

TESTING THE RELATION BETWEEN BETA AND RETURNS IN THE ATHENS STOCK EXCHANGE

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Abstract

The main objective of the current study is the examination of the relationship between beta and returns in the Athens Stock Exchange, taking into account the difference between positive and negative market excess returns' yields. The investigation period is between 1991 and 2002 and the focus on the risk-return trade-off by examining separately the up-market and down-market months. The study tries to verify whether beta is an important measure of risk and if an inverse relationship holds between beta and returns when the return on the market is negative. It also investigates whether there is any symmetry between up and down market returns in the ASE. The estimation of return and beta without differentiating positive and negative market excess returns produces a flat unconditional relationship between return and beta. Using the conditional CAPM and cross-sectional regression analysis, the evidence in this paper tends to support the significant positive relationship in up market and a significant negative relationship in down market. (JEL G12).

Key words: CAPM, unconditional – conditional relationship, risk-return trade-off.

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1. Introduction

The risk-return relationship is one of the fundamental concepts in finance that is of great importance for investors and portfolio managers, who have as one of their main tasks the estimation of investment risk. The popular Capital Asset Pricing Model, CAPM (Black, 1972; Lintner, 1965; Sharpe, 1964) argues that beta, or the systematic risk is the only relevant risk measure for investment and a positive trade-off between beta and expected returns should exist. Because of its importance and relevance to all investors, it is one of the most extensively tested financial models in the literature. The CAPM postulates that the return on any asset is linearly related to its market beta, with beta being defined as the ratio of the covariance of each asset with the market portfolio to the variance of the market portfolio. In other words, during cross-sectional tests on the returns of assets only the market beta (β) shall be priced.

The empirical evidence to date on the CAPM has been mixed. While the results of many studies, particularly those of the earlier classical work of Black *et al.* (1972) and Fama and MacBeth (1973), support the CAPM, some researchers, such as Fama and French (1992), report an inconsistent or a flat relationship between returns and beta. The findings for non-US studies are also inconclusive. For example, studies for France (Hawawini *et al.* 1983) and Japan (Hawawini 1991; Chan *et al.* 1991) point to a positive relationship between returns and beta, but the empirical findings in Canada (Calvet and Lefoll 1989), Belgium (Hawawini *et al.* 1989), Finland and Sweden (Ostermark 1991), the United Kingdom (Corhay *et al.* 1987; and Chan and Chui 1996), Singapore (Wong and Tan 1991), Hong Kong (Cheung and Wong 1992; Ho *et al.* 2000a and 2000b), and Korea and Taiwan (Cheung *et al.* 1993) suggest either no relationship or an inconsistent relationship between returns and market risk.

Though initial empirical studies support the CAPM (Fama and MacBeth, 1973; Black, Jensen and Scholes, 1972), there are empirical variables e.g. the Market Value of Equity ratio (MVE), the Earnings to Stock Price ratio (E/P) and the Book-to-Market Equity ratio (B/M) that had explanatory power greater than the beta of the market (Banz, 1981; Basu, 1983; Rosenberg, Reid and Lanstein, 1985).

Ross's (1976) Arbitrage Pricing Theory (APT) commenced a new family of models which have tried to verify that beta is not the only component that could measure the systematic risk or undiversified of stock returns and other securities, e.g. the macroeconomic APT showed that there are many different variables that have an effect on stock returns (Chen, Roll and Ross, 1986; Chen and Jordan, 1993).

The CAPM studies attempted to test for an unconditional, systematic and positive trade-off between average returns and beta, but failed to take into account the fact that the relationship between realized returns and beta is conditional on the relationship between the realized market returns and the risk-free rate.

Pettengill, *et al.*, (1995) developed a conditional relationship between beta and realized returns by separating periods of positive and negative market excess returns. Using US stock market data in the period 1936 through 1990, they found a significant positive relationship between beta and realized returns when market excess returns are positive and a significant negative relationship between beta and realized returns when market excess returns are negative. This significant relationship is also found when data

are divided by months in a year. Furthermore, they found support for a positive risk–return relationship.

Isakov (1999) followed the approach of Pettengill *et al.* (1995) and examined the Swiss stock market for the period 1983–1991. He found supporting results that beta is statistically significant related to realized returns and has the expected sign. Hence, Isakov (1999) concluded that beta is a good measure of risk and is still alive.

The aim of the current study is to determine whether beta has a role to play in explaining cross-sectional differences in the returns of the General Greek Index. The main purpose of this paper is to present evidence of the conditional relationship between returns and beta in the Athens Stock Exchange. It tries to verify whether coefficient beta is an important measure of systematic risk. There will also be a try of observing a symmetrical relation between return and beta in up and down markets. Pettengill *et al.* (1995) support this notion of symmetry in up and down markets, while Fletcher (1997) had different results in his research in the U.K., i.e., the slope equality hypothesis was rejected in comparison to Pettengill, *et al.*, (1995).

This cross-sectional regression and the subsequent test of the mean of the coefficients estimated in the monthly regressions can be interpreted as a test of two joint hypotheses. The hypothesis that there is a positive relationship between beta and realized return is tested jointly with the hypothesis that the average market risk premium is positive. One important explanation for this result lies in the fact that realizations of the market risk premium are often negative even if the expected, or ex-ante, risk premium is positive. An ex-post formulation of the CAPM predicts that stocks with a higher beta have higher returns only when the market return is higher than the return of the riskless asset. If the market return falls short of the riskless rate, stocks with a higher beta have lower returns. Pettengill, *et al.*, (1995) call this the conditional (ex-post-) relation between beta and return.

They modify the Fama - MacBeth (1973) test procedure in a way that takes the conditional nature of the relation between beta and return into account. Their empirical results support the conclusion that there is a positive and statistically significant relationship between beta and realized returns. The idea underlying the modified test approach of Pettengill, *et al.*, (1995) rests on the distinction between the ex-ante CAPM and its ex-post representation used for empirical tests. A crucial difference between these formulations is the fact that the expected market risk premium is always positive ex ante whereas the realizations of the risk premium may be, and often are, negative.

The purpose of this study is to examine whether the conditional relationship between beta and returns, which has been shown to exist in developed markets, like US (Pettengill, *et al.*, 1995), UK (Fletcher 1997), Brussels (Crombez and Vennet, 1997), Japan (Jiro Hodoshima, Xavier Garza–Gomez, and Michio Kunimura, 2000), Germany (Elsas *et al.*, 2003), and Switzerland (Isakov, 1999), holds for the Athens Stock Exchange (ASE) too.

The methodology follows an applied research procedure and has a positivist explanatory form as it is focused on causal relationships between returns and systematic risk.

Next section covers the literature review of the relation between beta and returns. In the subsequent sections the data collection is presented and there is a detailed analysis on the time series data. In the last section there is a presentation of the conclusions from

the data analysis and the limitations of the study. Finally, there are proposals for future research on the risk-return trade-off.

2. Literature review

Most of the empirical tests are mainly based on the Fama and MacBeth (1973) methodology using a three-step approach.

However, Reinganum (1981) found that the cross-sectional differences in portfolio betas and the differences in average portfolio returns are not reliably related, i.e. the returns on high-beta portfolios are not significantly higher than the returns on low-beta portfolios, casting doubts on the empirical content of CAPM

Schwert (1983) suggested that Fama and MacBeth (1973) only provided a very weak support for a positive risk–return trade-off since the positive risk–return relationship found is not significant across sub-periods. Furthermore, when considering the seasonal behavior of their results, the *t*-statistic becomes highly suspect and the basic risk–return trade-off virtually disappears.

Tinic and West (1984) found that January has a larger risk premium than the other months and further that the significant relationship between risk and expected returns only exists in January. When data for the January months are excluded from the analysis of the risk–return trade-off, the estimates of risk premiums are not significantly different from zero. Thus, they concluded that their results reject the validity of CAPM.

Lakonishok and Shapiro (1986) examined the monthly returns of all stocks traded on the New York Stock Exchange (NYSE) and found that return on individual security is not specifically related to its degree of systematic risk, but is significantly related to the market capitalization values. They concluded that the traditional (beta) as well as the alternative (residual standard deviation) risk measure is not able to explain the cross-sectional variation in return; only size can significantly explain it.

Haugen and Baker (1991) examined the risk and return characteristics of 1000 US stocks that have largest market capitalization over all US exchanges and markets between 1972 and 1989. They found that the market portfolio is not efficient because low-risk stocks seem to have abnormally high returns, contradicting the relationship between beta and returns as prescribed by CAPM.

Fama and French (1992), using Sharpe-Lintner-Black CAMP, studied the monthly returns of NYSE stocks and found an insignificant relationship between beta and average returns. They concluded that the CAPM cannot describe the last 50 years of average stock returns and only market capitalization and the ratio of book value to market value have significant explanatory power for portfolio returns. This study also produces a controversial finding on the validity of CAPM: first, as the main model in investigating the relationship beta-return; and second, the beta role in explaining financial asset return. Other studies related to static CAPM are reported in Banz (1981), Reinganum (1981), Gibbons (1982), Basu (1983), Chan, Chen and Hsieh (1985), Shaken (1985), Bhandari (1988), and Jagannathan and Wang ZhengYu (1996). They find that the static CAPM is unable to explain the cross-sectional variation of average returns.

Recent studies (e.g. Pettengill, Sundaram, and Mathur, 1995 for the US market; and Isakov, 1999, for the Swiss market) suggested an alternative approach to assess the reliability of beta as a measure of risk. Their argument is that since the CAPM deals with

the expected returns, while the realized returns are used as proxies, negative realized risk premia could be observed in some periods. Their model is conditional on the realized risk premium, whether it is positive or negative. When the realized risk premium is positive, there should be a positive relationship between the beta and return, and when the premium is negative, the beta and return should be negatively related. The reason is that high beta stocks are more sensitive to the negative realized risk premium and thus will have a lower return than low beta stocks. Their empirical results, based on estimations conditional on the sign of the market excess returns, indicate that betas and returns are positively related in the US capital market. This conditional positive relationship is observed in the UK (Fletcher, 1997), Germany (Elsas *et al.*, 2003), Brussels (Crombez and Bennet, 1997), and Taiwan (Jagannathan and Wang, 1996) as well.

More recent studies attempt to answer whether the standard CAPM can be applied to emerging capital markets in order to estimate the cost of equity capital in these markets. Since the individual emerging market has its unique market structure, institutional background, history, level of the market integration, local risk-free return, etc, the answer may differ across countries. Karacabey (2001) studies the beta-return relationship in the Istanbul Stock Exchange and shows that only the conditional relationship holds. Thus, beta is still a useful risk measure in this emerging market. Estrada (2001) gives evidence that the cross section of returns in emerging markets can only be explained by “downside risk” measures as the semideviation of the means. The semideviation method uses negative deviations from a benchmark return such as the mean return of the asset or a specified target mean. Thus, downside risk defines risk as volatility below the benchmark (Nawrocki, 1999; Sortino and Meer, 1991). One of the advantages of the downside risk approach is that a desired benchmark return can be chosen, and the investors care more about downside than upside risk. Estrada (2001) points out that for skewed distributions the semideviation is a more appropriate risk measure

Previous empirical studies on the unconditional relationship between beta and returns found that the CAPM only provides an inadequate explanatory power for the risk–return relationship observed in both domestic and international stock markets. However, results from empirical studies on the conditional relationship between beta and returns support the model and found a significant conditional relationship in domestic stock markets. A logical question followed is whether the conditional relationship between beta and returns can also be applied to international stock markets. To the best of our knowledge, no study (except one) has investigated this issue. Fletcher (2000) examined the conditional relationship between beta and returns in international stock markets between January 1970 and July 1998 using the approach of Pettengill *et al.* (1995).

Using monthly returns of the MSCI equity indices of 18 countries and the MSCI world index, Fletcher (2000) found that a consistent result exists. There is a significant positive relationship between beta and returns in periods when the world market excess returns are positive and a significant negative relationship in periods when the world market excess returns are negative. Besides, this relationship is symmetrical and there is, on average, a positive mean excess return of the index.

Fletcher (2000) also found that the significant conditional relationship in January exists only in periods of positive market excess returns and the relationship is

insignificant in periods of negative market excess returns. The results differ from those obtained by Pettengill *et al.* (1995) on the US market data. Although Fletcher's (2000) study supported the conditional relationship between beta and returns in international stock markets, the empirical evidence is still limited.

The ASE for a number of years has been characterized as an emerging market and has attracted international interest. During the past 15 years it has entered a period of new structural reforms and development. As a result, the market has become potentially more efficient and competitive. The number of listed companies increased significantly, market liquidity improved, and structural and legislative reforms provided for a modern and adequate regulatory framework. The ASE contains two market segments, the "main" and the "parallel market". The main market primarily includes larger firms with higher equity capital and operating profits. In contrast, the parallel market typically include firms with lower equity capital, smaller scale of operation, and lower profits.

There has been limited research on the behaviour of stocks traded on the ASE. Papaioannou (1982, 1984) reports price dependencies in stock returns for a period of at least six days. Panas (1990) provides evidence of weak-form efficiency for ten large Greek firms. Koutmos, Negakis, and Theodossiou (1993) find that an exponential generalized ARCH model is an adequate representation of volatility in weekly Greek stock returns. Barkoulas and Travlos (1998) test whether Greek stock returns are characterized by deterministic nonlinear structure (chaos).

Papaioannou and Philippatos (2000) examined the impact of non-synchronous trading on the beta estimates of the market model using Greek stock market returns. Niarchos and Georgakopoulos (1986) found that the Greek stock prices respond very slowly to new information and conclude that the Greek market is not efficient.

More recently, Diacogiannis *et al.*, (1998) examined the effect of the Price / Earnings (P/E) ratio and the Dividend Yield (DY) on expected returns of ASE common stocks for the period 1990 – 1995. He found that P/E is statistically significant variable explaining the cross section variation of expected returns, while the explanatory power of DY was documented rather weak.

Karanikas (2000) examined the role of size, book to market ratio and dividend yields on average stock returns in the ASE for the period from January 1991 to March 1997. He followed the Fama and MacBeth's cross sectional regression methodology enhanced with Shanken's adjustments for the Error in Variables (EIV) problem. He found that a statistically significant positive relationship exists between book to market ratio, dividend yields and average stock returns. He also found that the market capitalization variable ("size effect") does not seem to explain a significant part of the variation in average returns.

Niarchos and Alexakis (2000) investigated whether it is possible to predict stock market returns with the use of macroeconomic variables in the ASE for the period from January 1984 to December 1995 on a monthly base, using cointegration analysis and as explanatory variables some macroeconomics factors. Based on their outcoming results, they statistically rejected the Efficient Market Hypothesis and they noted the statistical significance of the lagged returns, which suggest that the monthly returns in the ASE are positively correlated. The above findings can not be explained as a thin trading effect or as non synchronous trading effect because of the monthly time interval used in the investigation.

In summary, emerging markets have proved extremely attractive over the last ten years to international investors hoping to benefit from abnormal returns as well as portfolio risk diversification (Harvey, 1995), and therefore the extent to which cross-sectional return behavior matches that of more developed markets is of particular interest. However, studies of such markets present a number of problems, ranging from the availability of suitable data on the one hand to methodological problems on the other. The few studies that have been conducted on this market have focused on the dynamic behaviour of Greek stock prices, the market's informational efficiency, or the reaction to announcements such as rights issues (e.g., Koutmos, *et al.*, 1993; Karathanassis and Patsos, 1993; Tsangarakis, 1996; Barkoulas and Travlos, 1998; Phylaktis, *et al.*, 1999; Barkoulas, *et al.*, 2000; and Papaioannou, *et al.*, 2000).

3. Data and methodology

Our data is daily closing prices of the common stocks traded in the Athens Stock Exchange. They are raw prices in the sense that they do not include dividends but are adjusted for capital splits and stock dividends. The data was taken from Datastream database.

The market return is obtained from the ASE Composite (General) Share Price Index. Time series of excess returns on the market and individual securities are taken over the three-month Government Treasury Bill rate, which is considered to be the short-term interest rate (risk free interest rate).

Daily returns are calculated using the logarithmic approximation:

$$R_{i,t} = \log\left(\frac{P_{i,t}}{P_{i,t-1}}\right) \quad (1)$$

where $P_{i,t}$ is the closing price of day t for asset i.

Then daily returns are aggregated to compose the monthly returns that are the input of our investigation.

The sample period for our study extends from 1991 to 2002. The 12 years of our sample period are divided into four 6-year periods such that the test periods do not overlap.

Portfolio formation period	Estimation period	Test period
01/1991 – 12/1992	1/1993 – 12/1994	1/1995 – 12/1996
1/1993 – 12/1994	1/1995 – 12/1996	1/1997 – 12/1998
1/1995 – 12/1996	1/1997 – 12/1998	1/1999– 12/2000
1/1997 – 12/1998	1/1999– 12/2000	1/2001– 12/2002

Table 1: Separation of the sample period

Each 6-year period is then subdivided into a 2-year portfolio formation period, a 2-year estimation period and a 2-year test period. Securities are included in a 6-year period sample if they have a complete price relative history (no missing values and no suspensions) in that period.

In the **formation period** the excess returns ($R_{i,t} - R_{f,t}$) of each security are estimated from a time series of returns of ASE listed stocks and the market premium

$(R_{m,t} - R_{f,t})$. Then the excess returns (dependent variable) are regressed on the market premium (independent variable). The outputs of the regressions are the beta coefficients of the individual shares. The formula used for the above estimation is the following:

$$R_{i,t} - R_{f,t} = (R_{m,t} - R_{f,t})\beta_i \quad (2)$$

where $R_{i,t}$ is the average monthly returns of the security i (dependent variable), $R_{f,t}$ is the risk free interest rate and $R_{m,t}$ is the average monthly return of the market (independent variable).

Based on these beta estimates the stocks are sorted into 15 equally weighted portfolios. Portfolio 1 contains the stocks with the highest beta, portfolio 15 the stocks with the lowest beta.

In the **estimation period** the portfolios' betas are estimated by taking the average of the betas of the stocks assigned to that portfolio, which are estimated using the second two – year period (As explained in Fama and MacBeth (1973), this calculation of beta corrects the phenomenon known as reversion to the mean).

In the **testing period**, using the third two years period, the portfolios' excess returns are estimated by averaging the excess returns of the stocks of each portfolio. Then monthly portfolio excess returns are regressed on the portfolio betas. The number of observations in the cross-sectional regressions is equal to the number of portfolios.

Then regression analysis is applied, using both the traditional (unconditional) test procedure and the conditional approach.

Traditional test :

$$R_{pt} = \hat{\gamma}_{0t} + \hat{\gamma}_{1t} * \beta_{pt} + \varepsilon_{pt} \quad p=1,\dots,N \quad t=1,\dots,T \quad (3)$$

where R_{pt} is the portfolios excess return estimated in the third step, β_{pt} is the portfolios beta estimate in the second step, ε_{pt} denotes an error term with $E(\varepsilon_{pt}) = 0$ and N and T are the number of portfolios and observations, respectively.

Conditional approach:

$$R_{pt} = \hat{\gamma}_{0t} + D_t * \hat{\gamma}_{2t} * \beta_{pt} + (1 - D_t) * \hat{\gamma}_{3t} * \beta_{pt} + \varepsilon_{pt} \quad p=1,\dots,N \quad t=1,\dots,T \quad (4)$$

where D_t a dummy variable which takes on the value 1 [0] if the market risk premium in the month under consideration is positive [negative]

Discarding the earliest two years of data and adding two new years this three-step procedure of six years is repeated. This procedure was used by Lakonishok and Shapiro (1984) and is very similar to the 5-5-5 procedure used by Pettengill *et al.* (1995).

Finally, the coefficients estimated in the cross-sectional regressions were averaged and hypothesis tests are based on these averages.

The main objective of this study is to examine the conditional relationship between beta and return. Pettengill *et al.* (1995) argued that studies focusing on the relationship between return and beta need to take account of the fact that ex post returns have been used in the tests and not ex ante returns. When realized returns are used, a conditional relationship between beta and return should exist. This occurs, as there must be some probability where investors expect that the realized return on a low beta portfolio should be greater than the return on a high beta portfolio. This is because no investor

would hold the low beta portfolio if this was not the case. Pettengill, *et al.* (1995), assumed that this occurs when the market return is lower than the risk-free return, which, they suggested, is implied by the excess returns market model. The implication of this is that there should be a positive relationship between beta and return when the excess market return is positive, and a negative relationship when the excess market return is negative.

To test the conditional relationship, the sample period was divided into up market months and down market months for all the months. The hypotheses, predicted by Pettengill *et al.* (1995) are:

$$H_0 : \bar{\gamma}_2 = 0$$

$$H_a : \bar{\gamma}_2 > 0$$

$$H_0 : \bar{\gamma}_3 = 0$$

$$H_a : \bar{\gamma}_3 < 0$$

where $\hat{\gamma}_2$ and $\hat{\gamma}_3$ are the average values of the coefficients $\hat{\gamma}_{2t}$ and $\hat{\gamma}_{3t}$. These can be tested by the standard t tests of Fama and MacBeth (1973).

Hence, given the time series of γ_i we could test the implications using a standard t-test. Defining ω as the t-statistic, we have:

$$\omega(\hat{\gamma}_i) = \frac{\hat{\gamma}_i}{\sqrt{T} * s(\gamma_i)}$$

where T is the number of months in the period, which is also the number of the estimates γ_i used to compute the mean $\hat{\gamma}_i$ and the standard deviation $s(\gamma_i)$ of γ_i .

Pettengill *et al.* (1995), pointed out that the above conditional relationship does not guarantee a positive risk-return trade-off. They stated that two conditions are necessary for a positive trade-off between risks and return: **a)** the excess market return should be positive on average and **b)** the risk premium in up markets and down markets should be symmetrical. The symmetrical relationship can be tested by the following hypothesis:

$$H_0 : \bar{\gamma}_2 - \bar{\gamma}_3 = 0$$

This can be tested by a two-population t tests, but the sign of the $\hat{\gamma}_{3t}$ coefficients needs to be reversed and the average value recalculated.

4. Results

The statistics in Table 2 give some insights into the characteristics of the ‘up’ and ‘down’ market periods during the 96-month test period from January 1995 to December 2002. It is observed that there are significant positive (8.05% per month) and negative (-6.07% per month) rewards for bearing market risk during the ‘up’ and ‘down’ market periods respectively. This could imply that the relationship between realized returns and beta is conditional on market situations. Whilst the evidence indicates a marginally negative compensation (-0.4% per month) for holding the market portfolio during the entire test period, this does not necessarily mean that a negative relationship exists between beta and returns.

		All Months		Up Markets		Down Markets	
Full sample 1995- 2002	Number of Months	96		41		55	
	Excess Market Return	-0.04%		8.05%		-6.07%	
		T - statistics	p-value	T - statistics	p-value	T - statistics	p-value
	-0.042	0.96	7.174	0.000	-7.828	0.000	
Period 1 1995 - 1998	Number of Months	48		22		26	
	Excess Market Return	1.34%		8.97%		-5.11%	
		T - statistics	p-value	T - statistics	p-value	T - statistics	p-value
	0.913	0.65	4.75	0.000	-4.37	0.000	
Period 2 1999 - 2002	Number of Months	48		19		29	
	Excess Market Return	-1,42%		6.97%		-6.938%	
		T - statistics	p-value	T - statistics	p-value	T - statistics	p-value
	-1.15	0.5	6.65	0.000	-6.75	0.00	

Table 2: Average Monthly Excess Market Returns

Furthermore, the existence of a large number of negative excess market return periods suggests that all previous studies that tested for an unconditional positive correlation between beta and realized returns were biased in finding a systematic relationship. They should have employed, as Pettengill *et al.* (1995) did, the segmentation process of the period under examination in ‘up’ and ‘down’ market periods.

Table 3 presents the results for both the full sample and the two sub periods of equal length (48 months). The coefficients estimated in the monthly cross – sectional regressions are averaged. Then, a t-test is used to determine whether the mean of the coefficient is significantly different from zero. The results for an unconditional relationship between beta and realized returns are, as expected, not significant and are consistent with Fama and French (1992) and many other studies that document no statistical significant relation between beta and return. According to the CAPM, $\hat{\gamma}_1$ should equal the expected excess return on the market portfolio and since the investors are risk averse it should be positive. For the overall period and one of the two sub periods average $\hat{\gamma}_1$ is negative and only in the second sub period becomes positive, but none of them is statistically significant. Sequentially, the null hypothesis of no relation between beta and returns cannot be rejected for both the full sample and the sub periods.

Period	$\hat{\gamma}_1$	T - statistics	p-value
Full sample 1995- 2002	-0.00155	-0.142	0.888
Period 1 1995 - 1998	-0.00721	-0.5265	0.601
Period 2 1999 - 2002	0.00410	0.2368	0.814

Table 3: The slope coefficient estimates from the unconditional cross-sectional regression $R_{p,t} = \gamma_{0,t} + \gamma_{1,t}\beta_p + \varepsilon_{p,t}$ were averaged over the indicated periods. The third column reports the t-statistics and the fourth column reports the corresponding p-value for a t-test of the null hypothesis that the mean is zero.

The main propose of this paper is to examine the conditional relation between beta and returns. Thus, the second step is to run the regression equation (4) that takes under consideration the conditional nature between beta and returns.

Table 4 presents the results of the overall sample period and the two sub periods, separately for the up (positive) and the down (negative) market periods.

Period	Positive market risk premium $\hat{\gamma}_2$		Negative market risk premium $\hat{\gamma}_3$		Symmetry $H_0: \hat{\gamma}_2 - \hat{\gamma}_3 = 0$	
	T - statistics	p-value	T - statistics	p-value	T - statistics	p-value
Full sample 1995- 2002	0.0376		-0.03082		3.23	0.001
	2.479	0.017	-2.1420	0.036		
Period 1 1995 - 1998	0.053		-0.05891		5.14	0.000
	3.533	0.002	-3.69699	0.001		
Period 2 1999 - 2002	0.018		-0.0056		0.632	0.530
	0.689	0.500	-0.251	0.804		

Table 4: The slope coefficient estimates from the conditional cross-sectional regression $R_{p,t} = \gamma_{0,t} + \gamma_{2,t}D_t\beta_p + \gamma_{3,t}(1 - D_t)\beta_p \varepsilon_{p,t}$ were averaged over the indicated periods. T- statistics and p values are reported for a t-test of the null hypothesis that the mean is zero.

The mean value of $\hat{\gamma}_2$ during the up markets (positive market excess returns) is 3.76% for the full sample, 5.3% for the first sub period and 1.8% for the second sub period. The values for the overall period and the first period are significant at the 0.05 level while the value of the second sub period is insignificant.

The mean value of $\hat{\gamma}_3$ during down markets (negative market excess returns) is -3.08% for the full sample, -5.89% for the first sub period and -0.56% for the second sub period. The values for the overall period and the first period are significant at the 0.05 level, while the value of the second sub period is insignificant.

The results show that there is a statistically significant relation between beta and return only in the first sub period and the full sample period. The coefficient means have the expected signs in the full sample and all the sub periods. Stocks with higher betas have higher returns when the market risk premium is positive and lower returns when the market risk premium is negative. Thus, the results of the conditional test tend to support the prediction of CAPM that betas are related to the realised returns. However, they do not satisfy Pettengill *et al.* (1995) first condition that the excess market returns should be positive on average.

Furthermore, Pettengill *et al.* (1995) argue that the results indicating a systematic conditional relation between beta and returns do not guarantee a positive risk-return trade-off. In order to examine this positive risk-return trade-off, there must be tested whether the risk premium is symmetrical in both up and down markets, i.e., $H_0: \bar{\gamma}_2 - \bar{\gamma}_3 = 0$.

The last column of table 4 reports the results of this test. The hypothesis that the relation between beta and return in up and down market is symmetrical is accepted for the overall

period and the first sub period. This is consistent with Flecher's (1997) and inconsistent with Pettengill's *et al.* (1995) results.

5. Conclusions

The existence of a large number of negative excess market return periods, suggests that previous studies that tested for an unconditional positive correlation between beta and realised returns were biased in finding a systematic relationship. They should have employed the segmentation process of the period under examination in up and down market periods.

The results of the present study, for an unconditional relationship between beta and realised returns, are, as expected, not significant and consistent with the findings of Fama and French (1992) that document, among others, no significant positive relationship between risk and return.

However, when the conditional nature between beta and returns is taken into consideration, the results prove the existence of a statistically significant relation between beta and return: Stocks with higher betas have higher returns, when the market risk premium is positive, and lower returns when the market risk premium is negative. Thus, the results of the conditional test support, partly, the prediction of CAPM that betas are related to the realised returns. Although these results indicate a systematic conditional relation between risk and returns, they do not guarantee a positive risk-return trade-off. For such a positive relation to hold, two conditions are necessary: a) the excess market return should be positive on average, and b) the risk premium in up and down markets should be symmetrical.

Examining the conditions in order to support the conditional relation between risk and realized returns, and guarantee a positive risk return trade –off, we found the following:

- a) Concerning the first sub – period (1995 –1998) conditional relations between realised returns and risk, as well as, symmetry are all statistically significant (table 4). Additionally, the average excess market return is positive (table 2).
- b) Concerning the second sub period (1999 – 2002), there is a conditional relation between realised returns and risk but not statistically significant (table 4). Also, none of the two necessary conditions hold, because symmetry is not statistically significant (table 4), and the average excess market return is negative (table 2). These results are quite logical for the ASE, during this specific period, because of the existence of the “bubble” effect.
- c) Concerning the overall period (1995 –2002), conditional relations between returns and risk, as well as, symmetry, are all statistically significant (table 4). However, the average excess market return is negative (table 2).

In summary, the conclusions drawn from our results tend to support the existence of a conditional CAPM relation between risk and realised return trade-off. However, the support of this relation is not 100% sure, because one of the conditions of Pettengill, i.e., the existence of positive average excess market return, does not hold in the case of ASE during the whole period under examination.

Limitations of the study

The present study has several limitations:

- a) ASE is a relatively small institution with a small number of listed companies. This limitation led to the inclusion of the financial and insurance companies in our sample too, knowing that the expected high leverage in these firms do not have the same value as for the non-financial firms, where it is likely the indicator of financial distress. This limitation also led to the formation of a small number of portfolios (10 in total, instead of 20 or 30). Thus, the small number of portfolios does not give us much confidence in estimating beta coefficients, because of the possible arise of the error in variable (EIV) problem.
- b) In calculating beta coefficients, the existence of high volatility of beta is noticed between different periods. Thus, instead of using only two years' period for the estimation of betas, it should be better to expand this period to four or five years, like in the Fama-MacBeth (1973) two pass methodology.

Further Research

The same research methodology, described in the present study, should be applied to individual stocks of ASE, without the formation of portfolios, and with the exclusion of all financial companies.

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