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Dr.Asaran Galal Asaran

Instructor in Egyptian Banking Institute, Manager of Banking Services - Bank Misr

The Impact of Market Risk Variation on the Ability of Capital Asset Pricing Model To Explain the Change in Stock Returns

Abstract

The purpose of this study is determine the effect of the degree of stock market risk, at different estimation periodsfor capital asset 4pricing model (CA-PM) variables, on the ability of the CAPM to explain the change in stock returns, applied on the Egyptian stock market.Where the re-searcher assumes that the different degree of market risk (high - low) may affects the ability of capital asset pricing model to explain the change in the stock returns. Especially most of the literature reviews of capital asset pricing model were not exposed to the conditions of measuring the returns. That is the approach of the present study was to test the theory of capital asset pricing model at a different degree of market risk and differentbasis of estimation periods of capital asset pricing model variables (1,3,6,12 months). Because the Egyptian stock market is one of the emerging markets, the study of capital asset pricing model ability, to predict stock returns at a different degree of market risk and different basis of estimation periodsfor capital asset pricing model variablesare critical. This is exposing in this study.

This study is based on a different approach represented in testing the ability of the capital asset pricing model to explain the change in the stock returns, according to a different degree of market risk (high – low).The EGX30 index was used as the most important indicator to measure the market index.70% of the strongest stocks were selected within the index for the study tests during the period from 01/01/2009 to 31/03 /2015.

Keywords: Capital Asset Pricing Model(CAPM);Market risk; stock-Expected returns; risk free rate; systematic risk;Stock Exchange.

1- Introduction

Capital market plays an important role in the development of an economy and is an essential part of financial system. In the capital market, the manner in which securities are priced is core issue and it has attracted the attention of researchers for long. The risk-return relationship performs a central role in pricing of securities consequently helps in making judicious investment decision making. The capital asset pricing model (CAPM)of Sharpe (1964), Lintner (1965) and Mossin (1968) marks the birth of asset pricing theory. In the development of the asset pricing model it is assumed that (a) All investors are single period risk-averse and prefer maximization of utility of terminal wealth. (b) They can choose portfolios solely on the basis of mean and variance.(c)There are no taxes or transactions costs.(d) All investors have homogeneous views regarding the parameters of the joint probability distribution of all security returns.(e) All investors can borrow and lend at a given risk-less rate of interest.Kapil and Sakshi (2010).

CAPM has been widely used in asset pricing and risk management for its simplicity and handiness in measuring the systematic risk of a portfolio or stocks. Angela (2011).The capital asset pricing model (CAPM) describes the relationship between return and risk and is used extensively in describing how capital assets are priced, finding out how to choose stocks and building portfolios.Strong (1993).

Some studies have criticized the capital asset pricing model, as the relationship between return and risk in theory does not explain the extent of the risk impact on return. Also, the extent of the risk effect on the return may exist in a period and does not exist in another. Nor does it mean that high systemic risk means a high rate of return. Michailidis(2006).

This study attempts to present effect of the difference in the degree of the market risk,at differentestimation periodsfor capital asset pricing model variables,on the ability of the CAPM to explain the change in stock returns during the years 2009-2015. Applyingto the Egyptian stock market.The study is organized in four parts. Part 1 is the introduction; part 2an overview of the capital asset pricing model; part 3 deals with objectives, hypotheses, methodology and data; part 4 focuses on the analysis of the results;part 5 presents the summary and conclusions.

2- An overview of the capital asset pricing model

The Capital Asset Pricing Model (CAPM) of Sharpe (1964) and Lintner (1965) remains a benchmark asset pricing models in the academic literature. According to the CAPM, the risk of an asset is measured by "beta" which is the covariance between the asset's return and the return on the market portfolio per unit of variance for the market return. Capital Asset Pricing Model (CAPM), the expected excess return on a portfolio of assets over a risk-free rate depends on a simple measure of the portfolio's risk relative to the market portfolio:

$$E[r_{i,t}] = B_i \; E[r_{m,t}]$$

Where $r_{i,t}$ is the return for portfolio i in excess of the risk-free return, $r_{m,t}$ is the market return in excess of the risk-free return, and B_i is the measure of the portfolio's risk" beta", defined as

$$B_i = \frac{cov(r_{i,t}, r_{m,t})}{var(r_m)}$$

Several previous studies have tested "beta" relationship with expected return, Diabi & Azzamil (1995) found no significant relationship between systematic risk (beta) and expected return. Jagannuathan &Wange (1996) examined the relationship between systemic risk (beta) and expected return on the NYSE & AMEX stock market during the period 1963-1990, based on the monthly revenue data and beta estimate according to the data of 24 months - 60 months. The results indicated that there was no significant relationship between the beta and the expected return.Fama& French (1996) applied to the New York Stock Exchange from 1928 to 1993 using monthly and annual data. The shares were divided into 10 portfolios according to beta values and their ranking from the smallest to the largest, study found a high average annual return with high beta, which means that the difference in the study period and the time basis for calculation the return may lead to different results.Grauer (1999)found the beta relationship between beta and expected return varies according to the method used in the test.

Daniel (2001) tested the results of the Fama&French (1992) study applied in US stock exchanges NYSE, AMEX, NASDAQ which showed no significant relationship between beta and expected return. While the Daniel study conducted on the Tokyo Stock Exchange in Japan, indicated a positive relationship between beta and expected return, with no clear direction of the relationship. Anter (2003) examined the effect of systemic risk on the performance of the Egyptian securities portfolio during the period from December 1995 to June 2002 for 20 Egyptian investment funds. The results showed no significant relationship between the systematic risks and the performance of investment fu-nds portfolios. Asaran (2014) tested a proposed model for the determinants of the performance and risks of investment funds, applying to 39 Egyptian investment funds during the period from the beginning of 2000 until the end of 2009. The study found that the determinants of systematic risk were different according to their degree. The determinants of non-systematic risk were different according to their degree.The determinants of the performance of Egyptian investment funds vary when the degree of risk varies, whether systematic or non-systematic.According to Brown & Walter (2013) CAPM, which is fundamentally an ex ante concept, is used widely by corporations in their forward-looking capital budgeting and capital structure decisions, and by academics when considering adjustments for differences in risk. According to Vigna(2014) CAPM has been widely recognized as one of the cornerstones of modern finance. While it originated from expected utility (EU) theory, in the past few years its robustness progressively came to light. Notably, CAPM is a suitable basis also under different choice paradigms. According toRoll (1977) using a proxy for the market portfolio has two difficulties. First, the proxy might be mean-variance efficient even when the true market portfolio is not. Alternatively, the proxy might be inefficient, and cannot be used to test the efficiency of the true market portfolio. Adrian & Franzoni (2009) use Kalman-filtered betas to explain the returns of the twenty-five portfolios sorted by size and book-to-market.That study complements the conditional CAPM literature by modeling a new type of time variation in conditional betas. There is substantial evidence that the risk of some asset classes has experienced long-run movements. Berk(2015) analyze the performance of the threshold CAPM of Akdeniz(2003) using industry portfolios constructed from stocks trading in Borsa Istanbul during the period 1998–2011. We show that there is significant time variation in market risk of industry portfolios with respect to monthly rate of changes in the currency basket. Study has important implications for both portfolio managers and investors who are performing asset allocation, portfolio selection, and hedging decisions in Turkish markets. In addition, the knowledge of dynamics of time-varying betas could contribute to dynamic strategies for hedging.

Previous studies show that:

Some study did not find a relationship between beta and expected return. Diabi & Azzamil (1995), Jagannuathan &Wange(1996),Fama&French(1992),Anter(2003),Ferson&Harvey(1991).Some studies have found a relationship between beta and expected return. Fama &French(1996), Daniel (2001), Roll & Ross(1994). Some studies have found a relationship between beta and expected return according to certain conditions. Grauer(1999),Asaran(2014), Adrian & Franzoni (2009), Berk(2015).

This study presents a new scientific contribution, as it determines the effect of the degree of stock market risk at different estimation periodsfor capital asset pricing model variables, on the ability of the capital asset pricing model to explain the change in stock returns applied on the Egyptian stock market.

3-Objectives, hypotheses, methodology and data

3-1 Objectives of the study

☒**This study aims to answer the following questions:**

- Does the CAPM capability differ in the interpretation of the change in stocks returns, when the degree of market risk at different estimation periods of CAPM variablesvaries?
- What are the determinants that explain the change in the stock returns, at different degrees of market risk (low-high) and at different estimation periods of CAPM variables (1, 3,6,12 months)?
- What are the discriminate determinants that separate between low and high return differentials (low – high)at different degree of market risk and at different degree the estimation period of CAPM variables?

3-2 Study hypotheses

H_1: There is significant positive effect of the degree of market risk and estimation period, on theCapability of CAPM model to explain the change in the stocks returns differentials.

H_2: There is difference in significant determinants that explain the change in the stock returns differentials, when the degree of market risk and estimation period varies.

H_3: The discriminate determinants that separate between low and high return differentials are different when the degree of market risk and the estimation period differ.

3-3 Methodology

The methodology of the study can be presented through the following points:

- Estimate the expected return according to the capital asset pricing model, based on the following equation:

$$R_i = R_f + b_i \ (R_m - R_f)$$

Where:

R_i is the expected rate of return on asset i

B_i is the beta of stock i.

R_m is the rate of return on the market portfolio

R_f is the risk-free rate

The averages of CAPM model components (risk-free rate, beta coefficient, market rate of return) were calculated using averages (1,3,6,12 months) during the period from 01/01/2009 to 31/

03/2015.The expected rate of return on asset i according to the CAPM $R^*_{i(t,v)}$ will be calculated according to the equation:

$$R^*_{i(t,v)} = R_{f(t,v)} + B_{i(t,v)}\left(R_{m(t,v)} - R_{f(t,v)}\right)$$

t=1, 2, 3,……………., n

v = average period calculation =1, 3, 6,12 month

- The average of actual return $R_{i(t,v)}$ data was calculated on an average basis (1,3,6,12months) during the period from 01/01/2009 to 31/03/ 2015.
- The average market risk data was calculated on an average basis (1, 3,6,12 months) the period from 01 /01/2009 to 31/03/2015and divided into two groups: the first include the lower 25% of the data, the second include the higher 25% of the data.
- CAPM ability to explain the change in stocks returns differentials (expected according to CAPM $R^*_{i(t,v)}$ and the actual return $R_{i(t,v)}$ .will be tested according to the degree of market risk (low–high) **using the following function :**

$$\left(R^*_{i(t,v)} - R_{i(t,v)}\right) = F\left(R_{f(t,v)}, B_{i(t,v)}, R_{m(t,v)}\right)$$

- Perform a multiple regression analysis of the CAPM model, where the stocks returns differentials will be a dependent variable, the determinants of the CAPM model will be independent variables. To determine the significant variables and their explanatory power, according to the degree of market risk (low-high), according to the time basis for calculating the model variables (1, 3, 6,12 months).
- Using discriminant analysis by Z-score models, applying the significant determinants of the CAPM regression model, according to the degree of market risk (low- high), according to the time basis for calculating the model variables (1, 3,6,12 months).**In order to identify:**

- Determinants ofdiscrimination that separate low and high returns differentials.
- The relative contribution of each of the discriminatory determinants that separate the low and high returns differentials.
- The discriminatory power of the Z-Score model, on the classification of low and high groups, for returns differentials.

3-4 Sample &Data

The data used in the study can be presented as follows:

- **Data selection:**

The study uses daily-adjusted closing stock prices for the sampled 13 companies of EGX30 index listed on the Egyptian Stock Exchange for the period of January 2009 to March 2015 with a total of 75 months.

The study sample represents the most important and strong stocks which maintained the free trading ratios. It is the leading stock in the sectors represented during the study period, which has maintained its survival within the index during the whole study period.

The following companies that came out of the EGX30 index and the date of exit, which were excluded from the study sample:

Egyptian Company for Mobile Services (MobiNil) in 18/10/2009, Qatar National Bank Alahly in 31/01/2013 , Al Baraka Bank Egypt in 31/01/2012, United Housing & Development in 31 /07/2014, El Kahera Housing in 31/ 07

/2014 , National Real Estate Bank for Development in 31/07/2013 , Orascom Construction Industries (OCI) in 31/07/2013, Arab Moltaka Investments in 31/01/2012 , El Ahli Investment and Development in 29/07/2010, Raya Holding For Technology And Communications in 31/07/2013 , Remco for Touristic Villages Construction in 31/07/2014 , Egyptian Media Production City in 27/01/2011 .

The following companies that listed in the index, were excluded because of their inclusion in the index late dates of the study period.

Arab Real Estate Investment CO.-ALICO in 02/02/2014 , El Shams Housing & Urbanization in 03/02/2013 , Egyptians Housing Development & Reconstruction in 01/02/2015, Medinet Nasr Housing in 02/02/2014, Heliopolis Housing in 03/02/2013, Egyptian Abroad for Investment & Development in 03/08/2014 , GB AUTO in 01/ 08/ 2013 , Prime Holding in 30/08/2014 , Belton Financial Holding in 01/02 /2015, El Wadi Co. For Touristic Inve-stment in 02/02/2014 .

The study period has witnessed the events of the Egyptian revolution and before and after the revolution, which affected the economic environment, the degree of the stock market risk. The researcher thinks that this period is suitable to study the impact of the degree of market risk on the ability of CAPM model to explain the change in stock returns.

The Egyptian Exchange has launched its main index EGX30 on 1 February 2003**.** The index includes top 30 companies in terms of Liquidity and activity. The Index is weighted by market capitalization and adjusted by free float. EGX30 avoids concentration on one industry and therefore has a good representation of various industries/sectors in the economy.The Egyptian Exchange started publishing EGX30 Index, the previously named CASE30 on 2 February 2003, which has a base date of 1/1/1998 and a base value of 1000 points. As of 1 March 2009, the Egyptian exchange started publishing EG-X30 in US$ terms, and renamed CA-SE30 to EGX30 reflecting the replacement of Cairo and Alexandria Stock Exchanges by the Egyptian Exchange (EGX), as per the amendments in the Capital Market Law No. 95/1992.The daily closing values of the EGX30Index are used as a proxy for the market portfolio. Furthermore, the yield on 91-days treasury bills of government of Egypt is incorporated as risk free return.

The following Table 1 shows the companies, the sector of the company, the company weight / sector weight, the company weight within the index EG-X30.

- The sample data calculation:

- Collect daily closing prices for stocks within the EGX30 index.
- The daily stocks returns and market returns calculated by using the natural logarithm according to the equation: $r_t = Ln(r_t / r_{t-1})$
- Calculate the systematic risk (Beta), market return, market risk per month, for stocks within the EGX30 index. As well as the monthly risk free return of Egyptian Treasury bills 91 days.
- Calculate the monthly average of market return, beta coefficient, risk-free return on a time basis 1,3,6,12 months according to the following equations:

According to time base = month

$$t_n = t_{n-1}$$

According to time base = 3 months

$$t_n \frac{\sum_{n-3}^{n-1} t}{3}$$

According to time base = 6 months

$$t_n \frac{\sum_{n-6}^{n-1} t}{6}$$

According to time base = 12 months

$$t_n \frac{\sum_{n-12}^{n-1} t}{12}$$

- Calculate the monthly average expected return based on the CAPM model according to previous time basis.
- Calculate the monthly average actual return, market risk according to previous time basis.
- Market risk data is divided into two groups; the first include the higher 25% of the average monthly market risk according to previous time basis, the second include the lower 25% of the average monthly market risk according to previous time basis.
- Returns differentials (expected according to CAPM $R^*_{i(t,v)}$ and the actual return $R_{i(t,v)}$ data is divided into two groups; the first include the higher 25% of the average monthly Returns differentials according to previous time basis, the second include the lower 25% of the average monthly Returns differentials according to previous time basis.In order to apply the discriminant analysis by Z-score models, according to the significant determinants of the CAPM regression model.

4- Analysis of the results

In this section will study the Capability of CAPM model to explain the change in the stock return, according to market risk. During different periods to estimate CAPM model variables(1, 3,6,12months).

The results of the analysis will be divided into four groups, the first according to a 1 month basis to estimate the CAPM model variables. Second according to a 3 month basis to estimate the CAPM model variables.Third according to a 6 month basis to estimate the CAPM model variables.Fourth according to a 12 month basis to estimate the CAPM model variable.

4-1 Capability of CAPM model to explain the change in the stock return, according to market risk. (The estimation period is 1 month).

Table 2 shows the multiple regression analysis of the CAPM model, where the stocks returns differentials will be a dependent variable, the determinants of the CAPM model will be independent variables.

Table 2 Capability of CAPM model to explain the change in the stocks returns differentials, according to market risk (The estimation period is 1 month).

variables	Low market risk	high market risk
Constant	0.008	0.019
Average Marker return	-0.211 (-1.566)	0.106 (0.924)
Risk free	0.166 (0.692)	-0.566 (-0.950)
systematic risk - Beta	-0.009 (-13.900)***	-0.012 (-5.663)***
R^2_{adj} **Explanatory power**	0.519	0.158
Number of observations (N)	187	187
f-statistic	67.786***	12.631***
Durbin-Watson	2.034	1.542

*** Significant at 1% significance level.
** Significant at 5% significance level.
* Significant at 10% significance level.

The results of the table show the following:

The significant CAPM determinant of return differentials according to low market risk is the beta coefficient, while the determinant of high market risk is the beta coefficients. The CAPM determinants of return differentials according to low market risk have an explanatory power 51.9%. CAPM determinants of return differentials according to high market risk have a explanatory power 15.8%.

The specific determinant of beta is robust, as it is significant and has the same direction at different levels of market risk.

Table 3 shows a Discriminatory determinant that separatesbetween return differentials. According to the degree of market risk (The estimation period is 1 month)

Table 3 Discriminatory determinants that separate, between the returns differentials (expected return and the actual return). According to the degree of market risk (high and low). (The estimation period is 1 month)

Components of the Z models	Equation Coefficient
Average Marker return	-
Risk free	-
systematic risk – Beta	2.726
Constant	-2.959
Eigenvalue	0.315
% of Variance	100%
Canonical Correlation	0.489
Wilks-Lambda	0.760
Chi-square x^2	101.713***
Number of observations (N)	374

*** Significant at 1% significance level.
** Significant at 5% significance level.
* Significant at 10% significance level.

The results of the table show the following:

The discriminatory determinant separating low and high return differentials is beta coefficients. The Canonical correlation is 48.9%.Chisquare is equal to 101.71at a significant level of 1%.

Table 4 shows the relative contribution of the discriminatory determinants that separates, between low and high re-turn differentials. According to the degree of market risk. (The estimation period is 1 month).

Table 4 The relative contribution of the discriminatory determinants that separates, between low and high return differentials. According to the degree of market risk (high and low). (The estimation period is 1 month)

Components of the Z models	Relative Contribution
Marker return	-
Risk free	-
systematic risk - Beta	47.95%
Constant	52.05%
total	100%

The results of the table show the following:

That the discriminatory determinant separating, a low and high returns differential is beta coefficient 47.95%.

Table 5 shows the discriminatory power of the determinants that separates between low and high return differentials. According to the degree of market risk. (The estimation period is 1 month)

Table 5The discriminatory power of the determinants that separates between low and high return differentials. According to the degree of market risk (high and low). (The estimation period is 1 month)			
Predicted Group Membership		**No. of cases**	**Actual Group Membership**
The high difference between (expected return and actual return)	The low difference between (expected return and actual return)		
49	138	187	The low difference between (expected return and actual return)
26.2%	73.8%	100%	percentage
142	45	187	The high difference between (expected return and actual return)
75.9%	24.1%	100%	percentage
Percent of "grouped" cases correctly classified: 74.9 %.			

The results of the table show the following:

The determinant of the beta coefficient has a significant discriminatory power of 74.9%.In other words, the beta coefficient can classify the low and high return differentials correctly by 74.9%.

4-2 Capability of CAPM model to explain the change in the stock return, according to market risk. (The estimation period is 3 month).

Table 6 shows the multiple regression analysis of the CAPM model, where the stocks returns differentials will be a dependent variable, the determinants of the CAPM model will be independent variables.

Table 6 Capability of CAPM model to explain the change in the stocks returns differentials, according to market risk (The estimation period is 3 months).

variables	Low market risk	high market risk
Constant	0.010	0.014
Marker return	-0.110 (-0.840)	-0.350 (-1.796)*
Risk free	0.284 (1.583)	-0.685 (-1.369)
systematic risk - Beta	-0.012 (-18.876)***	-0.005 (-2.870)***
R^2_{adj}Explanatory power	0.672	0.062
Number of observations (N)	180	180
F-statistic	123.204***	4.953***
Durbin-Watson	1.984	1.865

*** Significant at 1% significance level.
** Significant at 5% significance level.
* Significant at 10% significance level.

The results of the table show the following:

The significant CAPM determinant of return differentials according to low market risk is the beta coefficient, while the determinant of high market risk is the beta coefficients, market return. The CAPM determinants of return differentials according to low market risk have an explanatory power 67.2%. CAPM determinants of return differentials according to high market risk have a explanatory power 6.2%. The specific determinant of beta is robust, as it is significant and has the same direction at different levels of market risk.

Table 7 shows a Discriminatory determinant that separatesbetween return differentials. According to the degree of market risk (The estimation period is 3 months)

Table 7 Discriminatory determinants that separate, between the returns differentials (expected return and the actual return). According to the degree of market risk (high and low). (The estimation period is 3 months)

Components of the Z models	Equation Coefficient
Average Marker return	-
Risk free	-
systematic risk - Beta	3.665
Constant	-3.887
Eigenvalue	0.405
% of Variance	%
Canonical Correlation	0.537
Wilks-Lambda	0.712
Chi-square x^2	121.459***
Number of observations (N)	360

*** Significant at 1% significance level.
** Significant at 5% significance level.
* Significant at 10% significance level.

The results of the table show the following:

The discriminatory determinant separating low and high return differentials is beta coefficients. The Canonical correlation is 53.7%.Chisquare is equal to 121.45 at a significant level of 1%.

Table 8 shows the relative contribution of the discriminatory determinants that separates, between low and high return differentials. According to the degree of market risk. (The estimation period is 3 months).

Table 8 The relative contribution of the discriminatory determinants that separates, between low and high return differentials. According to the degree of market risk (high and low). (The estimation period is 3 months)

Components of the Z models	Relative Contribution
Marker return	-
Risk free	-
systematic risk - Beta	48.53%
Constant	51.47%
Total	100%

The results of the table show the following:

That the discriminatory determinant separating, a low and high returns differential is beta coefficient 48.53%.

Table 9 shows the discriminatory power of the determinants that separates between low and high return differentials. According to the degree of market risk. (The estimation period is 3 month)

Table 9The discriminatory power of the determinants that separates between low and high return differentials. According to the degree of market risk (high and low). (The estimation period is 3 months)

Predicted Group Membership		No. of cases	Actual Group Membership
The high difference between (expected return and actual return)	The low difference between (expected return and actual return)		
38	142	180	The low difference between (expected return and actual return)
21.1%	78.9%	100%	percentage
135	45	180	The high difference between (expected return and actual return)
25%	75%	100%	percentage
Percent of "grouped" cases correctly classified 76.9 %.			

The results of the table show the following:

The determinant of the beta coefficient has a significant discriminatory power of 76.9 %.In other words, the beta coefficient can classify the low and high return differentials correctly by 76.9%.

4-3 Capability of CAPM model to explain the change in the stock return, according to market risk.(The estimation period is 6 month).

Table 10 shows the multiple regression analysis of the CAPM model, where the stocks returns differentials will be a dependent variable, the determinants of the CAPM model will be independent variables.

Table 10 Capability of CAPM model to explain the change in the stocks returns differentials, according to market risk (The estimation period is 6 months).

Variables	Low market risk	high market risk
Constant	**0.010**	**0.008**
Marker return	-0.288 (-2.374)**	-0.274 (-1.899)*
Risk free	0.298 (1.786)*	-0.352 (-1.352)
systematic risk - Beta	-0.012 (-21.151)***	-0.004 (-3.548)***
Explanatory power R^2_{adj}	0.750	0.092
Number of observations (N)	169	169
F-statistic	169.20***	6.681***
Durbin-Watson	2.307	2.147

*** Significant at 1% significance level.
** Significant at 5% significance level.
* Significant at 10% significance level.

The results of the table show the following:

The significant CAPM determinant of return differentials according to low market risk is the beta coefficient, risk free and market return, while the determinant of high market risk is the beta coefficients, market return.The CAPM determinants of return differentials according to low market risk have an explanatory power 75%. CAPM determinants of return differentials according to high market risk have an explanatory power 9.2%. The specific determinants of beta and market return are robust, as they are significant and have the same direction at different levels of market risk.

Table 11 shows a Discriminatory determinant that separatesbetween return differentials. According to the degree of market risk (The estimation period is 6 month)

Table 11 Discriminatory determinants that separate, between the returns differentials (expected return and the actual return). According to the degree of market risk (high and low). (The estimation period is 6 months)

Components of the Z models	Equation Coefficient
Marker return	147.427
Risk free	-
systematic risk - Beta	4.324
Constant	-5.017
Eigenvalue	0.430
% of Variance	100%
Canonical Correlation	0.548
Wilks-Lambda	0.699
Chi-square x^2	199.823***
Number of observations (N)	338

*** Significant at 1% significance level.
** Significant at 5% significance level.
* Significant at 10% significance level.

The results of the t able show the following:

Thediscriminatory determinants separating low and high return differentials are beta coefficients and market return.TheCanonical correlation is 54.8 %.Chi-square is equal to 199.82 at a significant level of 1%.

Table 12 shows the relative contribution of the discriminatory determinants that separates, between low and high return differentials. According to the degree of market risk. (The estimation period is 6 months).

Table 12 The relative contribution of the discriminatory determinants that separates, between low and high return differentials. According to the degree of market risk (high and low). (The estimation period is 6 months)

Components of the Z models	Relative Contribution
Marker return	94.04%
Risk free	-
systematic risk - Beta	2.76%
Constant	3.20%
Total	100%

The results of the table show the following:

That the discriminatory determinants separating, a low and high returns differential are beta coefficient 2.76% and market return 94.04%.

Table 13 shows the discriminatory power of the determinants that separates between low and high return differentials. According to the degree of market risk. (The estimation period is 6 months)

Table 13The discriminatory power of the determinants that separates between low and high return differentials. According to the degree of market risk (high and low). (The estimation period is 6 months)

Predicted Group Membership		No. of cases	Actual Group Membership
The high difference between (expected return and actual return)	The low difference between (expected return and actual return)		
37	132	169	The low difference between (expected return and actual return)
21.9%	78.1%	100%	percentage
117	52	169	The high difference between (expected return and actual return)
69.2%	30.8%	100%	percentage
Percent of "grouped" cases correctly classified: 73.7%.			

The results of the table show the following:

The determinants of the beta coefficient and marker return have a significant discriminatory power of 73.7%. In other words, the beta coefficient and marker return can classify the low and high return differentials correctly by 73.7%.

4-4 Capability of CAPM model to explain the change in the stock return, according to market risk. (The estimation period is 12 months).

Table 14 shows the multiple regression analysis of the CAPM model, where the stocks returns differentials will be a dependent variable, the determinants of the CAPM model will be independent variables.

Table 14 Capability of CAPM model to explain the change in the stocks returns differentials, according to market risk (The estimation period is 12 months).

Variables	Low market risk	high market risk
Constant	0.017	0.011
Marker return	-0.410 (-2.233)**	-0.343 (-1.737)*
Risk free	-0.324 (-1.658)*	-0.440 (-1.936)*
systematic risk - Beta	-0.013 (-29.528)***	-0.007 (-6.097)***
Explanatory power R^2_{adj}	0.863	0.261
Number of observations (N)	148	148
F-statistic	309.833***	18.278***
Durbin-Watson	2.410	2.408

*** Significant at 1% significance level.
** Significant at 5% significance level.
* Significant at 10% significance level.

The results of the table show the following:

The significant CAPM determinants of return differentials according to low market risk are the beta coefficient, risk free and market return, while the determinants of high market risk are the beta coefficients, risk free and market return. The CAPM determinants of return differentials according to low market risk have an explanatory power 86.3%. CAPM determinants of return differentials according to high market risk have an explanatory power 26.1%. The specific determinants of beta, risk free and market return are robust, as they are significant and have the same direction at different levels of market risk.

Table 15 shows a Discriminatory determinant that separatesbetween return differentials. According to the degree of market risk (The estimation period is 12 months)

Table 15 Discriminatory determinants that separate, between the returns differentials (expected return and the actual return). According to the degree of market risk (high and low). (The estimation period is 12 months)

Components of the Z models	Equation Coefficient
Marker return	368.225
Risk free	-
systematic risk - Beta	5.587
Constant	-6.558
Eigenvalue	0.926
% of Variance	100%
Canonical Correlation	0.693
Wilks-Lambda	0519
Chi-square x^2	192.115***
Number of observations (N)	296

*** Significant at 1% significance level.
** Significant at 5% significance level.
* Significant at 10% significance level.

The results of the table show the following:

Thediscriminatory determinants separating low and high return differentials are beta coefficients and market return.The Canonical correlation is 69.3%.Chi-square is equal to 192.11 at a significant level of 1%.

Table 16 shows the relative contribution of the discriminatory determinants that separates, between low and high return differentials. According to the degree of market risk. (The estimation period is 12 months).

Table 16 The relative contribution of the discriminatory determinants that separates, between low and high return differentials. According to the degree of market risk (high and low). (The estimation period is 12 months)

Components of the Z models	Relative Contribution
Marker return	96.81%
Risk free	-
systematic risk - Beta	1.47%
Constant	1.72%
total	100%

The results of the table show the following:

That the discriminatory determinants separating, a low and high returns differential are beta coefficient 1.47% and market return 96.81%.

Table 17 shows the discriminatory power of the determinants that separates between low and high return differentials. According to the degree of market risk. (The estimation period is 12 months)

Table 17 The discriminatory power of the determinants that separates between low and high return differentials. According to the degree of market risk (high and low). (The estimation period is 12 months)

Predicted Group Membership		No. of cases	Actual Group Membership
The high difference between (expected return and actual return)	The low difference between (expected return and actual return)		
25	123	148	The low difference between (expected return and actual return)
16.9%	83.1%	100%	Percentage
116	32	148	The high difference between (expected return and actual return)
78.4%	21.6%	100%	Percentage
Percent of "grouped" cases correctly classified: 80.7 %.			

The results of the table show the following:

The determinants of the beta coefficient and marker return have a significant discriminatory power of 80.7%. In other words, the beta coefficient and marker return can classify the low and high return differentials correctly by 80.7%.

Results of hypotheses tests

H_1: Validation of the first hypothesis "There is significant positive effect of the degree of market risk and estimation period, on the Capability of CAPM to explain the change in the stocks returns differentials".

There is a significant difference in CAPM model ability to explain the variability in stock return differentials according to market risk (low-high) and estimation periods (1, 3,6,12 months). Where the explanatory power of the CAPM model according to low market risk was 51.9%, 67.2%, 75%, and 86. 3% according to the estimation periods (1,3,6,12 months), respectively. While The explanatory power of the CAPM model according to high market risk was 15.8%, 6.2%, 9.2% and 26.1%, according to the estimation periods (1,3 ,6,12 months) respectively.Tables 2, 6, 10, 14

H_2: Validation of the second hypothesis"There is difference in significant determinants that explain the change in the stock returns differentials, when the degree of market risk and estimation period varies".

There are differences of significant determinants that explain the change in the stock returns differentials, when the degree of market risk (low-high)and estimation period (1, 3,6,12 months) varies.Where thesignificant determinants according to the low market risk were (beta at a 1 month estimation period), (beta at a 3 months estimation period), (beta, riskfree, market return at a 6 months estimation period), ((beta, risk free, market return at a 12 months estimation period). While the significant determinants according to the high market risk were (beta at a 1 month estimation period), (beta, marker return at a 3 months estimation period), (beta, market return at a 6 months estimation period), (beta, risk free, market return at a 12 months estimation period). Tables 2, 6, 10, 14

H_3:Validation of the third hypothesis: "the discriminate determinants that separate between low and high return differentials are different when the degree of market risk and the estimation period differ".

There is a significant difference in the discriminate determinants that separate between low and high return differentials, according to market risk (low-high) and estimation periods (1, 3,6,12 months).

Where the discriminate determinants that separate between low and high return differentials at 1 month estimation period were (beta)with relativecontribution 47.95% , beta coefficient can classify the low and high return differentials correctly by 74.9%. (Tables 3, 4, 5)

At 3 months estimation period were (beta) with relative contribution 48.53 %, beta coefficient can classify the low and high return differentials correctly by 76.9 %.(Tables 7, 8, 9)

At 6 months estimation period were (beta coefficients and market return)

with relative contribution 2.76%, 94.04% respectively.The beta coefficient and marker return can classify the low and high return differentials correctly by 73.7 %.(Tables 11, 12, 13)
At 12 months estimation period were (beta coefficients and market return) with relative contribution 1.47%, 96.81% respectively. The beta coefficient and marker return can classify the low and high return differentials correctly by 80.7 %.(Tables 15, 16, 17)

5- Conclusion & future research

This study aimed to determine the effect of the degree of market risk at different estimation periodsfor capital asset pricing model (CAPM) variables, on the ability of CAPM model to explain the change in stock returns applied on the Egyptian stock market.

In this section we will present and discuss the implications of the results of this study, and make recommendations for future research concerning the ability of CAPM model to explain the change in stock returns as follows:

Implication of results

The study showed that the ability of CAPM to explain the change in stock returns differentials can be improved by determining the degree of market risk (low-high).

Also the CAPM can explain the change in return differentials according to the low market risk degree far more than the high market risk degree.

The study showed the effect of the estimation periodsfor CAPM variables, on its ability to explain the change in return differentials.The effect of the 12-month estimation periods was higher than all estimation periods according to the degree of market risk.

There are differences of significant determinants of CAPM variables, which explain the change in the stock returns differentials, when the degree of market risk and estimation periods varies.

There is a difference in the discriminate determinants of CAPM, the relative contribution, discriminatory power, which separates the low and high return differentials at the different degree of market risk and the estimation periods.

The researcher sees through the previous results that he can make recommendations to the fund managers as follows:

- The ability CAPM model to explain the change in stock returns, according to the low market risk, than in the case of high market risk.
- Relying on 12 months basis to estimate the CAPM model variables.
- Marker return and Beta coefficient can classify the low and high return differentials correctly according to 12-month basis to estimate the CAPM model variables.

Future Research

Through the results of the study could provide a range of proposed researchas follows:

- Study the CAPM ability to explain the change in stock returns according to a set of economic variables such as interest rates, exchange rates, inflation.
- Study the CAPM ability to explain the change in stock returns according tothe level of market return

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