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An Empirical Study on the Applicability of the CAPM Model in the Shanghai A-Share Market

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Abstract: The Capital Asset Pricing Model (CAPM) is widely used to explore the efficiency of Chinas stock market, and the theory of securities market efficiency also serves as the foundation for studying whether CAPM is applicable to Chinas stock market. This paper selects the weekly returns of the top 18 enterprises by market capitalization in the Shanghai A-share market from January 2020 to December 2022 as the research object, conducts an empirical analysis on the applicability of CAPM in the Shanghai A-share market, and performs the Fama-Macbeth test on the empirical results. It is concluded that CAPM has limited applicability in Chinas stock market.

Keywords: CAPM Model; Shanghai A-Share Market; Market Efficiency.

1. Introduction

Since the official establishment of the Shanghai Stock Exchange in 1990, Chinas stock market has developed rapidly, advancing from an initial pilot to gradual maturity. However, there are still several prominent issues to be addressed, the most significant of which is the efficiency of Chinas stock market. CAPM is commo nly adopted by investment institutions for securities prediction and investment, with its basic assumption being frictionless transactions conducted by investors in the stock market. Therefore, studying the applicability of CAPM in Chinas stock market is of great significance for the improvement of the stock market and the further development of the economy. Nevertheless, due to the less developed nature of Chinas stock market compared with that of Western countries and the particularity of Chinas econom ic system, Chinas stock market exhibits many characteristics distinct from those of mature foreign stock markets. Thus, the effectiveness of CAPM in Chinas actual stock market deserves further exploration. Some domestic scholars argue that it is normal for CAPM to be inapplicable to Chinas stock market due to the short time span of market data and insufficient sample size in relevant studies.

2. Literature Review

Since the proposal of CAPM, foreign scholars have conducted numerous empirical tests on its effectiveness in the real market. Market efficiency, which is reflected in frictionless transactions and information symmetry, is one of the core assumptions of CAPM. Black, Scholes and Jensen [1] selected stock data of all listed companies on the New York Stock Exchange from 1926 to 1966 for an empirical test, and found a significant positive linear relationship between stock returns and β coefficients. Fama and MacBeth [2] used a multiple linear regression model to conduct an empirical study on the US stock market, and their results were consistent with those of Black et al., indicating that CAPM is applicable to the US stock market. Domestic research on this topic has also yielded rich findings. Fu Zigang [3] randomly selected 100 stocks listed and traded on the Shanghai Stock Exchange from 2017 to 2019 as samples, and tested the effectiveness of CAPM in the Shanghai stock market through time series and cross-sectional tests, revealing that CAPM has weak effectiveness in this market. Chen Xuanxuan [4] selected 30 stocks to analyze their cumulative returns, and concluded that although the efficiency of Chinas stock market has been improved to a certain extent, it has not yet reached the level of a semi-strong form efficient market, and problems such as information asymmetry still exist. Meanwhile, Cai Jianrong [5] proposed that Chinas stock market needs to reduce government intervention through national planning strategies and strengthen institutional supervision to improve its efficiency. Xu Dilong and Zhang Yu [6] adopted time series and cross-sectional tests to conduct an empirical study on the data of the Shanghai stock market from 2000 to 2002, and found a significant positive linear correlation between portfolio returns and β coefficients. In summary, both domestic and foreign studies show that the efficiency of Chinas stock market fails to meet the hypothetical requirements of CAPM. Therefore, it can be initially judged that CAPM may not be suitable for pricing research and investment in Chinas secu rities market in view of its prerequisite assumptions.

3. An Overview of the CAPM Model

The Capital Asset Pricing Model (CAPM) is an important and widely used financial asset pricing model with strong practicality, playing a crucial role in asset pricing, risk analysis and stock return prediction. CAPM was proposed by William Sharpe, Jake Treynor, John Lintner, Jan Mossin and other scholars based on the modern portfolio theory. On the basis of in-depth research on Markowitzs portfolio theory, they improved the asset pricing theory. The model is based on the following assumptions: (1) Investors evaluate the quality of investment portfolios through expected return rates and standard deviations; (2) Investors are never satisfied and will choose investment portfolios with higher expected return rates under the same risk level; (3) Investors are risk-averse and will choose portfolios with smaller standard deviations under the same expected return level; (4) All assets are infinitely divisible; (5) Investors can lend (i.e., invest) or borrow funds at a risk-free interest rate; (6) The financial market is a perfectly competitive and perfect market, with taxes and transaction costs ignored; (7) All investors have the

same investment horizon; (8) The risk-free interest rate is the same for all investors; (9) Information is free and immediately available to all investors; (10) Investors have homogeneous expectations. The model holds that under certain premises, the relationship between the expected return and expected risk of an investment portfolio can be expressed by a simple linear model, with the formula as follows:$R_s = R_f + \beta(R_m - R_f)$ Where:R_s= return rate of the asset portfolio; R_f= risk-free return rate; R_m= return rate of the market portfolio; $R_m - R_f$= excess return rate of the market portfolio; β = a measure of systematic risk, calculated by the following formula: $\beta = \frac{Cov(R_s,R_m)}{Var(R_s)}$ When $\beta < 0$, the return rate of the asset portfolio changes in the opposite direction to that of the market portfolio; when $\beta = 0$, there is no linear relationship between the return rate of the asset portfolio and that of the market portfolio; when $\beta > 0$, the return rate of the asset portfolio changes in the same direction as that of the market portfolio. Although CAPM has certain advantages in explaining investment returns, with the development of modern financial markets and in-depth research on the stock market, the model has gradually exposed its shortcomings. First, the application of the model is based on relatively stringent assumptions, which greatly limits its effectiveness in practical application. Second, the model cannot effectively explain the excess returns of some investment portfolios in practice.

4. Empirical Analysis

4.1. Data Selection

4.1.1. Sample Selection

This paper selects the weekly returns (data as of December 31, 2022) of the top 18 enterprises by market capitalization in the Shanghai A-share market from January 2020 to December 2022 as research samples, with all data sourced from the RESSET Database [7]. These 18 stocks are selected because of their large market capitalization and pivotal position in the Shanghai A-share market. (Table.1)

Table 1. The top 18 enterprises by market capitalization in the Shanghai A-share market

Stock Name	Market Capitalization Ranking
Kweichow Moutai	1
Industrial and Commercial Bank of China	2
China Construction Bank	3
PetroChina Company Limited	4
Agricultural Bank of China	5
Bank of China	6
China Life	7
Ping An Insurance (Group) of China	8
China Merchants Bank	9
China Petroleum & Chemical Corporation	10
China Shenhua Energy Company Limited	11
China Yangtze Power Co., Ltd	12
Foxconn Industrial Internet	13
Postal Savings Bank of China	14
Bank of Communications	15
Industrial Bank Co., Ltd	16
Jiangsu Hengrui Medicine Co., Ltd	17
Zijin Mining Group Co., Ltd	18

4.1.2. Selection of Market Return Rate and Risk-Free Rate

All 18 selected stocks are from the A-share market of the Shanghai Stock Exchange. The Shanghai Composite Index is chosen as the market index of the Shanghai stock market because it can accurately reflect the changes in the overall market trend and the development of the stock market, which is in line with the market portfolio described in CAPM. Therefore, the weekly returns of the Shanghai Composite Index from 2020 to 2022 are used as the market return rate in this paper. The weekly risk-free return rate from 2020 to 2022 in the RESSET Database is selected as the risk-free return rate.

4.2. Empirical Tests

4.2.1. OLS Least Squares Test for Sample Data

The Ordinary Least Squares (OLS) method is adopted to test the sample data, and a regression equation of the weekly excess returns of individual stocks and the weekly excess returns of the market portfolio is constructed, with the regression test conducted by SPSS. The regression equation of CAPM is as follows:

$R_{i,t} - R_f = \alpha_i + \beta_i(R_{m,t} - R_f) + \varepsilon_{i,t}$

Where: $R_{i,t}$ = return rate of the i-th stock in the t-th period; R_f= risk-free return rate; $R_{m,t}$= return rate of the stock market portfolio in the t-th period; $\varepsilon_{i,t}$ = residual term in the t-th period; α_i and β_i = parameters to be estimated. The OLS regression results of the sample stocks are shown in Table 2.

As shown in Table 2, the P-values of the β coefficients of all individual stocks are less than 0.01, indicating that the β coefficients of individual stocks are significantly non-zero, which means the explanatory variable has a great impact on the explained variable, i.e., the returns of the sample stocks are significantly affected by the changes in the Shanghai Composite Index. In addition, the β values of all sample stocks are positive, indicating a positive impact, that is, the changes in the returns of individual sample stocks are positively correlated with those of the market returns. The goodness of fit R^2 values of the sample stocks are generally low, with a maximum of only 0.427 and a minimum of 0.060, indicating a generally low goodness of fit of the regression equation. In other words, the β coefficient cannot well represent the relationship between the explanatory variable and the explained variable, meaning the relationship between the return fluctuations of the sample stocks and the market return fluctuations cannot be well explained by β, which proves that such fluctuations are also affected by other factors.

4.2.2. Fama-Macbeth Test

(1) First-stage regression

The weekly returns of each sample stock $R_{i,t}$, the risk-free return rate R_f and the market portfolio return rate $R_{m,t}$ are converted into monthly returns. The OLS regression is conducted again using the equation $R_{i,t} - R_f = \alpha_i + \beta_i(R_{m,t} - R_f) + \varepsilon_{i,t}$, and the slope of each stock obtained from the regression is taken as the estimated value of β.

(2) Second-stage regression The estimated values of β obtained from the first-stage regression are used as input values for the second-stage regression, with the regression equation as follows: $R_{i,t} - R_f = \gamma_0 + \gamma_1\beta_i + \gamma_2\beta_i^2 + \gamma_3\varepsilon_{i,t} + \epsilon_{i,t}$ Where:$\varepsilon_{i,t}$ = residual term in the first-stage regression equation, representing unsystematic risk in this paper; $\epsilon_{i,t}$ = residual term of the second-stage regression.

Hypothesis 1: γ_2=0. If the hypothesis is valid, it indicates a linear relationship between the market portfolio return rate

and the β coefficient.

Hypothesis 2: γ_3=0. If the hypothesis is valid, it indicates that unsystematic risk does not bring risk premium. Taking the 12 periods from January 2020 to December 2020 as the base period, the Fama-Macbeth regression coefficients for January 2021 are predicted. Then, the base period is moved forward by one period (February 2020 to January 2021, 12 periods in total) to predict the regression coefficients for February 2021. This process is repeated until December 2022, resulting in a total of 24 sets of regression coefficients. The t-test is conducted on the results, as shown in Table 3 and Table 4.

Table 2. Summary of Sample Regression Data

Stock Name	β	t	F	P	R^2
Kweichow Moutai	0.59	9.016	81.292	<0.01	0.348
Industrial and Commercial Bank of China	0.409	5.521	30.48	<0.01	0.167
China Construction Bank	0.47	6.56	43.039	<0.01	0.221
PetroChina Company Limited	0.383	5.109	26.099	<0.01	0.147
Agricultural Bank of China	0.459	6.362	40.478	<0.01	0.210
Bank of China	0.502	7.155	51.196	<0.01	0.252
China Life	0.651	10.561	111.524	<0.01	0.423
Ping An Insurance (Group) of China	0.654	10.651	113.449	<0.01	0.427
China Merchants Bank	0.636	10.157	103.159	<0.01	0.404
China Petroleum & Chemical Corporation	0.498	7.072	50.013	<0.01	0.248
China Shenhua Energy Company Limited	0.503	7.170	51.408	<0.01	0.253
China Yangtze Power Co., Ltd	0.246	3.127	9.779	<0.01	0.060
Foxconn Industrial Internet	0.567	8.491	72.105	<0.01	0.322
Postal Savings Bank of China	0.380	5.066	25.666	<0.01	0.144
Bank of Communications	0.595	9.135	83.455	<0.01	0.354
Industrial Bank Co., Ltd	0.573	8.625	74.401	<0.01	0.329
Jiangsu Hengrui Medicine Co., Ltd	0.459	6.373	40.612	<0.01	0.211
Zijin Mining Group Co., Ltd	0.605	9.369	87.787	<0.01	0.366

Table 3. Results of the Second-Stage Regression

	Coefficient	Standard Error	t-value	P-value	F-value	R^2
γ_0	0.0137	0.019	0.937	0.334	2.734	0.367
γ_1	-0.1237	0.032	-2.384	0.029		
γ_2	0.0417	0.017	2.256	0.043		
γ_3	0.2973	0.237	1.147	0.273		

Table 4. Results of the t-test

	t-value	P-value
γ_2	0.901	0.138
γ_3	9.952	<0.01

As shown in Table 4, the P-value corresponding to the coefficient γ_2 is 0.138, which is greater than 0.05, indicating that Hypothesis 1 cannot be rejected, i.e., there is a linear correlation between the market portfolio return rate and the β coefficient. The P-value corresponding to the coefficient γ_3 is less than 0.01, which is smaller than 0.05, indicating that Hypothesis 2 is rejected, i.e., unsystematic risk will bring risk premium. As shown in Table 3, the goodness of fit R^2 obtained from the second-stage regression is only 0.367, indicating a poor goodness of fit of the regression equation, and the coefficients cannot well explain the relationship between the explanatory variable and the explained variable. The results of the Fama-Macbeth regression are consistent with those of the sample regression, thus verifying the sample regression results.

5. Conclusion

This paper selects the relevant data of the top 18 stocks by market capitalization in the Shanghai A-share market and the Shanghai Composite Index for 36 months (154 trading weeks) from January 2020 to December 2022, conducts an empirical study on the applicability of CAPM in the Shanghai A-share market, and performs the Fama-Macbeth test on the empirical results. The main conclusions are as follows: First, there is a positive linear correlation between the changes in stock returns and the changes in market portfolio returns in the Shanghai A-share market; Second, the returns of individual stocks in the Shanghai A-share market are affected not only by systematic risk but also by other risk factors. In summary, CAPM cannot be well applied to the Shanghai A-share market, and its ability to explain the excess returns of the A-share market is limited. The reasons for its inapplicability are as follows:

1) At present, the scale of Chinas stock market is not large enough, its development is insufficient, and various mechanisms and systems are not mature;
2) Supervision, laws and regulations are imperfect, and there are a series of factors that do not conform to the hypothetical conditions of CAPM, such as short-selling restrictions;
3) The market is dominated by individual investors with insufficient professionalism, who cannot make correct analysis and judgment on market information;
4) The degree of information disclosure of listed companies is low, leading to information asymmetry. Based on the above empirical analysis, the following suggestions are put forward to address the existing problems in Chinas securities market:
5) Strengthen market supervision, improve the laws and regulations related to the information disclosure system of listed companies, and increase the crackdown on illegal operations in the stock market;
6) Raise investors awareness of the basic knowledge of the securities market and relevant laws and regulations through government publicity and guidance, appropriately expand the scale of the stock market, and cultivate a group of professional

institutional investors;

7) Cultivate the self-discipline and sense of responsibility of listed companies, guide them to rationally use the funds provided by investors, and realize the optimal allocation of resources;
8) Gradually reduce the direct government intervention in the stock market, transform government functions, and focus more on supervision rather than regulation.

References

[1] Black, F., Jensen, M. C., & Scholes, M. (1972). The capital asset pricing model: some empirical tests. New York: Praeger.

[2] Fama, E. F., & MacBeth, J. (1973). Risk, return, and equilibrium: empirical tests. Journal of Political Economy, 71(1), 607-654.

[3] Fu, Z. G. (2023). An empirical study on the CAPM model based on the data of China's stock market. *Hebei Enterprise*, (11).

[4] Chen, X. X. (2017). A test on the semi-strong form efficiency of China's stock market. Modern Business, (18).

[5] Cai, J. R. (2016). A brief analysis of the efficiency of China's stock market. Economic and Trade Practice, (13).

[6] Xu, D. L., & Zhang, Y. (2005). An empirical analysis of the capital asset pricing model and the Shanghai stock market. Journal of Nanchang University (Natural Science Edition), 19, 43-46.

[7] RESSET Database. (2023, December 10). Retrieved from https://www.resset.cn