-depth analysis of the practicability of the Fama-French three-factor model by studying the monthly returns of all A-share real estate stocks in the Chinese stock market from June 2001 to June 2007, and found that three In the factor model, the market factor and the book-to-market ratio factor have a more significant impact on the return of the stock portfolio, while the scale factor has a smaller impact. Gou Dongning (2016) selected the weekly data of 16 listed bank stocks in my country from 2011 to 2014, and used the Fama-French three-factor model to study the factors affecting the volatility of my country's banking industry returns, and found that the scale effect and the book-to-

market value ratio effect Exists in small-cap bank stocks and large-cap low book-to-market bank stocks. Zhao Peng (2018) used the Fama-French three-factor model to conduct an empirical analysis on 27 securities stocks listed on the A-share market in my country. In large companies with high book-to-market ratios, these two factors are not significant. In addition, Cheng Shiyu et al. (2019), Guo Zhuxi (2019), Li Ziyi et al. (2020) conducted empirical research on the stock returns of my country's auto sector stocks, steel sector and 5G sector through this model.

3. DATA PROCESSING AND FACTOR CONSTRUCTION METHODS

3.1. Sample Data Selection and Processing

As of the end of 2019, there were 86 listed companies in the retail industry in my country's A-share market. Considering the availability and consistency of data, after excluding companies with incomplete data, this paper selects the weekly data of the remaining 43 listed companies in the retail industry in the A-share market from January 1, 2017 to December 31, 2019 as empirical evidence Study the sample and guarantee 154 weekly return data for each sample stock. The sample data used in this paper comes from the Guotai'an database.

The risk-free rate of return (r_f) in this paper adopts the weekly one-year fixed deposit rate, and the weekly individual stock return is the weekly individual stock return considering the reinvestment of cash dividends. The market rate of return (r_{mt}) is obtained by using the weekly rate of return of the comprehensive A-share market, which is obtained by the weighted average of the total stock market value. In addition, the sample market capitalization (ME) in this paper adopts the total market value of individual stocks during the sample period, which is obtained by multiplying the total number of issued shares by the weekly closing price. The book-to-market ratio (BE/ME) refers to the stockholders' equity at the end of the period divided by the total market value of the stock at the end of the period. All data are available directly from the database.

3.2. Rate of Return and Factor Calculation Method

Fama and French (1993) added the market value factor (SMB) and book-to-market ratio factor (HML) to the asset pricing model on the basis of CAPM, and proposed the famous Fama-French three-factor model:

$$E[r_{it}] - r_f = \beta_i (E[r_{mt}] - r_f) + a_i \text{SMB}_t + b_i \text{HML}_t$$

Among them, r_{it} represents the rate of return of asset i at t , r_f represents the market risk-free rate of return, and r_{mt} represents the market rate of return at t . $r_{mt} - r_f$ reflects the market risk premium. SMB_t represents the return of the market capitalization factor simulated portfolio at t , which is the difference between the returns of the small-cap and large-cap stock portfolios. HML_t represents the book-to-market ratio factor simulation portfolio return at t , which is the difference between the returns of the high book-to-market ratio and the low book-to-market ratio stock portfolio.

Referring to the grouping method of the three-factor model of Fama and French (1993), this paper first sorts the sample 43 stocks according to their total market capitalization at the end of year t ($t=2017, 2018, 2019$), according to the ratio of 50% and 50%. The sample stocks are divided into large-cap (B) and small-cap (S) groups. According to the high and low book-to-market ratio at the end of the year, the sample stocks are divided into two groups of low book-to-market ratio (L) and high book-to-market ratio (H) according to the ratio of 50% and 50%. Secondly, by crossing the two indicators of market value and book-to-market value ratio, all stocks can be divided into four combinations: SH, SL, BH, and BL.

According to the grouping results, combined with the weekly individual stock returns and the market value data of listed companies at the end of the period, the weighted average combined

weekly return of each grouping is calculated. Each group can get 154 weekly rate of return data (rit), according to which the market value factor and book value ratio factor can be constructed:

$$SMB_t = (SL_t + SH_t) / 2 - (BL_t + BH_t) / 2$$

$$HML_t = (SH_t + BH_t) / 2 - (SL_t + BL_t) / 2$$

3.3. Descriptive Statistics

Descriptive statistics were performed on the weekly return data of four groups of stocks by stata software.

Table 1. Descriptive statistics of portfolio weekly return data

	S/L	S/H	B/L	B/H
Mean	-0.002201	-0.0030792	0.0018237	-0.0024566
s.d.	0.0360045	0.0290352	0.0289695	0.0313383
Min	-0.103145	-0.1117201	-0.0852734	-0.0962843
Max	0.0955712	0.0728171	0.0844496	0.0774882

It can be seen from Table 1 that the average weekly rate of return of the four portfolios in the past three years is only positive for group B/L, and the average weekly rate of return for the other three groups is negative, indicating that the profit margin of listed retail companies in the three-year period from 2017 to 2019 is very small. . Comparing the standard deviation of average weekly returns between groups, $B/H < S/H$, $B/L < S/L$, the risk of investing in stocks of small-scale listed companies is greater than that of investing in stocks of large-scale listed companies. Among the four combinations, the B/H group shows the characteristics of low risk and high return, and the S/H group shows the characteristics of insufficient return and excess risk.

4. EMPIRICAL RESEARCH

4.1. Stationarity Test

Unit root and cointegration tests are required before time series regression to ensure data stationarity and avoid spurious regression. In this paper, the ADF test is carried out on the sample data of the four combined weekly returns and the data of each impact factor. The results show that all variables have passed the significance test at the 5% significance level, that is, the series is stationary and there is no unit root. A further regression analysis can be performed.

4.2. Construction of the Regression Model

The regression equation of the Fama-French three-factor model is designed as follows:

$$Z_{it} = \alpha + \beta_i Z_{mt} + a_i SMB_t + b_i HML_t + \varepsilon_{it}, t = 1, 2, \dots, 154$$

Among them, i refers to the four stock portfolios constructed above, namely S/L, S/H, B/L, B/H; Z_{it} refers to the excess return of the i -th stock portfolio at time t , or the Systematic risk return, namely $E[rit] - r_f$; Z_{mt} refers to the excess return of market portfolio at time t , or average market systematic risk return, namely $E[r_{mt}] - r_f$; SMB_t is the simulated portfolio of scale factor at time t Return; HML_t is the simulated portfolio return of the book-to-market ratio factor in period t .

4.3. Evidence Results

Table 2. Fama-French three-factor model regression analysis results

Minute Group	intercept term	Correlation coefficient			F test	goodness of fit	
		Zmt	SMB	HML		R2	adj R2
	α	β	a	b	F value	R2	adj R2
S/L	-0.0023* (-1.67)	1.0421*** (18.05)	0.6930*** (9.31)	-0.6422*** (-7.6)	175.22	0.7780	0.7736
S/H	-0.0016 (-1.52)	0.9501*** (22.36)	0.4825*** (8.81)	0.1838*** (2.96)	220.59	0.8152	0.8115
B/L	-0.0016 (-1.52)	0.9501*** (22.36)	-0.5174*** (-9.45)	-0.8161*** (-13.3)	219.37	0.8144	0.8107
B/H	-0.0023* (-1.67)	1.0421*** (18.05)	-0.3070*** (-4.12)	0.3578*** (4.24)	120.63	0.7070	0.7011

Note: ***, **, * indicate significant at the 1%, 5% and 10% significance levels, respectively

Table 2 shows the regression results of the Fama-French three-factor model team's return on the stock portfolio of four listed retail companies. The adjusted R2 of the four regressions are all above 0.7, and all have passed the F test, indicating that the model fits well, that is, the market factor, scale factor and book value ratio factor well reveal the changes in the excess return of the investment portfolio. condition.

Observing the intercept terms of the four combined regression results, it can be seen that the intercept terms of the S/L group and the B/H group passed the significance test at the 10% significance level, while the intercept terms of the S/H and B/L groups passed the significance test. The distance term did not pass the significance test. Because α is higher than the market return, it depends on the excess return of active investment, and the return cannot be explained by β . Therefore, for the S/L group and the B/H group, there may be other factors that affect the stock return.

Zmt is a proxy variable of the market factor. In the regression of the four stock portfolios, the regression coefficients of Zmt are all at the 1% significance level, and have passed the significance test, and the regression coefficients are positive and take values around 1. . It shows that there is a positive correlation between the two. The stocks in the retail market can respond quickly to changes in the market environment, and the favorable market environment will also bring about the benefits of the stocks of listed companies in the retail industry; SMB is a proxy variable of the scale factor, four In the regression of each stock portfolio, the regression coefficients of the scale factor are all at the 1% level of significance, and all have passed the significance test, which shows that the market capitalization factor is one of the main factors affecting the changes in stock returns, which reminds investors when constructing When investing in stocks, we should pay attention to the impact of market value factors on the return of investment targets. According to the regression results, the regression coefficients of the SMB factors of the S/L and S/H groups are both positive, indicating that for stocks with small market capitalization, the excess return of the investment portfolio is positively correlated with the scale factor. The regression coefficients of the SMB factors of the B/L and B/H groups are both negative, indicating that for stocks with large market capitalization, the excess return of the portfolio is negatively correlated with the size factor. This conclusion is basically consistent with that of Fama and French, that is, small-scale companies have a positive slope on the SMB factor, while large-scale companies have a decreasing positive or negative slope on the SMB factor. HML is the proxy variable of the book-to-market ratio factor. In the regression of the four stock portfolios, the regression coefficients of the book-to-market ratio factor are all at the 1%

significance level, and all have passed the significance test, which shows that the book-to-market ratio factor is also One of the main factors affecting stock returns changes. And it can be seen from observation that except the regression coefficients of the HML factors of the S/H and B/H groups are positive, the regression coefficients of the HML factors of the other two groups of stocks are negative. This is basically consistent with Fama and French's conclusion that value stocks generally have a positive slope to the HML factor, while growth stocks have a negative slope or a decreasing positive slope to the HML factor.

5. CONCLUSION

According to the above empirical analysis results, this paper draws the following conclusions: (1) The Fama-French three-factor model is established in my country's securities market. Market factors, size factors and book-to-value ratio factors can well describe the changes in cross-sectional data of stock returns. (2) The trend of the stocks of listed companies in the retail industry in my country's A-share market is positively correlated with the trend of the broader market of A-shares, and its fluctuation range is basically the same as that of the broader market. The development of my country's retail industry is inseparable from my country's economic situation. Investors should pay special attention to the overall economic environment and the trend of A shares when investing in the steel industry. Investment can get relatively reliable returns. (3) The empirical results of this paper get roughly the same conclusion as Fama and French, that is, the performance return of value stocks is higher than that of growth stocks, and in the same book-to-market ratio category, the performance return of small companies is higher than that of large companies.

My country's retail industry has seized the development opportunities brought by the 40 years of reform and opening up, and has achieved rapid overall development in recent years. The development and upgrading of Internet technology has further injected vitality into the development of my country's retail industry, and the status of retail industry in the operation of my country's national economy is even more irreplaceable. The role of retailing in the national economy reinforces the importance of retailing stocks in the securities market. 2017 is the first year of my country's new retail development. Internet giants led by Alibaba and Tencent have invested heavily in the offline physical business field. In the wave of new retail reform, as the boom fades, the industry will eventually return to the business essence of profitability. In the next few years, the retail sector will also become a key industry sector for investors in the securities market. According to the research results of this paper, investors should fully consider the factors affecting the stock returns of listed companies in the retail sector in the A-share market when investing in the future. , and then make investment choices.

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