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A Test of the Validity of Capital Asset Pricing Model in Istanbul Stock Exchange

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Abstract: CAPM is one of the subjects that constitute fundamentals of modern finance theory. Although the research that test validity of CAPM give conflicting results, CAPM is widely used especially in portfolio investments and capital budgeting. In this study, we test validity of the CAPM in Istanbul Stock Exchange (ISE) by utilizing Fama and McBeth's (1973) unconditional testing approach. Our results show that there is no meaningful relationship between betas and risk premiums; therefore CAPM is not valid in ISE over the sample period.

Keywords: CAPM, beta, risk premium, Istanbul Stock Exchange, unconditional test.

1. Introduction

Capital Asset Pricing Model (CAPM) is one of the most important models in the Finance literature. According to CAPM, the return of a stock has a positive and linear relationship with the stock's systematic risk. This systematic risk is measured with the beta coefficient of the stock and it is assumed to be stable over time.

Empirically testing the validity of CAPM always became an attractive subject among finance scholars. From the works of the earliest researchers, such as Black, Jensen and Scholes (1972) and Fama and MacBeth (1973) to latest research, there is a large amount of empirical research on the subject. Early researchers found some evidence that supports CAPM, but later research findings contradict their results. CAPM is an ex-ante model. But it can be tested only by using historical data. This situation leads to doubts about the testability of the model. Although there are many critics about the validity of the CAPM, it is continued to be widely used by investors in real-life.

The aim of this study is to examine the existence of an unconditional relationship between beta and returns in Istanbul Stock Exchange (ISE). Research data was taken from ISE web site. Sample period of 5 years were divided into three twenty-month sub-periods. Unconditional testing approach developed by Fama and MacBeth is applied. In order to analyze the results t-tests are used.

The following section presents a summary of the development of the CAPM. A detailed description of the model and its assumptions are given in the third part. Some information related to the empirical tests can be found in the fourth part. Also some information about CAPM research conducted in emerging markets is presented in this part. Data and methodology used for the research and the findings are explained in the fifth part. The last part concludes.

2. Development Process of the Capital Asset Pricing Model

Academic studies related to the behavior of capital markets began with Harry Markowitz's 1952 paper "Portfolio Selection". In this paper and in his dissertation (1955), he developed the foundations of modern capital market theory (Jensen, 1972). He divided portfolio selection process into three parts;

1) Making probabilistic estimates about the future performances of securities,

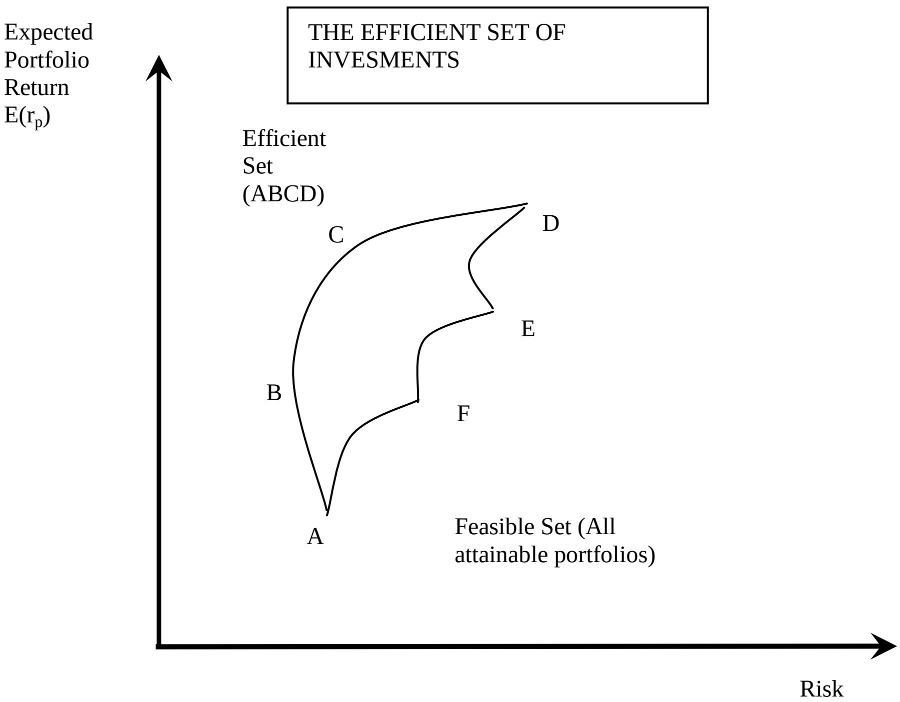
2) Analyzing those estimates to determine an efficient set of portfolios,

3) Selecting from that set the portfolios that best suited to the investor's preferences (Sharpe, 1963).

He suggested his readers to use Williams's Dividend Discount Model to make the estimates for the first part, and then, explained his model to achieve the second part Markowitz accepted portfolio selection as a problem of utility maximization under conditions of uncertainty (Jensen, 1972) and used linear programming to solve this problem. The resulting seminal model (which is later known as Markowitz's Mean-Variance Model) is the starting point for the following research on the subject of the risk-return relationship within capital markets. In his work, Markowitz explained that when return of a stock increases, the risk of that stock is also increases and diversification is necessary to eliminate the risk at some degree. He emphasized "the right kind of diversification for the right reason" (Markowitz, 1952). This diversification could only be achieved by forming a portfolio that contains securities with low co-variances among themselves. Markowitz also argued that for every investor a specific portfolio should be formed based on their risk aversion. In other words, the portfolio formed for a high risk-averse person should be different from the portfolio formed for a low risk-averse person. He developed the concept of "the efficient frontier" which contains "efficient portfolios" that gives best rate of returns for given amount of risks or lowest risks for given rate of returns.

In Figure 1, the area bounded by A,B,C,D,E and F points contains all possible set of investment options which involve some risk. The investor will choose one of the options that either provides highest return for a given level of risk or involves lowest risk for a given level of return. Only options that lie on the ABCD curve satisfy these conditions. This curve is called efficient frontier and the investment options it contains called efficient portfolios.

Figure 1. Efficient Set of Investments

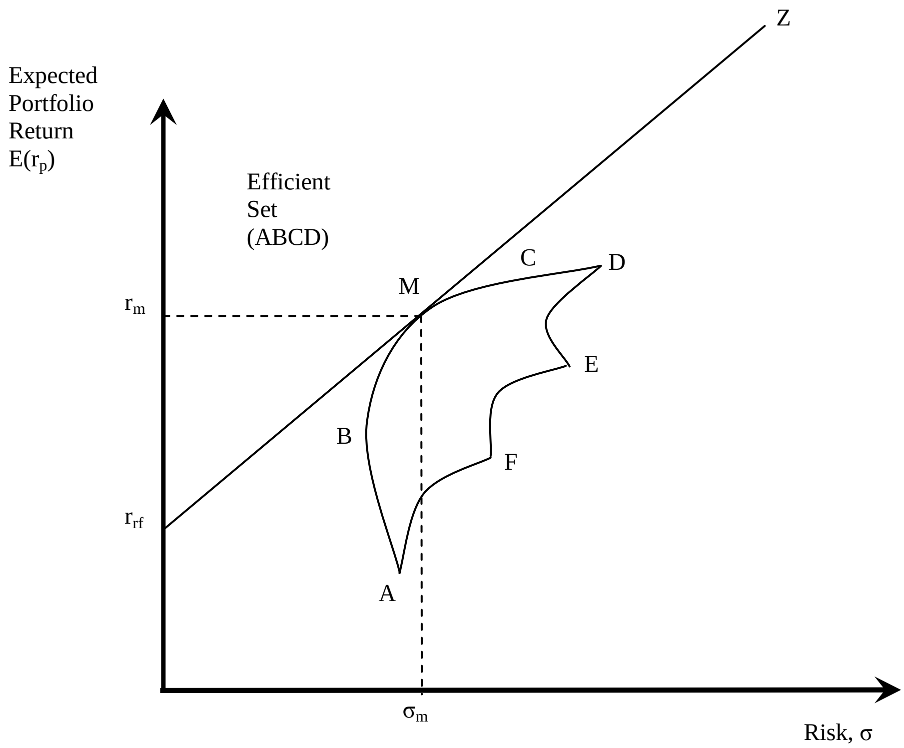


According to Markowitz, an investor should analyze all probable security combinations and should choose efficient portfolios from them (Bernstein, 1997). Once this time-consuming and difficult task is completed, next step is to list these portfolios according to their risk or expected return rates and find the efficient frontier. After James Tobin's contributions to the subject, the line which contains all efficient portfolios is called Capital Market Line.

James Tobin, a well-known economist, improved Markowitz ideas. While Markowitz accepted the idea that investors can only have risky securities, Tobin realized that in reality, investors choose the securities in their portfolio both from risk free assets (such as government treasury bills) and from risky securities (Bernstein, 1997).

In Figure 2, not ABCD curve, but rrfMZ line (Capital Market Line) contains all the efficient portfolios that an investor can choose. Then, the chosen portfolio will have a combination of risky and risk free assets. M is the tangency point between rrfMZ line and ABCD curve. It represents the market portfolio which is a portfolio that contains every risky asset in the market.

Figure 2. Capital Market Line



Beside this, Tobin divided the problem of finding the optimal portfolio into two different components;

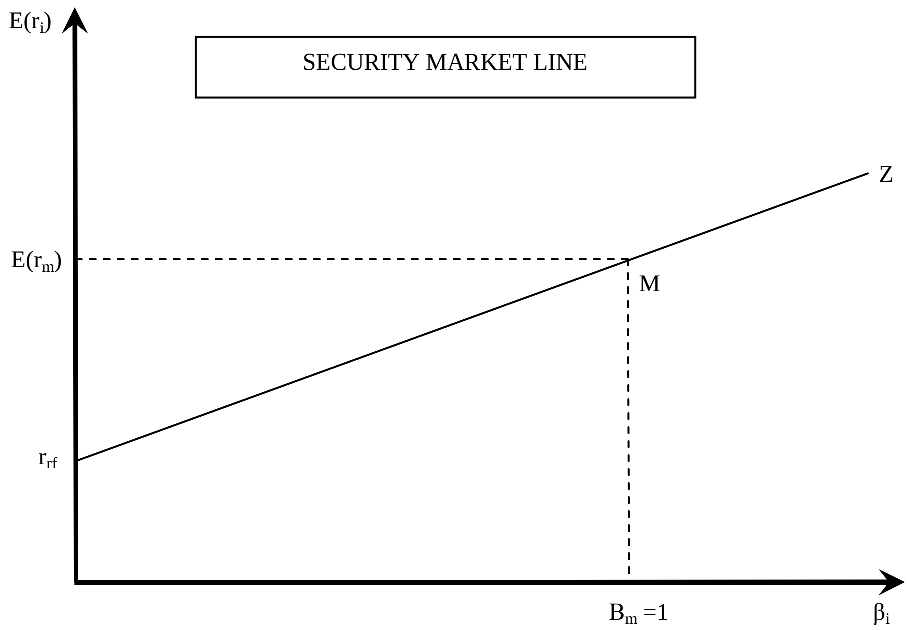
1. Finding the optimal mix (which is later found out to be the market portfolio) and
2. Deciding the amounts of risky and risk-free assets in the chosen portfolio (Bernstein, 1997).

This idea is later known as Tobin's Separation Theorem. Tobin helped the investor to choose the optimal portfolio in the efficient frontier but he did not provide an easier way to describe the efficient frontier than what was proposed by Markowitz (Bernstein, 1997).

The necessary aid came from William Sharpe in his 1961 paper "A Simplified Model for Portfolio Selection". He argued that the relationship between various securities' returns is only possible with a decisive factor. Investors should calculate the relation of each security with this dominant factor instead of calculating their relations with each other (Bernstein, 1997).

Sharpe introduced Capital Asset Pricing Model (CAPM) in his 1964 paper “Capital Asset Prices; A Theory of Market Equilibrium under Conditions of Risk”. In this paper, he argued that in equilibrium there will be a simple linear relationship between the expected return and standard deviation of return for efficient combinations of risky assets (Sharpe, 1964). He introduced the concepts of “systematic and unsystematic risk” and used beta to calculate the systematic risk of each individual asset. All stocks in the market portfolio must have predicted beta and expected rate of return.

Figure 3. Security Market Line



In Figure 3, beta is used to show the risk for a given level of return. Beta of market portfolio is 1 and each individual stock’s beta reflects the riskiness of that stock relative to the riskiness of the market.

Sharpe argued that stocks with high betas (more responsive to the changes in the market) will have higher expected returns than those with low betas (less responsive to the changes in the market) stocks. Sharpe concluded that;

> “....diversification enables the investor to escape all but the risk resulting from swings in economic activity - this type of risk remains even in efficient combinations. And, since all other types can be avoided by diversification, only the responsiveness of an asset’s rate of return to the level of economic activity is relevant in assessing its risk. Prices will adjust until there is a linear relationship between the magnitude of such responsiveness and expected return. Assets which are unaffected by changes in economic activity will return the pure interest rate; those which move with economic activity will promise appropriately higher expected rates of return” (Sharpe, 1964).

Same conclusions with Sharpe’s are reached by Jack Treynor, Jonh Lintner and Jan Mossin in their independent studies in 1960s. The resulting model is called CAPM.

The developers of CAPM accept the following assumptions;

1. All investors are single-period expected utility of terminal wealth maximizers who choose among alternative portfolios on the basis of mean and variance (or standard deviation) of return.

2. All investors can borrow or lend an unlimited amount at an exogenously given risk free rate of interest and there are no restrictions on short sales of any asset.
3. All investors have identical subjective estimates of the means, variances and covariances of return among all assets.
4. All assets are perfectly divisible and perfectly liquid, i.e., all assets are marketable and there are no transaction costs.
5. There are no taxes.
6. All investors are price takers.
7. The quantities of all assets are given (Jensen, 1972).

CAPM explains the relationship between the risk and required rates of return on stocks when they are held in well-diversified portfolios (Brigham and Ehrhardt, 2005).

Rate of return of a stock investment is calculated using the following formula;

$$\text{Rate of return} = \frac{\text{Amount received-Amount invested}}{\text{Amount invested}} \quad (1)$$

A stock investment's risk can be considered either on a stand-alone basis or on a portfolio basis. Stand-alone risk is the risk of a stock when the investor only holds that stock in her portfolio.

Risky investments rarely provide their expected returns; their returns are either below or above the expected amount. Otherwise they would not be risky. Then, the risk of an investment is related to the probability distribution of its realized return. The expected return of a stock investment i is;

$$\mathbf{E\ (r_i) = \sum p_i * r_i} \quad (2)$$

$\mathbf{r_i}$**:** the ith possible return

$\mathbf{p_i}$**:** the probability of the occurrence of the r_i

In order to calculate the stand-alone risk of a stock, the weighted average of the deviations from the expected return (standard deviation) is calculated (Brigham and Ehrhardt, 2005).

Since most stocks are held in portfolios with a number of other stocks, the risk that the investor must be concerned with, must be the one on a portfolio basis. In other words, the expected return and risk of an investor's portfolio is much more important for her than the expected return and risk of each single stock she has in her portfolio. Portfolio expected return is calculated using the following formula;

$$\mathbf{E\ (r_p) = \sum w_i * E(r_i)} \quad (3)$$

$\mathbf{E(r_i)}$**:** the expected return of stock i

$\mathbf{w_i}$**:** the percentage of the dollar value of the portfolio that is invested in the stock i.

The expected return on a portfolio is the weighted average of the expected returns of the stocks it contains. However, the risk of a portfolio is not the weighted average of the risks of the stocks it contains. Otherwise, holding portfolios which contain stocks of various companies (diversified portfolios) would not be advantageous over having only a single company's stocks. There is an important factor that cause the risk of a portfolio's being almost always smaller than the stand-alone risks of the stocks it contains. This factor is called correlation. It is the tendency of two variables moving together and it is measured by correlation coefficient. If two stocks are perfectly negatively correlated, a portfolio which only contains these two stocks will be riskless. If two stocks are perfectly positively correlated, then, their portfolio will be as risky as any one of them. In other words, diversification has no effect in the second case. In real life, the stock correlations lie between these two extreme cases and diversification decreases risk but does not eliminates it completely.

In order to understand the concept of diversification, we can look back to Harry Markowitz's writings about the true kind of diversification (Markowitz, 1952). In his 1952 paper, he wrote that when forming a portfolio, the important point is not to put as many number of stocks as possible to it. Instead, investors should consider the correlations of the stocks they choose. For instance, if an investor forms a portfolio consisting of only railway securities, this selection does not provide the diversification effect because all the securities in this portfolio will be almost equally affected from the same factors. Instead of choosing all securities from the same industry or from industries that usually are affected from the same factors, stocks of firms from dissimilar industries must be chosen.

Efficient diversification can reduce risk but does not eliminate it completely. The main reason of this is the existence of some factors that affect the risk of all stocks in the same way such as economic crises, war, national disasters or inflation rates. The risk of a portfolio consists of two parts; firm specific (or diversifiable risk) and market risk. Market risk remains whether the stocks are held in a well diversified portfolio or not. But diversifiable risk can be eliminated with the efficient diversification.

According to Capital Asset Pricing Model (CAPM), the relevant risk of an individual stock is its contribution to the risk of a well diversified portfolio (Brigham and Ehrhardt, 2005). A single stock with a high stand-alone risk may have a very small contribution to the overall riskiness of a portfolio if the efficient diversification is achieved. The portfolio with the most efficient diversification is the market portfolio; the one which contains all stocks in the market. And the relevant risk of an individual stock is its contribution to the market portfolio's risk. CAPM defines this relevant risk as beta of the stock;

$$\beta_i = (\sigma_i/\sigma_m)\rho_{i,m} \qquad (4)$$

σ_i**:** standard deviation of the stock i's return

σ_m**:** standard deviation of market's return

$\rho_{i,m}$**:** correlation between stock i's return and the market's return

According to this formula of beta, a stock with a higher standard deviation will have a higher relative risk than a stock with a lower standard deviation. Similarly, the stock's correlation with market portfolio has a positive effect to its relevant risk. In order to estimate the beta of a security, regression analysis is used. When the stock's returns are plotted to the y-axis and the market portfolio's returns are plotted to the x-axis, the slope of the regression line found is the same with beta. Beta of a portfolio is the weighted averages of the betas of the stocks it contains.

$$\beta_p = \sum w_i * \beta_i \qquad (5)$$

w_i**:** the fraction of the portfolio invested in the stock i

β_i**:** beta of stock i

CAPM provides Security Market Line (SML) equation to calculate the required rate of return for stock i as;

$$r_i = r_{rf}+(r_m-r_{rf})*\beta_i \qquad (6)$$

r_i**:** required rate of return on stock i,

r_{rf}**:** risk free rate of return (the return provided by riskless assets such as government treasury bills)

r_m**:** required rate of return on the market portfolio

β_i**:** beta of stock i

The additional return provided by market portfolio over the risk free rate of return is called risk premium on the market and denoted as RP_m.

$$RP_m = r_m-r_{rf} \qquad (7)$$

SML formula can be rewritten using this notation;

$$r_i = r_{rf}+(RP_m)*\beta_i \qquad (8)$$

3. Empirical Tests of the Capital Asset Pricing Model

The validity of any model can only be determined through empirical tests. Although a large number of empirical tests are conducted about CAPM, there is a serious problem in testing CAPM. Whereas CAPM is an ex-ante model, there is only *ex-post* data to test it. According to CAPM, beta should reflect investors' estimates of a stock's future volatility in relation to that of the market (Brigham and Ehrhardt, 2005). However, only past data exist about volatility of the stock. This past data is used to calculate historical betas and it is assumed that betas will be the same (stable) in the future. But research of Robert Levy and some others showed that beta of individual stocks change over time. In other words, future betas of individual stocks are not same with their betas in the previous time periods. But these same studies also showed that betas of portfolios tend to remain constant. Betas of portfolios which contain more than ten stocks are stable. Then, historical betas of portfolios can be accepted as good indicators of their future betas and CAPM is a better concept for structuring investment portfolios than it is for estimating required return for individual securities (Brigham and Ehrhardt, 2005). As a result of this situation, researchers generally preferred to use portfolios instead of individual stocks to test CAPM. In this section some important emprical tests of the model are summarized.

The two traditional studies are Black and others (1972) and Fama-MacBeth (1973). Both of these studies' findings support the validity of the model in its original form. Some of later researches' findings contradict this early works' results. Fama and French's (1992) and Pettengill and others' (1995) works stand out in the crowd as milestones of the CAPM research. Especially Pettengill and others' conditional test approach is widely used by contemporary researchers beside the traditional one developed by Fama and MacBeth.

Black and others (1972) developed a time series test and tested CAPM, firstly. They formed ten portfolios which contains all securities in the NYSE in the period 1931-1965. Their result showed that CAPM "in its most elementary form" does not provide an adequate description of the structure of security returns (Jensen, 1972). Secondly, Black and others used cross sectional analysis to regress average excess monthly returns against betas of portfolios formed. If CAPM is valid the relationship between these two variables will be linear and the intercept of this line will be zero. They found out that the line is linear but intercept is not zero. They concluded that because of the existence of sampling error, the intercept is not zero. The results they found were consistent with the predictions of CAPM (Gürsoy and Rejepova, 2007).

Fama and MacBeth (1973) tested CAPM by using monthly percentage returns for all common stocks traded on the NYSE during the period January 1926 through June 1968. They divided the 42 and half year research period into 5 overlapping periods. First period included a 4 year portfolio formation period, 5 year estimation period and 4 year testing period. All of remaining 4 overlapping periods included a 7 year portfolio formation period, 5 year estimation period and 4 year testing period (Sharpe, 1964). During the portfolio formation period monthly returns of individual stocks were used to formulate 20 portfolios on the basis of individual stock's beta values. Stocks with lowest betas were included in the first portfolio, stocks with the second lowest betas included in the second portfolio, and so on. The following 5 years of data were then used to recompute the betas and these were averaged across securities within portfolios to obtain 20 initial portfolio betas for the risk return tests. Lastly, portfolio returns were calculated for the testing period and regressed to portfolio betas calculated in estimation period. At the end of their testing process, Fama and MacBeth (1973) concluded that one cannot reject the hypothesis that the pricing of securities is in line with the implications of the two-parameter (CAPM) model for expected returns.

Fama and French (1992) study monthly returns for a period between 1963 and 1990 and found an insignificant relationship between beta and average results. They realized the existence of two other factors beside beta; the firm's size and its book/market ratio. Researchers later developed an alternative model to CAPM (Pettengill and others, 1995).

Pettengill and others (1995) tested the conditional relationship between beta and realized returns. Their sample period is 65 year from 1926 to 1990. They included monthly returns of stocks and used Center for Research in Security Prices (CRSP) equally-weighted index return as a proxy for the market return. They utilized three-month Treasury bill rates as risk free rate. They used a modified version of Fama-MacBeth three-step approach. The sample period is divided into 15-year periods than each of these periods is divided into three five-year sub-periods. These sub-periods are called portfolio formation, portfolio beta estimation and testing periods in accordance with Fama-MacBeth approach.

In the portfolio formation period 20 portfolios were formed according to the relative beta rankings. Stocks with lowest betas are placed in the first portfolio, the next lowest in the second portfolio, and so on. Portfolio betas were estimated in the second five-year sub-period. In the third step, where the relationship between portfolio beta and returns were tested, Fama-MacBeth's approach was modified to account for the conditional relationship between beta and realized returns. Pettengill and others asserted that findings of previous research did not support the systematic relation between risk and return because their results were biased due to the aggregation of positive and negative market excess returns. Researchers argued that if the realized market return is above the risk-free return, portfolio betas and returns should be positively related, but if the realized market return is below the risk free return, portfolio betas and returns should be inversely related. Therefore, researchers tested portfolio beta and return relationship in positive and negative excess return periods separately. In other words, portfolio returns of the testing period were regressed to estimation period betas in positive and negative excess return periods separately. Their cross sectional regression results revealed the existence of a systematic, conditional relationship between beta and realized returns. They also determined that high beta stocks, on average, earn higher returns than low beta stocks (Pettengill and others, 1995).

Theriou and others' (2010) research aim is to examine the beta-returns relationship in the Athens Stock Exchange (ASE). They used daily closing prices of common stocks traded in ASE and ASE composite share price index return is taken as the market return. Three-month government treasury bill rate is taken as proxy to risk free rate of return. They calculated monthly returns from the daily returns and use this data as the input of their research. Their study covers 12 years from 1991 to 2002. The sample period is divided into four six years periods and each of them is further divided into three two-year sub-periods. As usual, these sub-periods are named as portfolio formation, beta estimation and testing periods. At the end of the first two year period, stocks are allocated to fifteen portfolios according to their calculated betas. In the next step portfolio betas are calculated using data from beta estimation period. Lastly, portfolio excess returns calculated in the last sub-period are regressed to portfolio betas calculated in the second sub-period. Authors used both traditional (unconditional) and conditional approaches (Theriou and others, 2010).

The results of Theriou and others' (2010) conditional test support the idea that betas are related to realized returns. The result of their unconditional test is insignificant and consistent with the findings of Fama and French (1992). They concluded that their results tend to support the existence of a conditional CAPM relation between risk and realized return trade-off. However, the support of this relation is not 100 percent sure, because one of the conditions of Pettengill and others, i.e. the existence of positive average excess market return, does not hold in the case of ASE during the whole period under examination (Theriou and others, 2010).

Karacabey and Karatepe's (2004) research was conducted in Istanbul Stock Exchange (ISE) which is known to be a very volatile emerging market. Research data consist of eleven year's monthly adjusted price information for the securities traded on the ISE from 1990 to 2000. Research period is divided into three sub-periods of 44 months each (Karacabey and Karatepe, 2004).

Firstly, they tested the existence of an unconditional relationship between betas and returns in İSE. For the first step beta coefficients are estimated. Then cross section regression was employed to examine the unconditional relationship between beta and return. Results were consistent with the findings of Fama and French (1992) and showed no significant relationship between beta and expected returns. Secondly, they run the regression equation developed by Pettengill and others (1995) to examine the conditional relationship. This time, a statistically significant relation between beta and return was found. In other words, their conditional test results supported the prediction of CAPM that the betas are related to the realized returns (Karacabey and Karatepe, 2004).

Gürsoy and Rejepova (2007) tested validity of CAPM in Turkey for the period of 1995-2004. Researchers used all ISE stocks available during the research period. ISE 100 index was taken as the proxy of market portfolio and US Treasury bill rate, adjusted for the difference between Turkish and US inflation rates, was taken as risk free rate. Both Fama and MacBeth (1973) and Pettengill and others' (1995) methods were applied.

Results of traditional unconditional test of Fama and MacBeth (1973) showed no relationship between beta and portfolio risk premiums in ISE. A very strong relationship between beta and realized risk premiums was found by the researchers when conditional approach of Pettengill and others (1995 is used. Researchers concluded that the systematic risk of a portfolio measured by beta coefficient is an important determinant of portfolio returns in Turkey (Gürsoy and Rejepova, 2007).

Korkmaz and others (2010) examined the validity of CAPM in ISE using panel data analysis. Sample period consists of 15 years from 1993 to 2007. 82 firm's stocks which are included in the ISE 100 index were used in the research. Researchers tested the relationship between excess returns of the stocks and market risk premium using panel data analysis method. Findings of the research supports the validity of CAPM in ISE for the related period and showed that panel regression could be an alternative for estimating market risk premium.

4. Data and Methodology

Sample period of the study extends from January 2006 through December 2010. Monthly returns of common stocks which are included in ISE 50 index are included in the study. The data are taken from ISE web site. ISE 50 stocks are included in the sample only if there is a complete data history of the stock during the sample period. From ISE 50 index stocks forty two of them comply with this criterion and included in the research. Summary information about sample period and the number of stocks used in each sub-period are presented in Table 1.

Table 1. Division of Analysis Period and Number of Stocks Included in the Research

Sub-periods	Time span	Number of available stocks in ISE 50 index	Number of stocks included in the research
Portfolio Formation Period	01/01/2006-31/08/2007	50	42
Estimation Period	01/09/2007-30/04/2009	50	42
Test Period	01/05/2009-31/12/2010	50	42

ISE 50 index monthly return is taken as the market return. Three-month government debt securities' (GDS) monthly performance index rate is taken as the risk free rate. Time series of excess returns on the market and the individual securities are calculated by subtracting the risk free rate from the market return and individual stock returns. Monthly stock returns, market return and risk free rate are calculated with the following formula;

Rate of return = (index value at the end-of-term – index value at the beginning-of-term) / index value at the beginning-of-term

4 portfolios are formed from above mentioned 42 stocks based on their beta coefficients. Portfolio 1 consists of stocks with the lowest beta values, portfolio 4 consist of stocks with the highest beta values. Portfolios 1 and 2 consist of ten stocks while portfolios 3 and 4 include eleven stocks each.

Analysis period is divided into three twenty month sub-periods; portfolio formation period, beta estimation period and test period, respectively. In the portfolio formation period, excess returns of each stock (r_i-r_{rf}) and the market risk premiums (r_m-r_{rf}) for the first twenty-month of sample period were calculated. Then excess returns of the stocks were regressed to market risk premiums. The result is the beta coefficients of individual stocks. The following formula was used for this estimation;

$$r_i - r_{rf} = (r_m - r_{rf})*\beta_i \qquad (9)$$

In the estimation period, the beta of each individual stock was calculated for the second twenty-month period. Then, betas of portfolios were estimated by taking the simple average of the betas of the stocks assigned to each portfolio.

In the testing period, the excess returns of individual stocks for the last twenty-month sub-period were averaged to calculate portfolios' excess returns. Then, monthly portfolio excess returns were regressed on the portfolio betas calculated in the second twenty-month period. The regression analysis is applied using unconditional test procedure.

$$r_{pt} = \gamma_{0t} + \gamma_{1t}*\beta_{pt} + e_{pt} \quad p=1.......4 \quad t=1..........20 \qquad (10)$$

r_{pt}: the portfolios excess return estimated in the third period

β_{pt}: Portfolio betas calculated in the estimation period.

E_{pt}: the error term that should be equal to zero if CAPM is valid.

Finally, the coefficients $\gamma 0t$ and $\gamma 1t$ were averaged and hypotheses were tested based on these averages. According to CAPM, mean of γ0t's should be equal to zero and mean of γ1t's should be equal to the market excess return (Karacabey and Karatepe, 2004).

Then, t-statistics are calculated using the following formula presented by Fama and MacBeth in their 1973 paper;

$$t(\dot{y}) = \frac{\dot{y}}{s(\dot{y})/\sqrt{n}} \qquad (11)$$

n: the number of months in the period (the number of estimates used to compute the mean and standard deviation).

5. Research Findings

Table 2. Summary Results of the CAPM Test in ISE

ẏ0				ẏ1			
Mean	Standard Deviation	t(ẏ0)	P value	Mean	Standard Deviation	t(ẏ1)	P value
0,041343	0,181936	1,016245	0,3223	0,005202	0,142852	0.162854221	0,8724

Summary results of the test are presented in Table 2. CAPM would be valid when ỳ0 = 0, and ỳ1 ≠ 0. In other words, if ỳ0 is equal to zero and ỳ1 is not equal to zero then CAPM is valid in ISE for the sample period (Gürsoy and Rejepova, 2007). According to the t-test results, as seen in Table 2, ỳ0 is equal to zero. This result confirms what CAPM predicts and shows that regression line intercepts the y-axis at origin. However, ỳ1 is also equal to zero. According to CAPM, ỳ1 should be equal to the expected excess return on market (market risk premium) and also it should be positive as investors are risk averse. This result shows that there is no meaningful relationship between betas and risk premiums, so CAPM in not valid in ISE over the sample period. This result is consistent with the findings of Karacabey-Karatepe (2004), Yalçıner (2006), and Gürsoy-Rejepova (2007) who all conducted empirical tests in ISE using same methodology.

6. Conclusion

The existence of an unconditional relationship between beta and returns in ISE is tested in this empirical study. Cross section regression model developed by Fama and MacBeth (1973) is used. The results are consistent with findings of of Fama and French (1993) and of previous research studies conducted in ISE. No evidence of any significant relationship between beta and returns is found and the validity of CAPM in ISE is rejected.

A potential cause of these results may be the conditionality of the relationship between realized returns and beta on the relationship between realized market returns and risk free rate. Researchers found strong relationships between risk and realized returns when they separate periods of positive and negative market excess returns in ISE. If the conditional approach developed by Pettengill and others (1995) were used, a significant relationship between risk and return might be found.

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