

The Practicability Test of CAPM Model in China Security Market

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ABSTRACT. *In this paper, the significance of the validity test of CAPM model in China's market is described first, and then the practical application of CAPM model in China's securities market is measured and tested. Finally, the problems existing in the practical application of CAPM model in China's securities market are empirically analyzed.*

KEYWORDS: *CAPM model, Theory validity test, Application analysis, China securities market*

1. Introduction

The theory of the validity of the securities market is a good tool to understand the operation rules of the securities market. In order to test whether the financial market is effective and to find the opportunity to beat the market, the study of the validity test has become a focus of people's attention. There are numerous mathematical statistical methods derived from the validity test. As one of the three cornerstones of modern financial theory, the CAPM model has been widely used. There are many articles that apply CAPM models to analyze China's stock market, but they do not test whether China's stock market is in line with CAPM models effectively. However, this issue is actually related to whether CAPM model can be applied to the major premise of China's stock market at the present stage. This paper will have some discussions on this issue.

Firstly, this paper is helpful to analyze the relationship between expected returns and systematic risks. The CAPM model allows risk to be quantified and, by taking risk into account, provides a widely used and relatively objective method for estimating expected returns.

Second, it helps to estimate the cost of equity. The cost of equity capital is the rate of return required by investors when investing in enterprise equity. There are many methods to estimate the cost of equity capital. CAPM is one of the most commonly used methods in the world. As a simplified method based solely on the results of hypothesis testing, the CAPM model has many limitations, but it can still be useful. In other words, even if the data rejects the model, the model may still be useful to the decision maker in some way.

2. Methodology and Data Selection

In this study, the monthly closing price data of 51 a-share stocks in Shanghai stock exchange were selected as stock samples, with the sample number of 600000-600645. There were no incoherent observations during the sampling period, and the time span was from July 2018 to December 2019, a total of 18 months. Because most of the empirical studies on CAPM in China take Shanghai stock exchange as the research object, it means that the selection of stock samples from Shanghai stock exchange can provide rich reference objects. In addition, it can be seen that the industry distribution of the 50 stocks is diversified, which means that they are likely to be well represented. In addition, considering that China's stock market is not a mature market, but develops rapidly, more recent data may represent more accurate and recent market conditions, which is why the data from July 2018 to December 2019 are selected. In addition, the Shanghai composite index is a value-weighted index, which can reflect the changing trend of the stock market and the change and growth of all capital values including all kinds of securities on the Shanghai stock exchange. In other words, the Shanghai composite index is in line with CAPM market portfolio requirements.

According to the model of " $R_i = \alpha_i + \beta_i * R_m + e_i$ ", this study will use every stock Monthly returns and the Shanghai composite index from July 2018 to December 2019 monthly month yields do linear regression, through the use of SPSS and Excel, the value of alpha and beta can be obtained. The statistical results are shown in table 1:

Table 1 Statistical results

Code	B	R ²	P-value	Code	B	R ²	P-value
600000	1.682	0.859	0	600149	1.304	0.309	0.061
600004	0.814	0.853	0	600155	0.913	0.246	0.101
600006	1.195	0.786	0	600159	1.014	0.817	0
600010	0.802	0.341	0.046	600163	1.314	0.251	0.097
600015	1.286	0.773	0	600170	1.067	0.311	0.06
600038	1.477	0.474	0.013	600175	0.594	0.404	0.026
600052	1.551	0.789	0	600177	1.223	0.777	0
600057	1.603	0.69	0.001	600184	1.428	0.482	0.012
600059	0.949	0.348	0.044	600190	0.027	0.001	0.926
600062	1.12	0.465	0.015	600196	0.914	0.586	0.004
600069	1.084	0.703	0.001	600197	1.643	0.766	0
600070	1.331	0.541	0.006	600202	1.602	0.469	0.014
Code	B	R ²	P-value	Code	B	R ²	P-value
600077	1.598	0.668	0.001	600208	1.426	0.612	0.003
600082	1.43	0.708	0.001	600213	1.721	0.569	0.005
600086	1.429	0.547	0.006	600238	1.584	0.663	0.001
600095	1.228	0.753	0	600246	1.357	0.899	0
600104	0.404	0.025	0.62	600599	1.479	0.734	0
600106	0.737	0.587	0.004	600605	1.468	0.727	0
600108	1.196	0.787	0	600613	1.715	0.491	0.011
600112	1.133	0.598	0.003	600618	1.45	0.76	0
600118	1.689	0.778	0	600620	1.176	0.307	0.061
600122	1.063	0.866	0	600628	1.043	0.894	0
600127	1.497	0.113	0.286	600637	0.131	0.008	0.785
600129	1.11	0.321	0.055	600641	1.275	0.94	0
600132	1.173	0.699	0.001	600645	2.295	0.498	0.01
600141	1.716	0.772	0				

Table 1 Beta Coefficient can Reflect the Level of Systemic Risk of Each Stock. If the Beta Coefficient of Equities is Greater Than 1, It Means That the Risk of Equity Earnings is Greater Than the Average Level of the Market. on the Contrary, If the Beta of a Stock is Less Than One, the Risk of Its Earnings is Less Than the Market Average. R² is the Coefficient of Determination. the Assumed Value of the Sum is Significant If Less Than 0.05.

As can be seen from table 1, the value of R² is mostly greater than 0.5, indicating that the expected monthly market rate of return has a strong ability to explain the monthly rate of return of each stock. At the same time, the P value of most of the equity is less than 0.05, which means that most of the equity is significant. Therefore, through the analysis of P value and R² made by SPSS, we believe that most of the margin value can be used as an effective estimation of the systematic risk of the sample stocks.

Based on the model “ $R_i = \text{equity } 0 + \text{equity } 1 * \text{equity } I +$ ” after estimating the equity of each stock, this study will use the equity of each stock and its average monthly earnings for regression analysis. If the CAPM model is valid in the Shanghai stock exchange, the following two assumptions need to be met:

① $\gamma_0 = R_f = 1.1\% / 12 = 0.092\%$ (this paper selects the three-month deposit rate as the risk-free rate. As there is no unified risk-free interest rate standard in China, many scholars choose the deposit interest rate as the risk-free interest rate.

② $\gamma_1 = R_m - R_f$ (γ_1 represents the risk premium).

Table 2 as We Can See from the Scatter Chart in Table 2, There is Some Form of Positive Correlation between Risk and Return.

Table 2 Risk and return chart

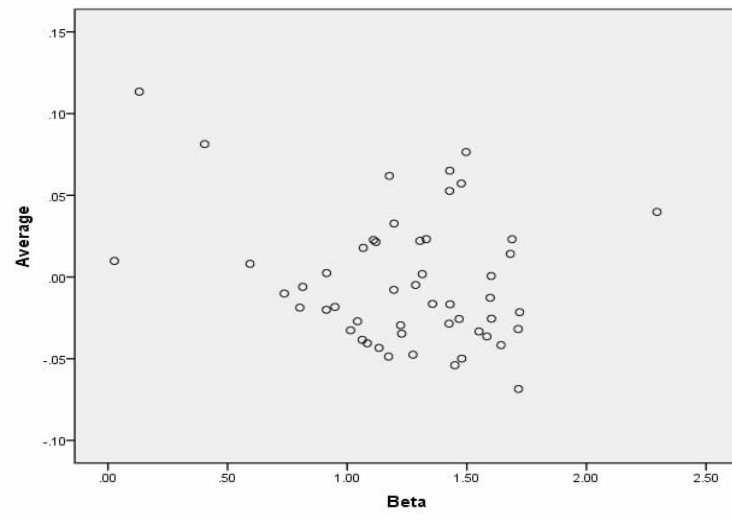


Table 3 through Linear Regression Analysis

Model Summary ^a				
Model ^a	R ^a	R Square ^a	Adjusted R Square ^a	Std. Error of the Estimate ^a
1 ^a	.244 ^a	.059 ^a	.040 ^a	.03877 ^a

a. Predictors: (Constant), Beta^a

Table 3 through Linear Regression Analysis, R² Represents the Coefficient of Determination, Which is Actually the Proportion of the System Risk to the Total Risk. as Can Be Seen from Table 3, R² is 0.059, Indicating That the System Risk is Weak in Explaining the Expected Stock Returns, and the Proportion of the System Risk in the Total Risk is Only about 6%. on the Other Hand, Non-Systematic Risk Accounts for 94% of the Total Risk, Indicating That the Main Part of Stock Returns is Not the Compensation for Systematic Risk, But the Compensation for Non-Systematic Risk, Which is Inconsistent with the Hypothesis.

However, this empirical analysis has several drawbacks. First of all, only these 50 selected stocks may not represent the whole Chinese stock market well, and only 18 months of statistics may not be enough. Therefore, even if the data rejects the model, it does not mean that the CAPM model is completely useless. CAPM model is actually an objective quantitative method, which shows the positive correlation between risk and return. By analyzing the reasons for the failure of CAPM model in China's securities market, it can promote the development of China's stock market and improve the applicability of CAPM model in China's stock market. Therefore, despite the limitations of the CAPM model, it is still useful to a certain extent.

3. Findings and Critical Analysis

3.1 Many of the Assumptions of the CAPM Model Do Not Exist in the Real Market

The CAPM model is based on some simplified assumptions about the market and investment behavior to predict the return on assets under systematic risk, which makes the model ignore many real-world complexities. However, the idea that capital asset pricing mechanisms are worthless seems extreme. First, each model is a simplification of reality, which is often necessary for a useful model, which means that the capital asset (CAPM) model is of a similar limitation to other useful models. In addition, the real test of the model depends not only on the rationality of its hypothesis, but also on the validity and usefulness of the model description.

3.2 The Restrictive Factors in China's Securities Market

In China, the information disclosure system is not perfect. Some core personnel of listed companies manipulate the stock market through inside information, and it often happens that major shareholders encroach upon minority shareholders' rights and interests. It can be found that China's securities market is not an efficient one. In addition, most individual investors do not conform to the assumptions of rational economic man, and tend to drift with the tide when entering the market, chasing the rise and killing the fall.

4. Conclusions and Suggestion

The CAPM points out that the combination of risky assets and risk-free assets can produce an effective portfolio. According to the CAPM model, the size of equity value is the main indicator of the stock return rate. Through the empirical test of equity value, the data of China's stock market show that although there is some form of positive correlation between equity return rate and equity value, there is no significant linear relationship. This conclusion shows that although China's stock market is constantly improving in the reform, there is still a big gap between it and the mature market in the west. Although our country's stock market returns and beta coefficient of correlation is not significant, in other words, the beta coefficient for the interpretation of the average income of China's stock market ability is weak, but to a certain extent, the CAPM reasons for the failure of application in China's securities market can be used to guide the reform and development of China's securities market.

In order to further promote the sustainable and healthy development of China's securities market, this paper puts forward the following Suggestions:

- 1) Carefully Formulate Government Policies to Reduce the Sensitivity of the Stock Market to Government Actions.
- 2) Vigorously Cultivate Institutional Investors and Promote the Institutionalization of Investment Subjects.
- 3) Eliminate Information Asymmetry and Improve Information Disclosure System.

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