

Investigation of Explanatory Power C-CAPM Model in Listed Companies in Tehran Stock Exchange

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Abstract: The aim of this study is that one of the two capital asset pricing model based on the use of C-CAPM and capital assets pricing model modified RA-CAPM can be used in the Tehran Stock Exchange as a tool to predict accurately and stronger appearance and optimal allocation of resources would be useful to investors. For this purpose, beta risk and real return on investment will be measured. That beta independent variable and the dependent variable that is true returns. Is consisted of three sub-hypotheses is the main hypothesis of this study was to study the companies listed in Tehran Stock Exchange during a period of five years (between 2009-2013). Among the companies listed in Tehran Stock Exchange by the end of 2013, using a sample survey earned Morgan table, then firms listed in the Tehran Stock Exchange and encoded using simple random sampling, the sample is obtained. To document the results of statistical analysis and final solutions achieved statistical methods using Eviews software has attempted to analyze the questions and assumptions. Hypotheses using linear regression compound F and t tests were analyzed. The result of this study shows a significant correlation C-CAPM model RA-CAPM model is better and can be more explanatory power in predicting actual performance. RA-CAPM test result also reflects the excellence of the C-CAPM model, and suggests that the expected return model RA-CAPM deviation of actual return is lower than the C-CAPM model.

Keywords: Stock Exchange, returns, risks, expected returns, CAPM pricing model, RA-CAPM model (modified asset pricing model)

Introduction and Problem Statement

Explain the relationship between risk, return and capital asset pricing issue that in recent decades has become the dominant paradigm capital markets. In financial literature, different models to examine the relationship between risk and return is provided. One of these models is the Capital Asset Pricing Model. Given the importance and expansion of capital markets in mobilizing and gathering small personal investment into productive activities, identify variables on corporate performance in these markets has been very important. Failure to explain the relationship between risk and return and the lack of awareness of investors on the issue, taking advantage of the field by manipulating the price and creating bubble price provided that this may result in loss of much of investors in the long term housing market. Investment damage and subsequently it will weaken the role of funders. Capital asset pricing model to measure the systemic risk of each asset in the asset's expected return commensurate with the risk it presents. With the development of these models can be used to allocate resources and achieve the optimal portfolio commensurate with the degree of risk. RA-CAPM model, besides systemic risk, liquidity risk and specific risk company also consider, this model could theoretically closer to the concept of risk and return. Research, compare the explanatory power C-CAPM model and RA-CAPM model in firms listed in the Tehran Stock Exchange. In this research, technical

attention to risk factors and the relationship between risk-taking and returns as well as factors such as systemic risk, unsystematic risk and the liquidity risk. One of the models is the base model with the assumptions of the model it is based on Liquidity Risk adjustment is achieved. In other words, an innovative model that has taken place in the composition of the two models. The "capital asset pricing improved" taking into account the intrinsic values of the company and also liquidity risk, most of the elements that make systematic and unsystematic risk are taken into account and theoretically percent explains more of the expected return (Rahnamay Roodposhti, 2007). In view of the above, the variables in this study, based on models of market return rate (R_m), beta consumption ($c\beta$) and beta-adjusted modified ($RA\beta$) as independent variables were considered. According to the capital asset pricing model to explain the rate of return according to the independent variables in this study, the actual performance of listed companies in Tehran Stock Exchange (R_i) as the dependent variable studied will be. In this study, we sought to answer the following questions:

What is the difference between the explanatory power of C-CAPM model and RA-CAPM model in listed companies of Stock Exchange?

Research Literature

The changes that have been made in recent years on the stock exchange, many studies have been conducted on various financial topics. Much of the research on the prediction of stock returns using

estimation and measurement of beta, in this paper to summarize previous studies on the C-CAPM and RA-CAPM is presented in the following table:

Table 1. Conducted research about RA-CAPM model

| Year | Researcher / Researchers | Studied Variables | Findings |
|------|-----------------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| 1986 | Amihud Mendelson | Liquidity risk | Providing a pricing model based on risk-adjusted assets liquidity |
| 2007 | Fereydoon and Rahnamay Roodposhti and Zahra Amir Hosseini | Inherent risk, leveraged beta, beta unlevered | There was no significant relationship between the degree of economic leverage and market efficiency. |
| 2010 | Hassan Ali Sinaei | Inherent risk, financial leverage | Inherent risk and financial leverage are particularly important in the formation of the portfolio. |
| 2009 | Manish Agarwal & D. Satish | Beta and liquidity risk | The effect of market conditions on the liquidity and stock returns |
| 2008 | Andrew & Loanid Rosu | Financial and economic levers and market efficiency | Economic levers of influence on portfolio selection. |
| 2011 | Michael R. King | Risk and return | Risk and return relationships |
| 2012 | Robert.D | Beta and economic levers | Economic levers causes fluctuations beta |
| 1980 | Hill & Stone | Efficiency and liquidity risk | Liquidity risk affects the decisions of buyers. |
| Year | Researcher / Researchers | Studied Variables | Findings |
| 2008 | Hansen & Richard | Risk and return assumptions provided by the CAPM | Conditional generalized CAPM model an unconditioned generalized CAPM model |
| 2010 | Wang & Jagannathan | Beta and risk premium | Alters beta and the risk premium, the model does not yield good mutual relations |
| | Wang & Xing | Risk and return | The relationship between risk and return with other tools in addition to the beta if you should be tested |

Conceptual Model

In this study, the model of Lee et al. (2013) were used. Their research model is as follows:

$$LIQ = \alpha + \beta_1 GOV_{1+} + \beta_2 GOV_{2+} + \beta_3 GOV_{2+} + \beta_4 GOV_{2+} + \beta_5 GOV_{2+} + \beta_6 GOV_{2+} + \beta_7 GOV_{1+\epsilon}$$

In this study, similar to the work of Lee et al (2013) The above equation is defined as a parametric equation in which the values of independent and dependent variables based on the historical performance of the Company over a period of 5-year and α and 1β and 2β and ... and 6β considered as unknown parameters that are estimated using linear regression composite panel data analysis.

Hypotheses

Main hypothesis of the research: what is the difference between RA-CAPM model explanatory power in predicting actual performance compared to the C-CAPM model?

Sub-research hypotheses:

What is the relationship between the beta RA-CAPM model and the actual performance of listed companies on the stock exchange?

What is the relationship between beta C-CAPM model and the actual performance of listed companies on the stock exchange?

What is the difference between the actual return and the expected return forecast error RA-CAPM model C-CAPM model Stock Exchange listed companies?

Methodology

The method of research, for the purpose, method of data collection method for inference and inductive inference of the research project, after the event. The population of this research is related to companies listed on the stock exchange. Among the companies listed in Tehran Stock Exchange by the end of 2013, with regard to criteria and using Morgan table to obtain a sample survey, the companies listed in Tehran Stock Exchange and encoded using simple random sampling, the sample. Therefore, the final

volume of 565 years – company has now been used as a hypothesis test data. To collect data for the library, to explain the theoretical foundations of research and literature has been compiled and to obtain the data required for the processing of hypotheses, the study documents according to information provided by the company. Data collection, including taking notes, tables assigned and listed companies to comply with the conditions laid down for the population of the check list has been investigated. To validate the study financial statements and the notes to the attached financial statements of listed companies were cited. The study period from 2009 to 2013, which can be concluded that the research will be of high reliability. To analyze the data by descriptive methods, analysis, assumptions, methods to determine the relationship between variables and econometric methods, linear regression compound is used. With regard to the use of time series data. In other words related to data collection and the need to analyze 5 samples panel

for the statistical analysis used the Eviews software. Before Excel software for data pre-processing and preparing them to be used as variables. It should be noted that the application "Rah Avard Novin" also published information from resources taken by the Tehran Stock Exchange and has a comprehensive calculation and classification. The information and data validity and credibility.

Results

Describing the Results

In this section, descriptive statistics were calculated variables. General observations per year based on a formula determined by a random sample size of 113 per year and over a period of 5 years (88 to 92) of 565 year - company has now been removed from the table describing data for variables. Statistical indicators calculated in this table includes the mean, standard deviation, minimum and maximum that is presented in Table 3 below.

Table 3. Describing the Results

| Variable name | Mean | Maximum | Minimum | Standard deviation |
|----------------------------------|---------|---------|---------|--------------------|
| Actual return | 2.9967 | 6.69 | -3.91 | 1.57159 |
| First beta version | 0.586 | 5.97 | -7.09 | 1.72662 |
| Second beta version (as amended) | 0.9874 | 6.99 | -5.59 | 1.85673 |
| First model expected returns | 1.7318 | 10:36 | -6.01 | 3.5125 |
| Second model expected return | 4.5045 | 12:45 | -3.23 | 2.53242 |
| First model error value | -1.2649 | 8.82 | -8.60 | 3.54835 |
| Second model error value | 1.5078 | 11:17 | -7.38 | 2.83481 |

Based on the results contained in Table 3 in connection with describing the findings is clear that:

Actual returns of companies relative to at least -3.91 and 6.69 is the maximum. The average real yield of 2.9967 with a standard deviation is 1.57159.

Beta version of the first companies to at least partially 7.9- and 5.97 times the maximum. The average of 0586 and the standard deviation is 1.72662.

Beta version of the rank second among the companies at least -5.59 and -6.99 fold the maximum. The average of the companies with a standard deviation 1.85673 0.9874 respectively. The expected return of at least the first model in the company's -6.1 and a maximum of 10.36. The average of the other 1.7318 standard deviation is 3.5125.

The expected return of at least -3.23 second model in the company was 12.45 and up. The average value of 4.5045 with a standard deviation of 2.53242 has been among the companies. The first model error relative to the sample companies have been at least 8.60- and 8.82-fold maximum. The average value among companies - 1.2649 standard deviation is 3.5483. The second model error relative to the sample companies have been at least -7.38 and a maximum of 11.17. The average value of 1.5078 with a standard deviation of 2.83481 has been among the companies.

Test hypotheses

First test

The first test of a link between RA-CAPM beta mode and the actual performance of listed companies on the Stock Exchange is intended to:

Table 4. Results of the first test

| Variable | Expected factor | Factor | T-Student Statistic | Significance |
|---------------------------------------|-----------------|--------------------------------|---------------------|--------------|
| Intercept | - | -0.201 | -16.2 | 0.031 |
| The first beta version | Positive | 0.248 | 3.49 | 0.000 |
| F statistic Chow (significantly) | | 19.40 (0.000) | | |
| | | 16.40 (0.066) | | |
| | | Panel data with random effects | | |
| F Fisher statistic (significantly) | | 49.49 (0.000) | | |
| Adjusted coefficient of determination | | 0.325 | | |
| Durbin-Watson statistic | | 1.58 | | |

Autocorrelation test: To test this hypothesis the Durbin-Watson statistic was used, according to the result of this test is 1.58 times. So regression model your remaining sentences there is no correlation.

F Fisher test: Results Table with a significance level of zero (under 5%) represents 95 percent reject the null hypothesis. In other words, generally linear relationship between independent and dependent variables, and the model is valid to analyze the results.

Adjusted coefficient of determination: In this model the coefficient of determination is 0.32. This

means that the independent variables explain 32 percent of the dependent variable.

Analysis of test results: Estimates indicate that the factor model and the error variable 0.289 And (0.021), which represents a significant correlation between these two variables.

Second test

We consider the second test of a link between beta C-CAPM model and the actual performance of listed companies on the Stock Exchange.

Table 5. Results of the second test

| Variable | Expected factor | Factor | T-Student Statistic | Significance |
|---------------------------------------|-----------------|--------------------------------|---------------------|--------------|
| Intercept | - | 0.254 | 13.36 | 0.054 |
| The first beta version | Positive | 0.398 | 3.85 | 0.000 |
| F statistic Chow (significantly) | | 19.43 (0.000) | | |
| | | 15.99 (0.067) | | |
| | | Panel data with random effects | | |
| F Fisher statistic (significantly) | | 49.43 (0.000) | | |
| Adjusted coefficient of determination | | 0.347 | | |
| Durbin-Watson statistic | | 1.61 | | |

Autocorrelation test: According to the result of this test is 1.61 times. So regression model your remaining sentences there is no correlation.

F Fisher test: Results Table with a significance level of zero (under 5%) represents 95

percent reject the null hypothesis. In other words, there is a significant linear relationship in general between independent and dependent variables and the model is valid to analyze the results.

Adjusted coefficient of determination: In this model the coefficient of determination is 0.34. This means that the independent variables explain 34 percent of the dependent variable.

Analysis of test results: Model shows that the coefficient and variable error 0.254 and (0.020), which represents a significant correlation between these two variables.

Third Test

The final test on the basis of what is the difference between the actual return and the expected return forecast error RA-CAPM model with C-CAPM model companies listed on the stock exchange is considered. To test the hypothesis presented above, the T-Test is used in SPSS:

Table 5. Correlation paired samples

| | | | |
|--------------------|-------------------------|-------------|-----------------|
| Significance level | Correlation coefficient | Sample size | |
| 0.000 | 0.7650 | 113 | RACAPM & C-CAPM |

Looking at the chart above we see that the correlation between the two samples, *RA – CAPM* and *C – CAPM*, with a 0.756 correlation is positive. Similarly *Sig* is less than 5%, so the numerical value of the test statistic is

critical solidarity and reject the hypothesis H_0 and H_1 supposed to be accepted.

Table 6. Paired sample test

| Significance level | Degrees of freedom | T-statistics | Difference paired samples | | | | | |
|--------------------|--------------------|--------------|--------------------------------|---------|------------------------------|------------------------|---------|-----------------|
| | | | difference with 95% confidence | | Standard deviation \bar{X} | Standard deviation X | Mean | |
| | | | Highest | Lowest | | | | |
| 0.000 | 899 | 27.304 | 2.97202 | 2.57241 | 0.10155 | 3.04654 | 2.77271 | RACAPM & C-CAPM |

Given that sig paired sample test statistic is less than 5% so H_0 will be critical in the area and H_0 is rejected and the alternative hypothesis H_1 is confirmed. The difference between the average differences between paired samples. This difference means that we cannot compare the two models and the comparison result will be better to choose a model as a model. In general, the standard deviation or variance statistic descriptive statistics model is better than that of other models. Table (7) descriptive statistics both *RA – CAPM* and *C – CAPM* using the second main hypotheses

have been proposed. As we've formed using two hypotheses:

- A) An example of that is the difference between *RA – CAPM* method of real returns (*RACAPM – Return*)
- B) An example of that is the difference between *C – CAPM* method of real returns (*CCAPM – Return*)

Table 7. Descriptive statistics

| Variance | Standard deviation | Mean | | Highest | Lowest | Variation range | Number | |
|------------|--------------------|------------------------------|-----------------|------------|------------|-----------------|------------|------------|
| Statistics | Statistics | Standard deviation \bar{X} | Mean Statistics | Statistics | Statistics | Statistics | Statistics | |
| 8.036 | 2.83481 | 0.09449 | 1.5078 | 11.1 | 7.38 | 18.56 | 113 | RACAPM - |
| 12.591 | 3.54835 | 0.11828 | -1.2649 | 7 | - | 17.42 | 113 | Return |
| | | | | 8.82 | 8.60 | - | 113 | CCAPM - |
| | | | | | | | | Return |
| | | | | | | | | Valid N |
| | | | | | | | | (listwise) |

Looking at the table (7), we see that to describe two sample statistics such as range, minimum, maximum, mean, standard deviation and variance are provided. As the table (7) is shown. Standard deviation and variance in sample *RACAPM – Return* and sample *CCAPM – Return* is equal to 2.83481 and 8.036 and 12.591 is at 3.54835. These numbers mean that fluctuations in the number of samples in *RACAPM – Return* lower average numbers of variations in model *CCAPM – Return*. The logical interpretation is that the efficiency numbers from the Model *RA – CAPM* difference is less than the actual output, so the return on the Model *RA – CAPM* better representation of real efficiency will deliver. The third sub-hypothesis and the proof will be accepted. That is the prediction error actual yield and expected yield Model *RA – CAPM* is less than the C-CAPM.

Discussions and Conclusions

In this study, the ability of the C-CAPM and RA- CAPM models in explaining the relationship between risk and return on equity of listed companies in Tehran Stock Exchange was investigated. Explain the relationship between risk and return and capital asset pricing concept that in recent years has become one of the issues challenging capital markets. The CAPM is one of the oldest and most common model is to explain the relationship between risk and return on equity has been raised. This model is introduced in the early years, but later it was welcomed by the economic and financial communities were criticized and some financial and economic scholars also enumerates the limitations and weaknesses of the model, with the inclusion of new variables it was proposed as an alternative to other models. Among the models that were introduced as an alternative to the CAPM, consumption-based capital asset pricing model (C-CAPM) by Lucas (1978) and Braiden (1979) was introduced. They argued that in determining the relationship between risk and return on equity, the ability to model C-CAPM is greater than the CAPM. The results of the test the hypotheses of this study showed that in all cases RA- CAPM model to explain the relationship between risk and return on equity over, C- CAPM model is more capable and representative of consumption variables in explaining the relationship between risk and not in stock returns. As stated in the literature, both in Iran and abroad a lot of research comparing C- CAPM model with other models in the field of asset pricing is done. A major part of these studies compared to other models of excellence CAPM C- story. In some of the studies compared to competitor models this

model have shown better performance results in comparison with the performance of the C-CAPM model RA - CAPM similar study by Kim et al (2012), and Darat (2011), Balbs and colleagues (2010), Ray and colleagues (2009), Chen et al (2003), manic and colleagues (1986), Talaneh and Ghasemi (2011), Tehrani et al (2008). In all studies, the model compared to competing models CAPM C- (A-CAPM, D-CAPM, CAPM) had a better performance, but compared with the RA-CAMP been better. As well as research studies of Asperm (1989), Tavangar and Khosraviani (2011), Mojtahedzadeh and Emami (2010), leader Roodposhti and Amir Hosseini (2010) and Shahverdiani (2009) was conducted in which performance has been better than the Model RA-CAMP rival. RA-CAPM method compared to other methods for predicting the risk and return of capital asset pricing has a positive and significant difference can be explained is higher in other words, according to the conditions of our society, the most appropriate model to predict the return and risk future of the reason is that, as previously mentioned, taking into account historical data and forecasts at the same time and given the systematic and unsystematic risk are integrated and combined with leverage, the concept of the financial. Then adjusted capital asset pricing model RA-CAMP Liquidity risk is the highest power of explanation. Finally, the method CAPM, D-CAPM explained in predicting the lowest risk and return in our society, with prominence explained A-CAPM model than the other two models in terms of pricing of liquidity risk in the model. The findings of Fama and French study as multi-factor asset pricing model capital correspond partly because the traditional CAPM not only does not pay attention to other factors, but only due to historical systematic risk factor.

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