Stock Selection Strategy and Model Test in A-share Market

Xuzhou Feng[1, †], Mingyu Wang[2, †], Ziwen Wang[3, *, †], Yue Xu[4, †]

[1]International College, Guangxi University, Nanning, China

[2]Tianjin Jizhou District No.2 Middle School, Tianjin, China

[3]Dalian Huamei School, Dalian, China

[4]Business College, Xianda College of Economics and Humanities, Shanghai International Studies University, Shanghai, China

*Corresponding author: ziwen_wang_ziwen@daischina.net

[†]These authors contributed equally

Abstract. Fama and French put forward the famous three-factor model in 1992, book-to-market ratio and market capitalization are added to the market combination factor of CAPM single factor mode to explain the value effect and scale effect, and then proposed the five-factor model in 2015. Based on this background, this paper wants to do regression experiments on these models in A-shares to validate their explanatory ability on stock returns. All the data include the actual data of all non-ST stocks in the A-share market from January 2006 to December 2019, the book-to-market ratio data of all listed companies in the A-share market (non-ST), the return on equity data of all listed companies in the A-share market (non-ST), and the change rate of total assets of all listed companies in the A-share market (non-ST). Using the three-factor model and five-factor model to explain China's A-share market, it is found that these two-factor models have a relatively poor ability to explain the A-share market, and the R-square fitting fluctuates greatly. The three-factor interpretation is better, the R-square fitting has a small fluctuation, and the five-factor R-square fitting has the smallest fluctuation and the largest fit. CAPM single factor model has been proposed for a long time, but the factor model still can explain, and it is still very good. This is because alpha is almost always insignificant. However, the fitting fluctuates greatly and the explanatory power is inferior to Fama-French three-factor model and the Fama-French five-factor model.

Keywords: CAPM model; OLS Regression; Fama-French three-factor; Fama-French five-factor.

1. Introduction

1.1 Background

In 1989, the stock market began its experimental entry into the Chinese market, using the Chinese stock market as a pilot operation. 1990 saw the start of the trial operation of the Shenzhen Stock Exchange, as well as the establishment of the Shanghai Stock Exchange, with both Shanghai and Shenzhen starting public offerings of stocks as pilots. The number of listed stocks on the SSE has increased from a few at the beginning to nearly 1,600 today, and the daily turnover has reached an order of magnitude of 100 billion yuan. Faced with this huge pool of stocks, selecting stocks with more value and growth has become the most important issue for investors, which is also a complex issue with academic and practical significance.

There are many kinds of stock selection models available, such as the style rotation model that changes according to market investor preferences, and the capital flow model that determines the decline and rise of stocks according to capital flows. The rise of these quantitative models represents the bullishness and importance investors attach to quantitative investment and proves its effectiveness. The basic concept of the multi-factor model is to use a series of factors as stock selection criteria, and stocks that meet these factors are bought and those that do not are sold. The multi-factor model has two methods of judgment, one is to score stocks based on each factor and then screen them, and the other is to use past stock returns to make a multi-factor regression and then substitute new factors to predict how their future returns will be. From the traditional asset pricing model (CAMP) to the Fama-

French three-factor model and Fama-French five-factor model, the multi-factor model has undergone continuous development and updates for improvement.

1.2 Related research

Wang et al. test the utility of the Fama-French three-factor model for the stock markets of China and the United States by comparing the data of Chinese and American stocks from 1994 to 2013. Conclusions are drawn: market risk is extremely prominent in the Chinese stock market, and stock returns are more sensitive to risk than in the U.S.; the CAMP single factor model still has strong explanatory power in the Chinese stock market, and portfolio theory is difficult to control risk and obtain high returns in China [1]. He argues that the development of stock market practice, that there are huge changes in the stock market, but there is no greater impact on the rational pricing model used to explain stock portfolio returns; that there is still room for improvement in the Fama-French three-factor model, which is still relatively weak in explaining the ability of certain portfolios. He concludes that the Fama-French three-factor model does not explain well the portfolio returns of our stock market through the data from 1995 to 2005 [2]. Foye et al. explored the Fama-French three-factor models to establish an explicit explanation of stock market return specific to Eastern European. Search establishes that the market value of the equity component in the Fama-French three-factor model performs poorly when applied to the new marketing dataset. Therefore, the search proposes a potential amendment to Fama-French three-factor model by replicating the market value of the equity factor with a term that relates to the accounting population [3].

Sehgal and Balakrishnan re-examined the efficacy of the one-factor capital asset pricing model alongside the Fama-French asset pricing model in elaborating the returns margin on multiple portfolios based on organizational size and value.In explaining the returns on various portfolios based on organizational factors, the Fama-French three-factor model outperforms the CAPM single-factor model. As such, the Fama-French three-factor model remains a robust technique for explaining returns on numerous character-based company portfolios [4]. Taneja explored the possible anomalies in the Stock exchange, which have continued to raise more concerns regarding the applicability of the Capital Asset Pricing Model (CAMP) as an efficient and standard estimation tool for stock market returns. The Fama-French three-factor model demonstrated the inability of the CAPM single-factor model to further explain the cross-sectional stock market returns through the introduction of two factors that include the size of the firm, value, and profitability [5]. Xu and Zhang showed the application of the Fama-French three-factor model in the Chinese A-shares market during the period from the last century to the 21st century. There are three factors were constructed in this search which are market, size and value respectively. In summary, the three factors have an important impact on the Chinese A-share market and this model has a Strong explanatory power in the portfolio returns in Chinese A-shares [6].

It explores the performance of the Fama-French five-factor model in Australian stock pricing. The research finds that Fama-French five-factor model has more asset pricing anomalies than other pricing models. So, research indicates the superiority of the Fama-French five-factor model [7]. Research mainly about the Fama-French three-factor model to explain 100 mutual funds in Pakistan, which turns out the explanation doesn't work very well [8]. Research mainly used 5 listed cement companies to conduct research and comparison among Fama-French three-factor model, Fama-French five-factor model and the CAPM single-factor model, and found that the Fama-French model was preferable to the CAPM model to predict the excess return rate of these 5 listed companies in 10 years [9]. Research mainly studies the Fama-French three-factor model with investor sentiment. The results show that the three-factor model with emotion can well explain the stock returns in the American stock market [10].

1.3 Objective

This paper searches for the explanations in the Chinese A-share market of the CAPM single-factor model, the Fama-French three-factor model, and the Fama-French five-factor model. It uses time

series grouping test concerning different models to explain the yield. Results show that CAPM single factors model has the lowest explanation, the Fama-French three-factor model and the Fama-French five-factor model have a higher explanation, especially The Fama-French five-factor model is the most effective tool for illuminating the Chinese A-share market.

2. Method and Data

The basic research idea of this paper is to select data, construct factors and perform time series group tests on each model.

2.1 Data selection section

Firstly, due to the equity share reform in 2005 and the outbreak of COVID-19 in 2020, the stock market may have been more volatile due to force majeure or other economic reasons. Therefore, firstly, the monthlyized data on the actual return and the total market capitalization in the circulation of all non-ST stocks in the A-share market during December 2005 and December 2019 is selected, and this part of the data is for the subsequent regression of the return after sample comparison of the explained sample. Second, the data on the book-to-market ratio of listed companies in all non-ST stocks in the A-share market from December 2005 to December 2019 is selected, and this part of the data is for the subsequent factor construction. Third, the data of return on net assets of all listed companies in non-ST stocks in the A-share market between December 2005 and December 2019 are selected, and this part of the data is for the subsequent construction of the profitability factor. Fourth, the data on the rate of change of total assets of all listed companies in non-ST stocks in the A-share market from December 2005 to December 2019 were selected to construct the investment factor. All the above data exclude stocks in the financial sector as well as the real estate sector.

2.2 Formula for inspection

2.2.1 CAPM single factor model

The CAPM single-factor model represents the relationship between individual security or portfolio and the systematic risk rate of return, i.e., the return on an individual portfolio is equal to the sum of the risk-free rate of return and the risk premium.

The main assumptions of the CAPM single-factor model include:

(1) The securities market is efficient, i.e., perfectly symmetric in information;

(2) Investors are free to lend or borrow money at risk-free rates, and risk-free securities are readily available;

(3) While total investment risk can be expressed in terms of variance or standard deviation, systematic risk can be described in terms of the beta coefficient;

(4) Every investor is a rational being who bases their investment decisions on mean-variance analysis and the Markowitz portfolio model.

(5) Despite the fact that securities are frequently subject to government taxation at rates specified by the source of the money (interest, dividends, income, etc.), there are no transaction costs and the securities market is frictionless.

(6) In addition to the above-mentioned explicit assumptions, fees, commissions, and other charges associated with securities transactions are determined by the volume of transactions and the customer's level of confidence.

Main result: The CAPM single factor model shows the relationship between an individual portfolio's expected return and the relative level of risk; for example, any asset's expected return must equal the risk-free rate plus a risk-adjusted return. The expected return on any asset must equal the risk-free rate plus a risk adjustment, as shown by the CAPM single factor model, which also shows the relationship between expected return on an individual portfolio and relative degree of risk.

$$r_{p,t} = \alpha + \beta_{MKT} MKT_t + \epsilon_t \quad (1)$$

2.2.2 Fama-French three-factor model

According to Fama and French in 1993, stock returns can be explained by a three-factor model.

The model contends that the exposure to three factors—the market factor, the size factor, and the book-to-market ratio component—can explain the excess return of a portfolio, including individual stocks.

Main assumption: in exploring the application of the Fama-French three-factor model, the assumptions of the "limited rationality" theory are used as the basis. On this basis, several basic assumptions are made.

(1) A huge number of investors exist.

(2) During the same security holding time, every investor plans their investment portfolios.

(3) The only assets that can be purchased by investors are those that are traded on open financial markets.

(4) There are no taxes, commissions, or other expenses associated with the transaction of securities.

(5) The mean, variance, and covariance of the returns on the assets are expected by investors to be the same.

(6) Regarding the assessment of the securities and the state of the economy, all investors share the same viewpoint.

Main result: compared with the CAPM single-factor model, the market capitalization and market-to-value ratio, which stand for size and value, respectively, are two additional components added to the Fama-French three-factor model. However, the process of constructing the factors (forcing two asset portfolios) is not theoretically sound.

$$r_{p,t} = \alpha + \beta_{MKT} MKT_t + \beta_{SMB} SMB_t + \beta_{HML} HML_t + \epsilon_t \quad (2)$$

2.2.3 Fama-French five-factor model

Fama French expanded on the 1993 three-factor model by including an earnings factor and an investment factor. (i.e., market premium factor, size factor, and book-to-market ratio factor) to represent the profitability and investment level of the firm, respectively, and found that the book-to-market ratio factor became a redundant variable, while the other factors performed well.

Main result: in the regression analysis of the Fama-French five-factor model, the five-factor model was found to be adaptive to the Chinese stock market, and it was concluded that the Fama-French five-factor model has more explanatory strength than the Fama-French three-factor model by comparing it with the Fama-French three-factor model. The profitability factor is a newly introduced variable, and the sensitivity coefficient of the profitability factor is found to be significantly positive in the regression analysis. The portfolio analysis and regression results show that the average return on stocks of firms with aggressive investment patterns is larger than the average return on stocks of companies with conservative investment patterns, which is another newly introduced variable.

$$r_{p,t} = \alpha + \beta_{MKT} MKT_t + \beta_{SMB} SMB_t + \beta_{HML} HML_t + \beta_{RMW} RMW_t + \beta_{CMA} CMA_t + \epsilon_t \quad (3)$$

2.3 Fama-French factor construction

First, the size factor and value factor were constructed. By adopting 30% and 70% of the book-to-market ratio as the quantiles, the median market value is separated into small and large groups, and the book-to-market ratio is divided into high, middle, and low groups. As Table 1 shows, the data are divided into six groups, and then the scale factor and value factor can be constructed by applying the formula.

$$\mathrm{SMB} = \frac{1}{3}\left(\frac{\mathrm{S}}{\mathrm{H}} + \frac{\mathrm{S}}{\mathrm{M}} + \frac{\mathrm{S}}{\mathrm{L}}\right) - \frac{1}{3}\left(\frac{\mathrm{B}}{\mathrm{H}} + \frac{\mathrm{B}}{\mathrm{M}} + \frac{\mathrm{B}}{\mathrm{L}}\right) \quad (4)$$

$$\mathrm{HML} = \frac{1}{2}\left(\frac{\mathrm{S}}{\mathrm{H}} + \frac{\mathrm{B}}{\mathrm{H}}\right) - \frac{1}{2}\left(\frac{\mathrm{S}}{\mathrm{L}} + \frac{\mathrm{B}}{\mathrm{L}}\right) \quad (5)$$

Table 1. Fama-French three-factor model double ranking 2*3 matrix

Market capitalization / book-to-market ratio	High	Middle	Low
Small	S/H	S/M	S/L
Big	B/H	B/M	B/L

The next step is to construct the earnings factor. The median market capitalization is divided into small and big groups, and the 30% and 70% of the net return on assets (ROE) are used as the quantile point to divide into the robust, neutral and weak groups. As can be seen in Table 2, the data are divided into six groups, and then the profitability factor can be constructed by applying the formula.

$$\mathrm{RMW} = \frac{1}{2}\left(\frac{\mathrm{S}}{\mathrm{R}} + \frac{\mathrm{B}}{\mathrm{R}}\right) - \frac{1}{2}\left(\frac{\mathrm{S}}{\mathrm{W}} + \frac{\mathrm{B}}{\mathrm{W}}\right) \quad (6)$$

Table 2. Fama-French five-factor model double ranking 2*3 matrix

Market capitalization / ROE	Robust	Neutral	Weak
Small	S/R	S/N	S/W
Big	B/R	B/N	B/W

Then comes the construction of the earnings factor. The median market value is divided into small and big groups, and the 30% and 70% change in total assets are used as the quantile points to divide into aggressive, neutral and conservative groups. As Table 3 shows, the data are divided into six groups, and then the investment factors can be constructed by applying the formula.

$$\mathrm{CMA} = \frac{1}{2}\left(\frac{\mathrm{S}}{\mathrm{C}} + \frac{\mathrm{B}}{\mathrm{C}}\right) - \frac{1}{2}\left(\frac{\mathrm{S}}{\mathrm{A}} + \frac{\mathrm{B}}{\mathrm{A}}\right) \quad (7)$$

Table 3. Fama-French five-factor model double ranking 2*3 matrix (2)

Market capitalization / Total Assets Growth Rate	Robust	Neutral	Weak
Small	S/R	S/N	S/W
Big	B/R	B/N	B/W

2.4 Perform time series grouping tests

First, by β Regression to get CAPM single factor element β Value to get the stock of each month in the sample every year β Cross section data; According to the β Section data by β They were divided into 1-8 groups in ascending order; Get groups market value-weighted average β And market capitalization-weighted average return; Take the weighted average income of each group as the explanatory variable, and take the factors involved in the Fama-French three-factor and Fama-French five-factor model as an explanatory variable; Obtained by OLS regression β、α and R square of each group; For previous regression construction abnormity discusses the explanatory power of the A-share stock return model, and draws a linear graph based on the average r-squared value to further explain. The explanatory power of each model is discussed.

3. Empirical research process and results of model test

The demonstration in this chapter mainly includes the existence test of low-risk anomalies in China's A-share market with risk-free returns, and the intercept term of stock market models under different models and groups α. The difference tests the difference, the existence test of low-risk anomalies under different risk-free rates of return, and the research and analysis of the applicability of the capital asset pricing model of the financial market in China's A-share market. The main method

follows the single variable sorting method β Sort, group and have β the monthly and monthly stock data and the return rate of the corresponding year are spliced, and the stock return rate is grouped by using single variable sorting and the weighted average return rate of each group is calculated. The main statistical methods used are the OLS method, time series regression, python, and other software and call the built-in module for measurement. In this chapter, the author intends to use the monthly stock return of A shares from January 2006 to December 2019 after the nontradable share reform. The routine practice excludes the ST shares and 2756 listed companies in the real estate industry and financial industry in the new and old industry classification of Shenyin Wanguo in 2021. Considering the size of each group of ranking and grouping the stock data, and the problem that the number of A-share companies listed year by year from 2006 to 2019 is too large in the first year and the last year, it was decided to determine the size of each group by β the time intersection of data and yield data can solve the above problems. First, use the merge function in the panda's module in python to find the simultaneous existence β and the intersection of stock data of listed companies with yield, screening stocks at the end of 2013-2019 β Time intersection with yield β by splicing the data with the yield, 569 listed companies can be selected through such processing. The value is calculated by running a regression between the market premium factor and the weighted average return rate of a certain stock portfolio. Regardless of the construction of model factors for key issues or the regression of intra-group weighted average returns, the method used in this paper is based on the single factor model market factor β Based on the calculation of, here we calculate the market factor of CAPM single factor model β the data used are from the market factor data updated and calculated by the Central University of Finance and Economics and the risk-free interest rate rf data calculated by the University. Calculate the β Thereafter β by splicing the data with the stock return rate and the circulating market value of the stock, 569 stocks were obtained, which were divided into eight groups, including 72 stocks in the first group and 71 stocks in each group from the second to the eighth group. However, this paper does not simply focus on grouping stocks by number, but more detailed processing was carried out according to the time series, that is, the cross-section data of monthly stock samples were sorted in ascending order of market value, they are divided into 8 groups from small to large, among which there are 72 stocks in the first group and only 71 stocks in other groups. The first group in 2013 is selected for data consolidation. The consolidated results are the first group of stocks in 2013. The author did not take controlling the number of stocks in each group as the sole basis for such single variable sorting grouping, but after sorting and grouping the cross-section data of the stock portfolio, The stock return data of the same component in all cross-sections of the same year are integrated as a group. Therefore, except for 864 (12 * 72) stock data in the first group each year, 852 (12 * 71) stock data are available in the second to eighth groups each year.

3.1 CAPM single-factor model regression result

The weighted average rate of return of each group of each year is then calculated, in which the rate of return of each group is a time series. Considering the completeness of information on grouping stocks and the lag between the market characteristics reflected by the beginning of the year and the end of the year stock portfolio, the time series of the weighted average rate of return adopted by each group of each year and each month only selects the weighted average rate of return from June to December as the explained variable, Take the market factor of CUFE at the corresponding time as the explanatory variable for OLS regression, and then we can get a single factor stock portfolio test result, such as P1 group in Table 4. β Is the slope of the market factor to the weighted average return of the stock portfolio. Since the author first defaults to the intercept term const before regression as one in the empirical process β Then it is monad α the actual value of, t value, and p-value are both portfolio factors and intercept items α Indicators for statistical inspection. See Table 4 for specific data. Table 7 displays the R square of CAPM single-factor model regression.

Table 4. The single-factor regression result

2013	P1			P2			P3			P4		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	0.07	0.12	0.91	0.03	0.05	0.96	0.03	0.05	0.97	0.01	0.02	0.99
CAPM_α	0.01	0.21	0.84	0.00	0.09	0.93	0.01	0.18	0.86	0.01	0.23	0.83
2014	P1			P2			P3			P4		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	0.19	0.40	0.71	0.08	0.14	0.90	0.01	0.02	0.98	0.06	0.11	0.92
CAPM_α	0.02	0.83	0.44	0.02	0.53	0.62	0.02	0.76	0.48	0.02	0.49	0.65
2015	P1			P2			P3			P4		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	-1.20	-2.92	0.03	-1.29	-3.17	0.03	-1.23	-2.82	0.04	-1.23	-3.08	0.03
CAPM_α	-0.02	-0.44	0.68	-0.03	-0.69	0.52	-0.02	-0.51	0.63	-0.03	-0.61	0.57
2016	P1			P2			P3			P4		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	0.04	0.04	0.97	0.17	0.16	0.88	-0.01	-0.01	0.99	-0.17	-0.17	0.87
CAPM_α	0.04	1.06	0.34	0.03	0.81	0.46	0.03	0.76	0.48	0.03	0.86	0.43
2017	P1			P2			P3			P4		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	0.27	0.24	0.82	0.15	0.14	0.90	-0.01	-0.01	0.99	0.19	0.20	0.85
CAPM_α	-0.03	-0.92	0.40	-0.02	-0.69	0.52	-0.01	-0.47	0.66	-0.01	-0.40	0.71
2018	P1			P2			P3			P4		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	1.20	3.55	0.02	1.12	4.40	0.01	0.84	3.02	0.03	0.93	4.09	0.01
CAPM_α	0.01	0.42	0.69	0.01	0.45	0.67	-0.01	-0.55	0.61	0.00	-0.33	0.76
2019	P1			P2			P3			P4		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	1.33	6.40	0.00	1.34	4.78	0.01	0.23	0.15	0.89	0.20	0.14	0.90
CAPM_α	-0.02	-3.18	0.02	-0.01	-1.17	0.30	0.01	0.30	0.78	0.02	0.37	0.73
2013	P5			P6			P7			P8		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	0.01	0.01	0.99	0.07	0.11	0.92	0.01	0.02	0.99	0.07	0.21	0.85
CAPM_α	0.01	0.19	0.86	0.01	0.12	0.91	0.00	-0.03	0.98	-0.02	-0.82	0.45
2014	P5			P6			P7			P8		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	0.02	0.04	0.97	0.14	0.28	0.79	0.12	0.26	0.81	-0.25	-0.62	0.56
CAPM_α	0.01	0.50	0.64	0.01	0.22	0.83	0.00	0.14	0.89	0.03	1.10	0.32
2015	P5			P6			P7			P8		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	-1.23	-3.24	0.02	-1.16	-3.78	0.01	-1.00	-3.90	0.01	-0.71	-2.24	0.08
CAPM_α	-0.03	-0.73	0.50	-0.03	-0.80	0.46	-0.02	-0.83	0.44	-0.03	-0.71	0.51
2016	P5			P6			P7			P8		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	-0.01	-0.01	1.00	0.02	0.02	0.98	-0.07	-0.09	0.93	0.05	0.10	0.93
CAPM_α	0.03	0.83	0.44	0.03	0.84	0.44	0.03	1.07	0.33	0.02	1.13	0.31
2017	P5			P6			P7			P8		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	0.27	0.30	0.78	-0.15	-0.16	0.88	-0.15	-0.18	0.86	-0.36	-2.30	0.07
CAPM_α	-0.01	-0.31	0.77	0.01	0.40	0.71	0.01	0.68	0.53	0.02	4.90	0.00
2018	P5			P6			P7			P8		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	0.75	4.20	0.01	0.58	3.04	0.03	0.66	3.70	0.01	0.55	2.32	0.07
CAPM_α	-0.01	-0.62	0.56	-0.01	-1.29	0.25	0.00	-0.24	0.82	0.00	0.19	0.86
2019	P5			P6			P7			P8		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	0.26	0.19	0.86	0.30	0.22	0.84	0.23	0.20	0.85	0.61	0.73	0.50
CAPM_α	0.02	0.41	0.70	0.02	0.49	0.65	0.02	0.53	0.62	0.02	1.02	0.36

3.2 The Fama-French three-factor model regression result

Table 5 shows the grouped regression test results of the Fama-French three-factor model year by year, in which β As a load of market factors, SMB is the scale factor calculated by dividing the equal weight average of three groups of large market value combinations by the equal weight average of three groups of small market value combinations, and HML is the value factor calculated by dividing the equal weight average of two groups of high book to market value combinations by the equal weight average of two groups of low book to market value combinations. FF3_ α Represent each combined intercept term in Fama-French three-factor model α Value, Table 8 is the R-square of the Fama-French three-factor model, reflecting the degree of interpretation of the model.

Table 5. Three-factor regression result

2013	P1			P2			P3			P4		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	0.29	0.33	0.76	-0.14	-0.16	0.88	0.03	0.03	0.98	0.12	0.61	0.59
smb	-0.94	-0.50	0.65	0.98	0.37	0.74	-0.16	-0.07	0.95	-1.09	-3.78	0.03
hml	-0.01	-0.01	1.00	-0.68	-0.40	0.71	0.27	0.13	0.91	-1.06	-6.10	0.01
FF3_α	0.03	0.45	0.68	-0.01	-0.13	0.91	0.01	0.10	0.93	0.03	1.80	0.17
2014	P1			P2			P3			P4		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	0.40	0.40	0.71	0.11	0.10	0.93	0.18	0.24	0.83	0.12	0.16	0.89
smb	-0.80	-0.56	0.61	-1.52	-0.86	0.45	-0.89	-0.91	0.43	-0.20	-0.38	0.73
hml	-0.20	-0.24	0.83	0.49	0.39	0.73	0.19	0.26	0.81	0.25	0.36	0.74
FF3_α	0.03	0.91	0.43	0.04	0.91	0.43	0.04	1.09	0.35	0.01	0.30	0.78
2015	P1			P2			P3			P4		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	-1.06	-2.25	0.11	1.47	-1.49	0.23	-1.09	-1.98	0.14	-1.33	-3.21	0.05
smb	0.67	0.55	0.62	-0.35	-0.23	0.83	-0.66	-0.45	0.68	0.05	0.03	0.98
hml	-1.48	-1.74	0.18	-0.23	-0.19	0.86	-0.91	-0.62	0.58	-0.99	-1.24	0.30
FF3_α	-0.01	-0.14	0.90	-0.03	-0.55	0.62	0.00	0.05	0.96	-0.02	-0.40	0.72
2016	P1			P2			P3			P4		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	0.22	0.11	0.92	-0.08	-0.06	0.96	1.30	0.48	0.66	0.52	1.49	0.23
smb	0.48	0.24	0.83	1.78	0.81	0.48	1.35	0.54	0.63	4.15	5.21	0.01
hml	0.24	0.10	0.93	-1.57	-0.83	0.47	0.36	0.23	0.84	1.04	3.80	0.03
FF3_α	0.04	0.72	0.52	-0.01	-0.17	0.88	-0.03	-0.28	0.80	-0.10	-3.64	0.04
2017	P1			P2			P3			P4		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	0.21	0.16	0.88	2.82	1.32	0.28	3.11	1.65	0.20	-0.40	-0.39	0.72
smb	-1.38	-0.79	0.49	-0.44	-0.19	0.86	-0.71	-0.35	0.75	-1.91	-1.43	0.25
hml	0.12	0.08	0.94	3.68	1.24	0.30	4.36	1.66	0.20	1.75	1.41	0.25
FF3_α	-0.01	-0.36	0.74	-0.03	-1.13	0.34	-0.03	-1.09	0.36	0.06	1.13	0.34
2018	P1			P2			P3			P4		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	1.03	5.04	0.02	1.11	1.92	0.15	0.85	1.88	0.16	1.17	2.68	0.08
smb	1.65	3.41	0.04	-0.17	-0.18	0.87	-0.66	-0.35	0.75	0.50	1.01	0.39
hml	0.74	2.52	0.09	-0.18	-0.19	0.86	0.53	0.75	0.51	0.48	0.74	0.51
FF3_α	-0.02	-1.39	0.26	0.01	0.40	0.72	0.00	-0.16	0.88	0.00	-0.01	0.99
2019	P1			P2			P3			P4		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	1.40	5.56	0.01	1.41	5.56	0.01	2.14	1.05	0.37	-0.09	-0.05	0.96
smb	0.54	1.91	0.15	-0.62	-1.34	0.27	4.96	1.15	0.33	2.91	0.89	0.44
hml	0.06	0.62	0.58	-0.79	-2.00	0.14	-7.17	-1.67	0.19	3.06	1.40	0.26
FF3_α	-0.04	-1.57	0.22	-0.01	-0.79	0.49	-0.01	-0.13	0.90	0.01	0.14	0.90

2013	P5			P6			P7			P8		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	1.17	4.06	0.03	1.41	0.87	0.45	0.35	0.71	0.53	-0.31	-0.87	0.45
smb	-3.93	-5.51	0.01	-3.35	-0.75	0.51	-2.19	-0.68	0.55	2.09	2.66	0.08
hml	-2.48	-5.35	0.01	-0.86	-1.45	0.24	-0.79	-0.87	0.45	-0.56	-1.26	0.30
FF3_α	0.04	2.23	0.11	0.07	0.70	0.53	0.05	0.61	0.59	-0.03	-2.01	0.14
2014	P5			P6			P7			P8		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	0.05	0.06	0.95	0.09	0.09	0.93	-0.15	-0.22	0.84	-0.41	-0.89	0.44
smb	0.43	0.55	0.62	-0.97	-1.08	0.36	-0.58	-1.29	0.29	0.32	1.00	0.39
hml	-0.19	-0.26	0.81	0.28	0.77	0.50	0.43	0.83	0.47	0.36	1.12	0.34
FF3_α	0.00	0.11	0.92	0.03	0.90	0.43	0.01	0.50	0.65	0.02	0.57	0.61
2015	P5			P6			P7			P8		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	-1.27	-2.92	0.06	-1.21	-2.79	0.07	-1.01	-2.94	0.06	-0.59	-1.55	0.22
smb	0.06	0.07	0.95	0.16	0.21	0.85	0.04	0.03	0.98	-1.09	-1.08	0.36
hml	-1.01	-1.52	0.23	-0.27	-0.43	0.70	0.03	0.06	0.96	-0.64	-1.10	0.35
FF3_α	0.00	-0.05	0.96	-0.04	-0.79	0.49	-0.02	-0.51	0.65	-0.01	-0.32	0.77
2016	P5			P6			P7			P8		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	0.36	0.54	0.63	0.24	0.49	0.66	-0.90	-1.64	0.20	-0.12	-0.13	0.91
smb	-0.37	-0.37	0.74	2.43	3.25	0.05	1.22	1.85	0.16	0.32	0.28	0.80
hml	2.44	2.63	0.08	0.96	1.94	0.15	1.24	2.97	0.06	0.01	0.01	0.99
FF3_α	0.02	0.70	0.54	-0.03	-2.06	0.13	0.01	0.68	0.54	0.02	0.93	0.42
2017	P5			P6			P7			P8		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	0.04	0.04	0.97	0.16	0.25	0.82	-0.99	-1.13	0.34	-0.24	-1.47	0.24
smb	-0.98	-0.79	0.49	-1.12	-2.51	0.09	-1.66	-1.81	0.17	-0.23	-2.44	0.09
hml	0.11	0.09	0.93	1.07	2.72	0.07	-0.14	-0.50	0.65	0.03	0.41	0.71
FF3_α	0.02	0.40	0.72	0.01	0.67	0.55	0.06	1.85	0.16	0.02	6.54	0.01
2018	P5			P6			P7			P8		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	0.57	1.50	0.23	0.64	4.77	0.02	0.60	2.61	0.08	0.62	1.73	0.18
smb	0.42	0.35	0.75	0.41	0.92	0.43	-0.48	-0.53	0.64	-0.19	-0.27	0.80
hml	-0.16	-0.32	0.77	0.52	1.70	0.19	0.29	0.92	0.43	0.10	0.30	0.79
FF3_α	-0.01	-0.62	0.58	-0.02	-2.76	0.07	0.00	-0.23	0.83	0.00	0.20	0.86
2019	P5			P6			P7			P8		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	-0.33	-0.20	0.86	-0.94	-0.67	0.55	-1.57	-1.05	0.37	0.61	0.73	0.52
smb	-3.48	-0.98	0.40	-1.32	-1.21	0.32	-3.01	-1.44	0.25	-1.17	-0.94	0.42
hml	-1.95	-0.89	0.44	-1.98	-1.44	0.24	-3.22	-1.65	0.20	-0.59	-1.37	0.26
FF3_α	0.08	1.01	0.39	0.02	0.50	0.66	0.04	1.03	0.38	0.02	0.60	0.59

3.3 The Fama-French five-factor model regression result

Table 6 shows the grouped regression results of the Fama-French five-factor model year by year, which is different from the Fama-French three-factor model. The profit factor RMW and the investment factor CMA are included in the five-factor model. Other indicators have the same meaning, so they will not be explained separately. Table 9 is the R-square of the Fama-French five-factor model.

Table 6. Five-factor regression result

2013	P1			P2			P3			P4		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	-0.48	-0.37	0.78	-0.28	-0.27	0.84	0.06	0.05	0.97	0.09	0.31	0.81
smb	-0.47	-0.16	0.90	-0.12	-0.04	0.98	1.57	0.38	0.77	-0.74	-0.96	0.51
hml	3.12	0.53	0.69	-1.29	-0.63	0.64	0.05	0.02	0.99	-0.97	-3.56	0.17
rmw	-0.40	-0.04	0.97	0.54	0.38	0.77	-0.81	-0.37	0.78	0.41	0.61	0.65
cma	4.44	0.33	0.80	1.63	0.91	0.53	-1.93	-0.71	0.61	-0.14	-0.26	0.84
FF5_α	-0.04	-0.23	0.86	0.00	0.03	0.98	-0.08	-0.51	0.70	0.01	0.24	0.85
2014	P1			P2			P3			P4		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	0.94	0.63	0.64	2.96	2.85	0.22	0.77	0.83	0.56	-0.51	-0.38	0.77
smb	-1.18	-0.32	0.80	-4.64	-3.62	0.17	-1.27	-1.21	0.44	-0.48	-0.57	0.67
hml	0.23	0.15	0.90	3.36	3.89	0.16	-0.23	-0.28	0.83	0.29	0.24	0.85
rmw	0.98	1.07	0.48	2.58	4.16	0.15	1.00	1.28	0.42	0.70	0.61	0.65
cma	0.52	0.27	0.83	-3.30	-3.23	0.19	0.80	1.21	0.44	0.07	0.04	0.98
FF5_α	0.02	0.29	0.82	-0.08	-2.16	0.28	0.02	0.36	0.78	0.05	0.61	0.65
2015	P1			P2			P3			P4		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	-3.58	-0.84	0.56	-1.84	-1.47	0.38	-1.60	-9.94	0.06	-1.08	-1.03	0.49
smb	4.69	1.01	0.50	-0.59	-0.33	0.80	-1.79	-4.01	0.16	-0.90	-0.19	0.88
hml	-4.21	-0.54	0.68	-0.72	-0.49	0.71	-1.88	-4.67	0.13	-3.33	-0.48	0.71
rmw	-0.75	-0.22	0.86	0.33	0.26	0.84	-5.26	-4.71	0.13	-2.12	-0.36	0.78
cma	1.08	0.14	0.91	-1.71	-1.07	0.48	-1.84	-2.15	0.28	1.50	0.50	0.71
FF5_α	0.08	0.62	0.65	-0.02	-0.23	0.86	0.08	2.75	0.22	0.01	0.09	0.94
2016	P1			P2			P3			P4		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	-2.58	-0.68	0.62	-3.21	-1.19	0.44	2.18	0.41	0.75	0.67	1.42	0.39
smb	2.07	0.72	0.60	-3.33	-0.77	0.58	1.54	0.37	0.78	4.06	4.45	0.14
hml	-0.83	-0.21	0.87	-3.13	-1.41	0.39	0.61	0.21	0.87	1.02	3.11	0.20
rmw	3.07	0.92	0.53	-0.05	-0.02	0.99	-0.52	-0.14	0.91	0.83	1.11	0.47
cma	-1.62	-0.33	0.80	4.25	1.39	0.40	-1.02	-0.34	0.79	0.18	0.99	0.50
FF5_α	0.12	1.19	0.45	0.15	1.09	0.47	-0.04	-0.22	0.86	-0.10	-3.20	0.19
2017	P1			P2			P3			P4		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	-0.24	-0.68	0.62	4.13	22.68	0.03	2.51	0.71	0.61	0.43	0.38	0.77
smb	-1.28	-3.10	0.20	1.93	8.74	0.07	0.51	0.13	0.92	1.56	0.52	0.70
hml	-0.23	-0.48	0.72	5.79	22.47	0.03	2.72	0.43	0.74	-1.35	-0.48	0.72
rmw	5.15	6.96	0.09	1.08	14.74	0.04	0.62	0.24	0.85	0.79	1.46	0.38
cma	2.71	5.20	0.12	-2.00	-18.49	0.03	0.66	0.36	0.78	3.55	1.19	0.45
FF5_α	-0.08	-6.42	0.10	-0.05	-21.38	0.03	-0.02	-0.44	0.74	-0.09	-0.71	0.61
2018	P1			P2			P3			P4		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	0.18	0.65	0.64	0.11	0.11	0.93	0.15	0.19	0.88	0.77	12.44	0.05
smb	-0.16	-0.26	0.84	0.75	0.69	0.62	-2.36	-0.72	0.61	0.68	10.19	0.06
hml	-0.80	-1.64	0.35	-0.33	-0.34	0.79	0.73	0.83	0.56	-0.40	-4.45	0.14
rmw	-0.73	-1.70	0.34	-0.91	-1.59	0.36	-0.37	-0.21	0.87	0.25	4.38	0.14
cma	-3.46	-3.32	0.19	0.22	0.16	0.90	-2.29	-1.03	0.49	0.97	14.77	0.04
FF5_α	-0.02	-2.36	0.26	-0.04	-0.81	0.57	0.01	0.16	0.90	-0.04	-10.79	0.06
2019	P1			P2			P3			P4		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	1.42	7.18	0.09	1.55	2.90	0.21	1.72	0.75	0.59	-3.43	-1.58	0.36
smb	0.59	2.15	0.28	-0.53	-0.81	0.57	4.59	0.61	0.65	2.37	0.93	0.52
hml	0.06	0.71	0.61	-0.51	-0.78	0.58	-10.96	-2.01	0.29	3.40	1.63	0.35

rmw	-0.29	-1.93	0.30	0.42	0.47	0.72	-4.81	-1.26	0.43	-5.43	-1.41	0.39
cma	-0.27	-1.11	0.47	0.59	0.66	0.63	-0.31	-0.06	0.96	-6.90	-1.80	0.32
FF5_α	-0.04	-1.96	0.30	-0.01	-0.78	0.58	0.02	0.37	0.78	0.10	1.26	0.43
2013	P5			P6			P7			P8		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	1.54	1.86	0.31	2.34	3.24	0.19	0.83	0.40	0.76	-1.28	-0.73	0.60
smb	-3.47	-1.99	0.30	-4.33	-2.30	0.26	-1.15	-0.22	0.86	4.04	1.31	0.42
hml	-3.78	-3.18	0.19	-1.95	-3.31	0.19	0.03	0.01	0.99	-1.41	-0.91	0.53
rmw	0.56	0.37	0.78	-2.12	-2.00	0.30	1.50	0.47	0.72	0.36	0.39	0.76
cma	3.57	2.12	0.28	1.92	-4.29	0.15	0.29	0.05	0.97	2.19	0.98	0.51
FF5_α	-0.02	-0.58	0.67	0.03	0.86	0.55	-0.02	-0.09	0.94	-0.07	-1.40	0.40
2014	P5			P6			P7			P8		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	0.23	0.16	0.90	0.44	0.25	0.84	-0.66	-1.46	0.38	0.66	1.21	0.44
smb	1.33	0.76	0.59	-1.21	-0.83	0.56	-0.72	-3.66	0.17	0.83	2.77	0.22
hml	-0.70	-0.46	0.72	0.22	0.25	0.85	1.25	2.14	0.28	4.38	2.55	0.24
rmw	-1.25	-0.67	0.63	-0.27	-0.70	0.61	0.57	1.08	0.48	2.68	2.17	0.28
cma	-0.21	-0.11	0.93	0.25	0.27	0.83	-0.80	-1.26	0.43	-3.82	-2.43	0.25
FF5_α	-0.02	-0.22	0.86	0.01	0.30	0.82	0.05	2.87	0.21	-0.02	-0.99	0.50
2015	P5			P6			P7			P8		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	-1.61	-3.98	0.16	-1.60	-1.98	0.30	-1.25	-48.66	0.01	-1.18	-30.06	0.02
smb	1.81	1.34	0.41	-0.01	0.00	1.00	-0.41	-4.04	0.15	-1.02	-9.83	0.07
hml	-0.76	-1.31	0.42	-0.65	-0.20	0.87	-2.16	-25.53	0.03	-0.98	-19.08	0.03
rmw	0.37	0.55	0.68	-0.90	-0.39	0.76	-1.87	-24.21	0.03	-2.27	-22.66	0.03
cma	2.86	2.00	0.30	-0.61	-0.09	0.94	0.57	9.31	0.07	-1.35	-9.51	0.07
FF5_α	-0.14	-1.78	0.33	0.00	0.01	1.00	0.02	5.56	0.11	0.00	1.46	0.38
2016	P5			P6			P7			P8		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	0.34	0.24	0.85	0.85	3.35	0.18	-0.36	-5.13	0.12	0.84	7.89	0.08
smb	-0.50	-0.30	0.82	0.97	1.99	0.30	0.90	13.50	0.05	0.68	5.93	0.11
hml	2.42	1.53	0.37	0.69	4.40	0.14	2.33	36.85	0.02	2.85	14.79	0.04
rmw	1.06	0.30	0.81	0.35	1.47	0.38	1.58	9.42	0.07	1.31	15.42	0.04
cma	0.28	0.13	0.92	0.97	4.29	0.15	-0.25	-1.68	0.34	-2.19	-11.03	0.06
FF5_α	0.01	0.17	0.89	-0.02	-4.92	0.13	0.01	6.64	0.10	-0.01	-2.52	0.24
2017	P5			P6			P7			P8		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	1.15	5.61	0.11	-1.02	-0.77	0.58	-1.25	-0.84	0.56	-0.80	-2.56	0.24
smb	-0.72	-4.21	0.15	-0.77	-1.43	0.39	-1.49	-1.01	0.50	0.09	0.87	0.55
hml	2.02	6.76	0.09	1.06	1.88	0.31	0.49	0.30	0.81	0.04	0.26	0.84
rmw	2.08	9.71	0.07	1.43	1.23	0.43	0.02	0.01	0.99	-0.45	-2.06	0.29
cma	1.44	11.84	0.05	0.16	0.16	0.90	-0.85	-0.44	0.74	-0.65	-3.14	0.20
FF5_α	-0.02	-3.22	0.19	0.02	0.78	0.58	0.07	1.23	0.43	0.01	4.09	0.15
2018	P5			P6			P7			P8		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	0.02	0.08	0.95	0.58	14.99	0.04	0.16	0.59	0.66	0.87	1.11	0.47
smb	0.66	0.99	0.50	0.28	2.29	0.26	-2.07	-1.85	0.32	0.17	0.12	0.92
hml	-0.17	-0.55	0.68	1.01	7.73	0.08	-0.11	-0.36	0.78	-1.58	-0.66	0.63
rmw	-1.61	-2.91	0.21	0.30	2.68	0.23	-1.59	-2.30	0.26	-1.64	-0.73	0.60
cma	-0.26	-0.93	0.53	-0.39	-4.50	0.14	-0.66	-1.47	0.38	0.04	0.05	0.97
FF5_α	-0.03	-2.18	0.27	-0.04	-12.04	0.05	-0.02	-1.64	0.35	0.02	0.36	0.78
2019	P5			P6			P7			P8		
	β	t	p	β	t	p	β	t	p	β	t	p
mkt_rf	-5.59	-0.40	0.76	-4.25	-0.37	0.78	-1.06	-0.12	0.92	1.77	1.02	0.49

smb	1.59	0.23	0.86	2.48	0.43	0.74	10.17	0.48	0.71	-1.77	-0.57	0.67
hml	2.17	0.34	0.79	2.28	0.42	0.75	2.02	0.24	0.85	-3.45	-0.73	0.60
rmw	7.84	0.72	0.60	7.66	0.84	0.56	7.55	0.60	0.66	-2.53	-0.24	0.85
cma	-4.93	-0.43	0.74	-3.98	-0.41	0.75	-1.48	-0.10	0.94	2.08	0.33	0.80
FF5_α	0.08	0.31	0.81	0.04	0.19	0.88	-0.23	-0.55	0.68	0.08	1.54	0.37

Table 7. CAPM_R²

	P1	P2	P3	P4	P5	P6	P7	P8	AVERAGE
2013	0.197	0.199	0.200	0.200	0.200	0.197	0.200	0.190	0.198
2014	0.163	0.195	0.200	0.197	0.200	0.182	0.184	0.113	0.179
2015	0.630	0.667	0.614	0.655	0.677	0.741	0.752	0.501	0.655
2016	0.200	0.194	0.200	0.193	0.200	0.200	0.198	0.198	0.198
2017	0.186	0.196	0.200	0.191	0.179	0.194	0.192	0.514	0.232
2018	0.715	0.794	0.645	0.770	0.779	0.649	0.732	0.517	0.700
2019	0.891	0.820	0.195	0.196	0.192	0.189	0.191	0.096	0.346

Table 8. FF3_R²

	P1	P2	P3	P4	P5	P6	P7	P8	AVERAGE
2013	0.833	0.867	0.987	0.887	0.845	0.415	0.582	0.798	0.777
2014	0.649	0.443	0.418	0.769	0.816	0.663	0.502	0.376	0.580
2015	0.821	0.673	0.675	0.786	0.822	0.774	0.753	0.670	0.747
2016	0.928	0.459	0.813	0.935	0.808	0.914	0.788	0.944	0.824
2017	0.594	0.466	0.591	0.434	0.604	0.737	0.534	0.850	0.601
2018	0.954	0.800	0.706	0.850	0.800	0.898	0.796	0.561	0.796
2019	0.953	0.935	0.631	0.512	0.453	0.549	0.508	0.472	0.627

Table 9. FF5_R²

	P1	P2	P3	P4	P5	P6	P7	P8	AVERAGE
2013	0.589	0.598	0.343	0.962	0.986	0.97	0.717	0.94	0.763125
2014	0.635	0.961	0.75	0.461	0.373	0.806	0.973	0.92	0.734875
2015	0.776	0.855	0.993	0.842	0.971	0.855	0.998	0.999	0.911125
2016	0.535	0.752	0.189	0.973	0.853	0.997	1	0.997	0.787
2017	0.985	0.999	0.693	0.841	0.995	0.905	0.62	0.99	0.8785
2018	0.996	0.944	0.868	0.999	0.98	0.998	0.972	0.714	0.933875
2019	0.99	0.959	0.882	0.906	0.621	0.712	0.661	0.88	0.826375

The results of Tables 7, 8 and 9 directly illustrate the ability of the three capital asset pricing models in financial markets to explain the A-share market. The R square index shows the degree of fit, and the annual regression of the three models is shown in Fig.1.

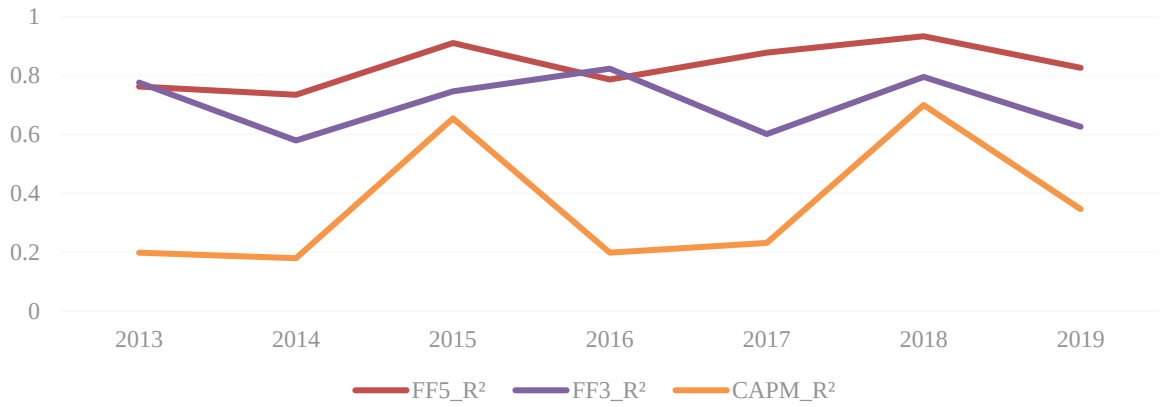

Figure 1. Comparison of AVERAGE values of CAPM R², FF3 R² and FF5 R²

4. Discussion

According to the regression results, the CAPM single-factor model has a strong explanatory ability to the financial market volatility, poor explanatory ability and low applicability; Fama-French three-factor model has less volatility than the CAPM single-factor model, and the fitting degree is mostly more than 70%, with good explanatory ability; Fama-French five-factor model has the best interpretation ability, basically above 80% and increases year by year, which may be the result of the deepening opening of the financial market in China. Therefore, it can be considered that the Fama-French five-factor and Fama-French three-factor models can better explain the relationship between risk and return in China's A-share market. From the perspective of α value, when the P test value in tables Table 4,5 and 6 is less than 0.1 or less than 0.05, it indicates that α's test cannot reject the assumption that "α is not zero", that is, although the model interpretation ability is better, there are still differences in the market. Exploring the regression results, the vast majority of α rejected the "non-zero hypothesis", which passed the T-test, but different combinations of individual years had α significantly non-zero in the three models. For example, in the second group of the Fama-French five-factor model in 2017 (the p-test value of α is 0.03), observing the distribution of this α significantly non-zero, this paper summarizes that they appear more random, but it can show that the vision of A-share market existed in 2019. Therefore, under the theory, investors can build their portfolios based on significant non-zero α combinations to obtain excess returns.

5. Conclusion

In this paper, the R-square of the factors involved in the CAPM single-factor model, Fama-French three-factor model and Fama-French five-factor model is obtained through the regression of OLS. Table 10 is made based on the derived R-square, and it can be seen from the graph that the Fama-French five-factor model has the strongest explanatory power for A-share stocks, which is closest to 1; followed by the Fama-French three-factor model, which has a somewhat weaker explanatory power than the Fama-French five-factor model, and the weakest explanatory power is the CAPM single factor model. This conclusion, that there is an inverse investment pattern effect in the Chinese A-share market, is at odds with the empirical findings of Fama and French, who studied the U.S. stock market. The Chinese stock market has a short history of development compared to the American stock market, laws and regulations are not yet sound, and the stock market disclosure mechanism is not yet perfect. This lack of stability has caused a "speculative wind" among stockholders who are willing to purchase shares of listed companies with aggressive investment patterns. While it is necessary to construct a perfect regulatory framework and further develop the idea of rational investing, China's stock market information disclosure mechanism is not yet ideal.

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