Fama French Three Factor Model in Chinese Stock Market during Covid-19

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Abstract. Many papers in the empirical finance literature examine the Fama-French three-factor model of stock returns in different markets. This paper applied the three-factor model to the Chinese stock market in the Covid-19 specific period and made a comparison with the pre-Covid model application to distinguish the impact of a pandemic shock on the model. Factors under the cross-sectional regression model become less significant during the shock and hence this paper further provides a possible improvement on the model under the shock by adding the stock market's expectation of volatility as a proxy of market anticipation. The empirical results indicate that the additional factor added is significantly negatively associated with the stock return. As a whole, results are reasonably consistent with the Fama-French three-factor model.

Keywords: Fama French Three Factor Model · Chinese Stock Market · VIX · Covid-19

1 Introduction

William Sharpe proposed the Capital Asset Pricing Model (CAPM) in 1964, which argued that after a fully diversified asset portfolio, systematic risk is the main factor affecting stock returns [1]. This model was a milestone in the field of capital asset pricing. However, subsequent researchers have found that equity returns are poorly correlated with market risk. Banz found that adding firm size to the market factor improved the pricing of the model [2], and Basu and Bhandari found that firm P/E ratio and leverage ratio, respectively, have a profitable effect on stock returns [3]. Therefore, the search for the pricing factor has become the main research of capital asset pricing. Based on the previous work, Fama and French further pointed out that CAPM could not explain the difference in different stock returns, and in addition to beta risk, firm size and book-to-market ratio are also important factors in capital asset pricing, and thus proposed a three-factor model. Its empirical results showed that the model had good pricing power

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for stock returns [4]. Fama and French empirically tested the three-factor model using stock market data over different time periods and constructing different asset portfolios [5].

In China, the three-factor model has also been tested and improved. Fan, Longzhen, and Yu, Shidian validated the monthly stock returns of the Chinese A-share market from July 1995 to June 2000 and found that all three factors were significant and the FF three-factor model could be used to explain the Chinese A-share market [6]. Xiao Jun and Xu Xinzhong introduced skewness and kurtosis factors into the FF three-factor model to improve the explanatory power of the model [7]. Liu, Vicky, Niu, Jinxia, and Zhang, Xindong just studied the application of the FF three-factor model to the Chinese A-share market before and after the equity distribution reform on April 29, 2005, and verified that the reformed Chinese securities market is more effective [8].

This article examines the impact of COVID on the Chinese stock market based on the Fama French Three Factor Model.

2 Data

Following the relevant research, we choose our data from all A-shares in Shanghai and Shenzhen stock exchanges, they are monthly return rate, market value, book-to-market ratio (or price-to-book ratio), and interest rate of term time deposit, and the Vix index respectively [9]. The data time period is 1970–2013 to verify whether the Fama French three-factor model is applicable in the Chinese stock market, with the addition of the forth factor - vix index. In terms of verifying the feasibility of the new four-factor model in the Chinese covid period, we select the data above from 2020 to 2022.

Figure 1 shows that the vix index in China decreases smoothly from 93.35 to 65.54, with a moderate rise during 2021/01 to 2021/07.

Figure 2 shows that the interest rate of term time deposit of all A shares in Shanghai and Shenzhen stock Exchanges during covid time stays constant.

Figure 3 shows that the monthly return rate shock dramatically around 0. In 2020, it raise rapidly to 13.064, which is the maximum value and in 2022 slump to its minimum (-9.463).

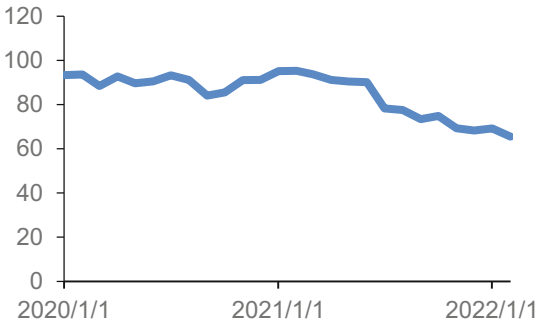

Fig. 1. Vix index

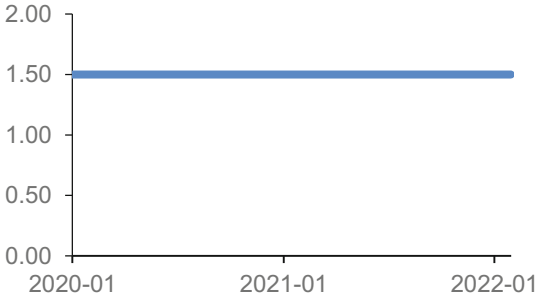

Fig. 2. Interest rate of term time deposit

Fig. 3. Monthly return rate

3 Model Introduction

3.1 Fama French Three Factor Model Introduction

In this section, we continued the application of the FF model on the Chinese stock market based on Zhao Bing's results.

In 2014, Zhao Bing, a Chinese financial researcher, has published a paper which tests whether the Fama French three factor model can be used to explain the Chinese A-share stock market. This paper provides us with a fundamental basis on how the A-share stock market looks like from March 2003 to October 2013 and how the stock market in this period differs from that in the covid-19 period.

The Paper written by Zhao Bing divided all A-shares listed in Shanghai Stock Exchange and Shenzhen Stock Exchange into 10 groups according to firm size and and 10 groups according to the book to market ratio. In this case, he combined them into 100 portfolios based on the firm size and the book to market ratio. These 100 portfolios are the main body of what he carried out a test on whether Fama French Three Factor model fits Chinese stock market.

The formula of Fama French Three Factor model is

$$E(Ri) - Rf = \beta i(E(Rm) - Rf) + siSMB + hiHML \tag{1}$$

Ri, Rf, Rm are the return of i stock or i portfolio, risk-free rate and market return respectively. SMB is the difference in returns between firms with small firms size and

with big firms size. HML is the difference in returns between firms with high book-to-market ratios and with low book-to-market ratios. In Zhao Bing's test, the model used for testing is

$$Rit - Rft = \alpha i + \beta i(E(Rmt) - Rf) + siSMBt + hiHMLt + \varepsilon it \tag{2}$$

Zhao Bing tested βi, si, hi and see whether they are statistically significant using their significance level.

From his test, the market premium is a very strong explaining factor in explaining the return, SMB is a strong explaining factor in explaining Chinese stock returns, and HML can also be regarded HML as a relatively strong factor in explaining Chinese stock returns even though its power is weaker than SMB and market premium.

We focused on the Covid-19 specific period to test for the validity of the model during shocks. The Fama-French 3 factor model is shown below:

$$R_{it} - R_{ft} = \alpha_i + \beta_i\left(E(R_{mt}) - R_{ft}\right) + s_i SMB_t + h_i HML_t + \varepsilon_{it} \tag{3}$$

With SMB, HML, and the risk premium being each of the three factors, we tested for the significance of the coefficients of each factor respectively. Secondly, we tested for the hypothesis of intercepts of regressions being zero. If the constant term is tested to be zero, implies the three factors can to a large extent explain the excess return of stocks, and no additional explanatory variables are required to add.

Due to the Covid time constraint, we collected and processed all data on a monthly basis. We began by constructing smb and hml factors using covid-specific data. Stocks in the A-share market were divided into two groups according to monthly market capitalizations and further divided the stocks into three groups based on the monthly book to market ratio. (Low group: bottom 30%, Medium group: middle 40%, High group: top 30%). The intersection of two grouping criteria creates 6 portfolios for every month, which are SL, SM, SH, BL, BM, BH respectively. The average monthly return for each of the 6 portfolios was calculated and substituted in the following factor equations to obtain the calculated factors for each month.

$$SMB = \frac{1}{3}[(SL + SM + SB) - (BH + BM + BL)] \tag{4}$$

$$HML = \frac{1}{2}[(SH + BH) - (SL + BL)] \tag{5}$$

To obtain a regression result that is comparable to Zhao's, we divide all stocks into 10*10 groups according to their market capitalization and BM ratio. The dependent variable in the regression model is the monthly average return of each of the portfolios, the smb and hml factors are values constructed above. We regress each of the 100 portfolio monthly returns on the 3 factors and record coefficient and p values of regression results. (Tables1, 2, 3, 4, 5, 6, 7 and 8).

Table 1. SMB Coefficients

	SIZE1	SIZE2	SIZE3	SIZE4	SIZE5	SIZE6	SIZE7	SIZE8	SIZE9	SIZE10
BM1	1.54	1.22	2.19	2.04	1.21	l.00	0.47	−0.49	−0.71	0.03
BM2	1.41	1.98	1.35	1.18	1.57	1.15	0.8	0.18	−0.15	−0.02
BM3	1.69	1.75	1.89	1.5	1.11	0.95	0.6	0.53	0.31	0.21
BM4	1.62	1.7	1.59	1.7	1.51	0.87	0.94	0.41	0.35	0.19
BM5	1.63	1.72	1.35	1.35	1.12	1.06	0.87	0.08	0.47	−0.04
BM6	1.79	1.55	1.38	1.3	0.96	1.08	0.74	0.8	0.44	0.16
BM7	1.58	1.37	1.36	1.12	0.82	1.1	0.82	0.38	0.41	−0.01
BM8	1.56	1.3	1.11	1.04	0.93	1.06	0.87	0.62	0.54	0.01
BM9	1.6	1.35	1.17	1.01	0.78	0.91	0.62	0.73	0.35	0.12
BM10	0.3	0.52	0.34	0.32	0.29	0.18	0.12	−0.02	0.05	0.07

Table 2. HML Coefficients

	SIZE1	SIZE2	SIZE3	SIZE4	SIZE5	SIZE6	SIZE7	SIZE8	SIZE9	SIZE10
BM1	0.11	−0.18	−0.5	−0.73	−0.83	−0.97	−1.09	−1.15	−0.69	−0.44
BM2	−0.12	−0.39	−0.38	−0.58	−0.69	−0.9	−0.92	−0.67	−0.28	−0.54
BM3	−0.26	−0.07	−0.68	−0.65	−0.63	−0.74	−0.43	−0.07	0.16	−0.19
BM4	−0.01	−0.25	−0.36	−0.33	−0.48	−0.46	−0.19	−0.04	0.13	0.02
BM5	−0.06	−0.24	−0.26	−0.22	−0.26	−0.22	0.03	0.19	0.18	0.31
BM6	−0.06	−0.04	−0.07	−0.07	−0.18	−0.09	0.06	0.13	0.53	−0.11
BM7	0.15	0.09	0.03	0.18	0.03	0.05	0.02	0.24	0.43	0.34
BM8	0.20	0.26	0.21	0.28	0.26	0.23	0.13	0.40	0.48	0.33
BM9	0.59	0.32	0.38	0.27	0.51	0.40	0.42	0.52	0.53	0.44
BM10	0.14	0.25	0.25	0.17	0.27	0.25	0.29	0.29	0.36	0.30

Table 3. Risk Premium Coefficients

	SIZE1	SIZE2	SIZE3	SIZE4	SIZE5	SIZE6	SIZE7	SIZE8	SIZE9	SIZE10
BM1	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.00
BM2	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.00
BM3	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.00

(*continued*)

Table 3. (*continued*)

	SIZE1	SIZE2	SIZE3	SIZE4	SIZE5	SIZE6	SIZE7	SIZE8	SIZE9	SIZE10
BM4	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
BM5	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.00
BM6	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.00
BM7	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
BM8	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
BM9	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
BM10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 4. Intersect estimates

	SIZE1	SIZE2	SIZE3	SIZE4	SIZE5	SIZE6	SIZE7	SIZE8	SIZE9	SIZE10
BM1	0.01	0.01	0.01	0.05	0.01	0.01	0.01	0.00	−0.01	−0.02
BM2	0.00	0.01	0.00	0.01	0.02	0.00	0.00	−0.01	−0.01	−0.03
BM3	−0.01	0.01	0.00	0.01	0.00	−0.01	0.01	0.01	0.00	−0.01
BM4	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00	−0.01
BM5	−0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
BM6	−0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.00
BM7	0.00	0.00	0.00	0.00	−0.01	0.00	0.00	0.00	0.01	0.00
BM8	−0.01	0.00	0.00	0.00	0.00	0.01	−0.01	0.01	0.01	−0.01
BM9	−0.01	−0.02	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.01
BM10	−0.02	0.00	−0.01	−0.01	0.00	−0.01	0.00	−0.02	−0.01	0.00

3.2 VIX Model Introduction

On the basis of the original FF-model, we consider market anticipation an influential component of stock and market returns. Considering the pandemic as a shock to the stock market [10], we would like to test if an investor's attitude toward the market is going to be associated with stock returns. We used the HSCEI Volatility Index("VHSCEI") as a proxy for investors' anticipation of the market. VHSCEI is an index aiming to measure the 30-calendar-day expected volatility of the Hang Seng China Enterprises. The methodology of the index is based on the VIX but has some modifications taking into account the trading characteristics of Hang Seng China Enterprise Index Option. The new regression model is presented below:

$$\begin{aligned} R_{it} - R_{ft} = {} & \alpha_i + \beta_i\big(E(R_{mt}) - R_{ft}\big) + s_i SMB_t \\ & + h_i HML_t + v_{i1} VIX_t + v_{i2} VIX_{t-1} + \varepsilon_{it} \end{aligned} \tag{6}$$

where VIX is the HSCEI Volatility Index of a specific month. A one-period lagged variable of VIX is added into the regression model to specify any lagged effect, intuitively because the index shows a prediction for the future 30 day.

4 Results and Result analysis

Tables 1, 2, 3 and 4 presents the estimated value of intersects and the estimated coefficients for each of the factors.

As shown in Table 1, a majority of SMB coefficients are positive, but in general coefficient decreases as firm size increases. Firms with a smaller market capitalization in the Chinese stock market generally have lower returns and 19 out of the 26 of the pre-constructed SMB factors are negative. This means portfolios consisting of larger market capitalization stocks earn a higher return. This points out a similar trend to what is described in Zhao Bing' s paper. In Zhao Bing's paper, firms with small size often have lower returns, thus SMB is often negative when the firm size is small. The smaller the firm, the more positive the coefficient is; the bigger the firm, the more negative the coefficient is. During the epidemic, China's finances at all levels have suspended social security payments and returned unemployment insurance, and many governments in Nanjing and Hangzhou have issued billions of money in "consumption vouchers". On this basis, China's fiscal deficit rate will be increased, the size of special bonds for local governments will be expanded, and special government bonds will be issued in the future.Whether it's a significant interest rate cut, uncapped quantitative easing, or a series of new liquidity supply initiatives, the immediate reason is to prevent financial turmoil from escalating into a financial crisis by mitigating potential financial institution failures that could result from a lack of market liquidity. In contrast, domestic financial markets remain relatively stable at present, with interbank market liquidity remaining abundant and the cost of financing for domestic financial institutions not rising significantly.

Meanwhile, 18 out of the 26 HML factors constructed are negative, indicating a higher return in growth firm than in value firms. However, as shown in Table 2, 49 of the portfolios have negative HML coefficients, so no clear conclusion could be made on the value premium. This is different from Zhao Bing's paper. In his paper, from 2003 to 2013, firms with higher a book-to-market ratio often have higher returns, thus HML is often positive. The smaller the book to market ratio of the firm, the more likely that the coefficient is negative, which means the firm with a lower book to market ratio often has lower returns.

The following Tables 5, 6, 7 and 8 show the results of p-values of coefficients and intercepts.

From the tables, all of the estimates passed the 5% significance level test for the risk premium factor, and this is the same as Zhao Bing's result on this. Also, within the 100 portfolios, 68 of them passed the 5% significance level test for the SMB factor. Zhao Bing's result of SMB is that within 100 portfolios, 80 of the coefficients have SMB estimates of coefficient that is statistically significant at 5% significance level. The average p-value of all portfolios is only 0.07 in t-test, which means on average the SMB estimates of the coefficient is statistically significant at 7% significance level. In this case, SMB is more statistically significant in the period of 2003–2013 than that

Table 5. Risk premium p-value

	SIZE1	SIZE2	SIZE3	SIZE4	SIZE5	SIZE6	SIZE7	SIZE8	SIZE9	SIZE10
BM1	0.00	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BM2	0.04	0.12	0.04	0.04	0.01	0.01	0.01	0.03	0.05	0.03
BM3	0.00	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BM4	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BM5	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BM6	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BM7	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BM8	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BM9	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BM10	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 6. Intersection p-value

	SIZE1	SIZE2	SIZE3	SIZE4	SIZE5	SIZE6	SIZE7	SIZE8	SIZE9	SIZE10
BM1	0.44	0.40	0.29	0.04	0.34	0.27	0.23	0.79	0.41	0.20
BM2	0.66	0.24	0.75	0.18	0.05	0.82	0.85	0.34	0.30	0.02
BM3	0.14	0.10	0.84	0.51	0.67	0.41	0.28	0.17	0.98	0.55
BM4	0.73	0.95	0.63	0.46	0.64	0.83	0.23	0.43	0.79	0.31
BM5	0.31	0.65	0.52	0.62	0.78	0.93	0.49	0.87	0.85	0.99
BM6	0.37	0.63	0.60	0.75	0.80	0.46	0.43	0.31	0.08	0.90
BM7	0.73	0.88	0.68	0.52	0.46	0.58	1.00	0.81	0.23	0.88
BM8	0.29	0.78	0.83	0.66	0.47	0.13	0.37	0.37	0.30	0.60
BM9	0.47	0.13	0.69	0.98	0.21	0.36	0.52	0.26	0.62	0.55
BM10	0.04	0.92	0.53	0.38	0.67	0.38	0.57	0.07	0.32	0.46

Table 7. SMB p-value

	SIZE1	SIZE2	SIZE3	SIZE4	SIZE5	SIZE6	SIZE7	SIZE8	SIZE9	SIZE10
BM1	0.44	0.40	0.29	0.04	0.34	0.27	0.23	0.79	0.41	0.20
BM2	0.66	0.24	0.75	0.18	0.05	0.82	0.85	0.34	0.30	0.02
BM3	0.14	0.10	0.84	0.51	0.67	0.41	0.28	0.17	0.98	0.55
BM4	0.73	0.95	0.63	0.46	0.64	0.83	0.23	0.43	0.79	0.31

(*continued*)

Table 7. (*continued*)

	SIZE1	SIZE2	SIZE3	SIZE4	SIZE5	SIZE6	SIZE7	SIZE8	SIZE9	SIZE10
BM5	0.31	0.65	0.52	0.62	0.78	0.93	0.49	0.87	0.85	0.99
BM6	0.37	0.63	0.60	0.75	0.80	0.46	0.43	0.31	0.08	0.90
BM7	0.73	0.88	0.68	0.52	0.46	0.58	1.00	0.81	0.23	0.88
BM8	0.29	0.78	0.83	0.66	0.47	0.13	0.37	0.37	0.30	0.60
BM9	0.47	0.13	0.69	0.98	0.21	0.36	0.52	0.26	0.62	0.55
BM10	0.04	0.92	0.53	0.38	0.67	0.38	0.57	0.07	0.32	0.46

Table 8. HML p-value

	SIZE1	SIZE2	SIZE3	SIZE4	SIZE5	SIZE6	SIZE7	SIZE8	SIZE9	SIZE10
BM1	0.56	0.43	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.03
BM2	0.31	0.04	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.02
BM3	0.02	0.55	0.00	0.00	0.00	0.00	0.00	0.63	0.46	0.30
BM4	0.88	0.02	0.00	0.01	0.00	0.00	0.24	0.82	0.50	0.84
BM5	0.56	0.04	0.01	0.09	0.05	0.03	0.77	0.29	0.21	0.10
BM6	0.62	0.70	0.52	0.44	0.17	0.53	0.68	0.28	0.00	0.64
BM7	0.11	0.37	0.79	0.10	0.77	0.67	0.92	0.08	0.00	0.10
BM8	0.04	0.01	0.07	0.00	0.01	0.05	0.17	0.00	0.00	0.04
BM9	0.01	0.05	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
BM10	0.37	0.15	0.10	0.15	0.05	0.04	0.01	0.05	0.00	0.00

during the covid-19 period. Regarding HML, 52 of them passed the 5% significance level test for the value factor. Compare with Zhao Bing's result that within 100 portfolios, 71 of them have HML estimates of coefficient that is statistically significant at 5% significance level, and the average p-value of all portfolios is only 0.13 in t-test, which means on average the HML estimates of the coefficient is statistically significant at 13% significance level. Similarly, HML is more statistically significant in the period of 2003–2013 than that during the covid-19 period. Overall, the explaining power of the SMB and HML factors are not as significant as the results in Zhao bing's paper. With respect to the intercepts, 97 of the portfolios fail to reject the null hypothesis of the intercept being zero. From Zhao Bing's result, within 100 portfolios, 14 of them have interception estimates that are statistically significant at 5% significance level, rejecting the null hypothesis of interception is 0". This means that compared to the period from 2003 to 2013, some other factors additionally affect the Chinese stock market during the period of covid-19.

All coefficient of vix and its lagged variable showed statistical significance under 5% significance level and the constant term of all portfolios cannot reject the null hypothesis

Table 9. Regression output table

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	bl	bh	bm	sl	sm	sh
vix	−0.00346***	−0.00262**	−0.00389**	−0.00266**	−0.00382***	−0.00349***
	(0.000964)	(0.00101)	(0.00139)	(0.00113)	(0.00119)	(0.000962)
vix_1	0.00368***	0.00282**	0.00416***	0.00271**	0.00438***	0.00357***
	(0.00108)	(0.00109)	(0.00138)	(0.00116)	(0.00128)	(0.00100)
rmrf	0.0119***	0.0113***	0.0139***	0.0120***	0.0125***	0.0127***
	(0.000755)	(0.000739)	(0.000773)	(0.000767)	(0.000684)	(0.000757)
smb	0.0444	0.499***	0.619***	1.583***	1.451***	1.128***
	(0.123)	(0.124)	(0.144)	(0.130)	(0.136)	(0.118)
hml	−0.657***	0.548***	0.0596	−0.400***	−0.0435	0.395***
	(0.0686)	(0.0624)	(0.0765)	(0.0662)	(0.0673)	(0.0703)
Constant	−0.0115	−1.22e-05	−0.00824	0.0153	−0.0388	0.00379
	(0.0300)	(0.0314)	(0.0321)	(0.0330)	(0.0271)	(0.0301)
Observations	25	25	25	25	25	25
R-squared	0.963	0.910	0.915	0.948	0.944	0.931

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

of it being zero under 5% significance level. In this case, we show that the sentiment and attitude of stock market participation are important in explaining the stock market return. After adding the vix, the test on constant tells us that no additional factors are needed to be added to explain the return further.

The bellowing's show regression output table of the new model.

5 Conclusion

The result shows that in terms of SMB. Firstly, stocks with a small market capitalization in the Chinese market usually have smaller returns, so the value of the SMB factor calculated is usually negative. Also, average estimates of SMB during covid-19 are greater, meaning that small firms suffer more from covid-19. It shows that there is a scale effect. In terms of HML. During covid-19, the growth firm outperforms the value firm, HML may become negative, but still fit the 3-factor model. That proves the "uncertainty" is becoming a vital factor for investors to refer to; In terms of VIX, we do not find the obvious impact of changes in the VIX index on the linkages between stock markets and to predict the possibility of contagion and contagion of the crisis. In terms of interception, we find that the data measured by the reference paper's Zhaobing is 14% of reject; while we measured 33%. So we assumed that there may be other factors affecting the model like Short-term reversal, medium-term momentum, volatility, and change of hands.

We use OLS regression analysis, which has two shortcomings: the predictors are assumed to have no measurement error, and the multicollinearity among the predictors

can hinder the interpretation of the results. And, what we want to explore is the prediction of VXFXI index on the future of China A-share market, which should be used in a time series model. In addition, the epidemic is not over and individual stock yields are subject to change with various uncertainties, and our research time period is not long, so we will continue to track it in the future.

Overall, Fama-French three-factor model is able to explain most of the variation in the time-series data of the Chinese stock market at the A-share stock size, book-to-market ratio, and market sector level.

However, since the control of a pandemic is continuous, the impact on the stock market is continuous and not a short time shock; if the epidemic is a turning point and changes people's view on growth firms and value firms, then maybe the format will change in the future.

The source of value creation is still the tangible economy, and financial markets should objectively reflect the condition of the manufacturing industries. Therefore, it is recommended that regulators could ensure the stability of the financial market to better promote the development of the economy.

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