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The cross-section of Expected Returns Method applied on data from American stocks

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Abstract

Title	The cross-section of Expected Returns Method applied on data from American stocks.
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Keywords	Cross-sectional regression, cross-sectional variation in average returns, Fama & French and Fama & MacBeth regressions.
Purpose	The main purpose of this thesis is to study the impact of a number of independent variables on the cross-section of expected returns on NYSE, ALTERNEXT (formed AMEX) and NASDAQ stocks between 1990 and 2008 in the American market. The analysis is based on methods presented in a number of scientific articles, which will be dealt with below.
Methodology	his study starts with the formation of portfolios by pre-ranked betas of ndividual securities, follow by the calculation of equal weighted ortfolios in order to form post-ranked beta portfolios. Then cross-section egressions are run to study the impact of different independent variables uch as market beta, size, book to market equity, leverage 1, leverage 2 nd earnings to price. We use the Thompson DataStream system to ownload the data needed.
Conclusion	The results of this study show that we did not find any association among average stock returns and any explanatory variable studied in this thesis for the time period 1990 to 2008, which contradicts the paper by Fama and French (1992).

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1. Introduction

The first chapter deals with our choice of subject matter and at the same time it presents the background and the problem specification, which leads to our problem statement and purpose. Under these points we expect to offer to the reader an insight about the main topic and to understand the purpose of this thesis. Further, we will present the limitations of the thesis, the main group that this thesis is suggested for and a disposal of the following chapters.

1.1 Background

During many generations one concern among economists has been the relationship between risk and returns and how this can be measured. This situation has lead economic researchers to carry out a lot of studies, trying to describe the price of stocks, using different variables. One of the most well recognized models is the Capital Asset Pricing Model (CAPM). With the appearance of the CAPM, investors could recognize how to quantify risk and be rewarded for bearing it, which at the same time opened a new door for them to increase their expected returns.

Markowitz (1959) explained CAPM as the investor selection problem, where there is a relation between expected returns and variance returns. *"He showed empirically that investors would prefer a mean-variance efficient portfolio, which means a portfolio with the highest expected returns for a given level of variance"*(Campbell, Lo & Mackinlay, 1997).

Subsequently, Sharper (1964) and Lintner (1965) extended this study to economy-wide statements. These statements follow some assumptions such as investors containing homogeneous expectations and comprising optimal mean-variance efficient portfolios, when there are no market frictions. This situation will give as results a mean-variance efficient portfolio. Sharpe and Lintner studies added the risk free interest rate to the model, which could be used to borrow or lend for an investment in an asset ***i***. The main argument for this model is divided into two statements; the first one is that the expected returns on individual assets are a positive linear function of their market betas and the second one is that market beta could explain the cross-section of expected returns. Although empirical evidence supported it, later studies have shown its limitations. In advance, Black (1972) developed a more general variation of the CAPM approach when we do not have access to borrowing or lending at the risk free interest rate. In this approach we find that the expected returns of asset ***i*** in excess of zero beta returns are linearly associated to its beta (Campbell et al, 1997).

In a paper from 1992, called the Cross-Section of Expected Stock Returns, Fama and French enlarge the basic CAPM model. Together with market betas other variables were included, namely the size of the firm, determined by its market equity, the book to market equity ratio, leverage measured by ratio of assets to book and market equity and finally the price to earnings ratio.

Our thesis will follow the paper by Fama and French (1992). For their regressions the authors used the American stock returns from the years 1963-1990 from three stock exchanges: AMEX, NASDAQ and NYSE, leaving out the companies from the financial sector since they contain different capital structure than companies from other industries.

1.2 Problem specification

During the last decenniums the attention to the expected stock returns method has increased remarkably. This has pointed out the importance of understanding which models are better in explaining the expected returns on securities. As mentioned above, the empirical studies by Sharpe (1964), Lintner (1965) and Black (1972) based on Markowitz's (1959) argument that the market beta can explain the cross-section of market returns, was an interesting subject that Fama & French analyzed in 1992, where they test a number of factors. Their study was based on American stocks by using portfolios to calculate their betas. Their research included stocks from 1963 to 1990. Further, their results were in contrast with earlier results, since they did not find that the basic idea of Sharper, Lintner and Black (SLB) holds. The idea is based on the average stock returns, which are positively related to market betas. This is one of the main reasons why it is interesting to analyze the American stock market. Our sample involves data from 1990 to 2008, in order to analyze if the results still are the same or if they are consistent with SLB and Markowitz main ideas.

Nevertheless, it is important to have in mind that during the first years of this century we have seen wealthy economies in most of the western countries with high conjuncture and high consumptions levels, especially in USA. This has been a special component for triggering this financial crisis, which started in the middle of 2007 and has continued during 2008[1]. The number of financial analysts and investors has increased remarkable during the last years, which have promoted the money trading from individuals to fund professionals. People in the west have become more wealthy and were able to invest more. All these factors together have facilitated for many people to earn fortunes without really understanding many different kind of derivatives, but anyway investing in them. According to Bloomberg, falling stock markets have wiped out 33% of the actual values of the companies, which is around $14, 5 trillion, which have resulted in many companies going to bankruptcy. Further taxpayers have been bailed out from their banks and financial institutions with large amounts of money. Only in the US this amount is around $9, 7 trillion in bailout package and plans[2]. At the same time governments are intervening more into the private sector; which was unthinkable some years ago. As an example, we can

[1] Shah A. ”Global Financial Crisis”
[2] Shah A.“A Crisis in Context”

mention the Bush administration, which offered a $700 billion rescue plan for the US financial system[3].

In advance, we expect that as the earlier financial crisis ended, this one will also come to the end. This will mean an increase of investments in the near future, and an increase of trading in the American stock market. Unfortunately, due to the time constraint we will not be able to analyze this since our data extended only to 2008.

1.3 Problem statement

Does the Cross-section of expected returns method explain the performance of the American stocks?

1.4 Purpose

The main purpose of this thesis is to analyze the relationship between stock returns and six variables: the effect of size, book to market equity, earnings to price, leverage 1 denoted by assets to market equity and assets to book equity, leverage 2 denoted by total debt to market equity and total debt to book equity and post-ranking market beta. Further, we would like to test if these variables are statistically significant and whether the findings of Fama and French (1992) still hold for the new data.

1.5 Limitations

This thesis is based on the return data of American stocks collected from the Thompson DataStream database. Our sample involves stock returns that have their domicile in USA from July 1990 to June 2008. For our purpose we leave out firms that belong to the financial sector since we assume that they are high leveraged in comparison with firms from other sectors. Further, we do not take into account firms that have negative book values, which in our case are very few.

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[3] Shah A. "The Financial Crisis and Wealthy Countries"

1.6 Target group

This thesis is written especially for students of finance, teachers, researches or those who have basic knowledge of statistics. It can even be of interest for financial analysts or investors who are interested in investing in the American stock market, or for those who are interested in learning about the Fama & French approach.

1.7 Disposal

Below, we offer a disposal over all the chapters in this thesis;

Chapter 2 **Theory,** will offer an overview of the theoretical approach we use in this thesis and also present a description of the different reference papers we use for the realization of this thesis.

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Chapter 3 **Methodology,** will present a description of the analytical approach, a description of our data, which will contain the reasons for our choices of markets, data and time period. Thereafter, we will present our data and explain how we form portfolios. Further, under this chapter we will present the criticisms of our data.

⇩

Chapter 4 **Empirical Studies,** will present the descriptive part and the results from it. Thereafter, we will present the diagrams showing the results from our regressions and also two tables showing the results from the cross-sectional regressions.

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Chapter 5 **Analysis,** will apply the theory mentioned in chapter 2 to offer a detailed explanation and an analysis of the results shown in chapter 4.

⇩

Chapter 6 Conclusions, will summarize our results and our conclusions and implications for further research.

2. Theory

In the following chapter we will introduce some relevant theories. First, we want to provide an overview of the stock market. Thereafter, we will present the basic Cross-section regression model, followed by a literature review of previous similar studies.

2.1 Overview of the stock market

The stock market has its start back in the 11th century in Cairo. Fernand Braudel, a French historian, suggested that there lived Muslim and Jewish busisness men, who had established some form of trade transactions such as credit and payments. A similar form is also found in the 12th century in France, which was denoted as *courratiers de change*. This type of people was interested in standardized different forms of debt in the agricultural communities for the benefits of the banks by controlling them. At that time, we can also find the origins of the first brokers, which were men who usually dealt with debt. Further, a more developed form of transactions appeared in the 13th century. These ones were the trading of government securities, which were managed by Venetian banks. This kind of transactions continues in the 14th century and extends to other European cities, such as Pisa, Verona and Geneva, due to the fact that these cities were independent and quite stable at the time[4].

During this time, there existed certain conditions that made it easy for this type of transactions to continue to be alive. These circumstances lead to the Dutches to start with the idea of combined stock exchanges, which led people to purchase shares and become shareholders. Subsequently, around the 17th century the first stock exchange

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[4] Economy Watch, "History of the Stock market"

appears, the Amsterdam Stock Exchange, which was denoted as the Amsterdam Beurs. Since then, many stock exchanges have appeared in different countries which have facilitated the expansion of this kind of transactions around the world[5].

Now, in most developed countries around the world we can find Stock Exchanges, which are open for every person, and this encourages companies to trade and earn money. Furthermore, it is important to mention that among all these Stock Exchange markets, there is a large diversity when it comes to the amount of securities traded and the amount of money. Here, we will mention six that at present are among the biggest stock markets in the world. We find the first one in USA, with the NEW YORK Stock Exchange, which has operated with $21.79 trillion share trades. It is significant to mention that this Stock Exchange is the largest one with an amount of 2,764 listed securities and which holds the second largest amount of securities of all Stock Exchanges in the world. This is one reason why we decided to collect data from firms that belong to this Stock Exchange. This Stock Exchange is followed by NASDAQ which has operated with $11.81 trillion share trades. Additionally, NASDAQ is the major electronic screen of equity securities trading in the American market. This is also one of the Stock Exchanges that we will use for the collection of our data. The third one is The London Stock Exchange with $7.57 trillion share trades. This one is followed by the Tokyo Stock Exchange which has operated with $5.82 trillion share trades and which is the second principal Stock Exchange in the world by market value. In contrast, Tokyo is the fourth Stock Exchange in terms of worth of shares traded. The fifth one is the Euronext which has traded $3.85 trillion share trades. This stock Exchange has its base in Paris, but has its subsidiaries in Belgium, France, Netherlands, Luxembourg, Portugal and the United Kingdom. The last one is the Deutsche Borse, which has operated with $2.74 trillion share trades. Further, it is significant to mention that this Stock Exchange, as different to the other

[5] Economy Watch, "History of the Stock market"

ones mentioned above, works as an operator service supplier and offers the entrance to the global capital markets to firms and investors.[6]

2.2 Regression model

Further, we will illustrate the main model, the Cross-Sectional Regression Model, which we know is of significant importance for the comprehension of this thesis.

2.2.1 Cross-Sectional Regression

As we mentioned earlier there is an additional view of the CAPM, where beta completely describes the cross-sectional variation of expected returns. The first authors to elaborate this methodology were Fama and MacBeth (1973). The main idea of this approach is to predict the returns based on the betas and then combine the estimates in the time dimension for each cross section. This is based on the fact that the betas are known (Campbell et al, 1997). The model looks as follows,

$$Z_t = \gamma_{0t}\iota + \gamma_{1t}\beta_m + n_t$$

where Z_t is the (Nx1) vector of excess assets returns for time period t, ι is a vector of ones, and β_m is the (Nx1) vector of betas. Further, this approach follows two steps; the first one is the calculation by using OLS for each period t, giving the estimates of γ_{ot} and γ_{1t}. The second step follows by analyzing the time series of γ_{ot} and γ_{1t} by using t-statistics. Since the returns follow a normal distribution and are temporally IID in this approach, the estimates of the gammas also get a Gaussian distribution and are IID. (Campbell et al, 1997).

[6] World Federation of Exchanges Industry Association "World's 8 biggest stock exchanges"

Further, in order to get the coefficients from the cross-sectional regressions, the procedure will be to take the average of the coefficients of each regression by using the following calculation;

$$\hat{\gamma}_j = \frac{1}{T}\sum_{t=1}^{T}\hat{\gamma}_{jt}$$

Additionally, this approach aims to test if the coefficients are statistically significant by calculating the t-statistic, with the help of the following calculation;

$$w(\hat{\gamma}_j) = \frac{\hat{\gamma}_j}{\hat{\sigma}_{\gamma j}}$$

where

$$\hat{\sigma}^2_{\gamma j} = \frac{1}{T(T-1)}\sum_{t=1}^{T}(\hat{\gamma}_j - \hat{\gamma}_j)^2$$

Finally, this approach can be modified by adding additional risk measures that could imply an explanatory capability not captured by the betas (Campbell et al, 1997).

If we take a closer look at the formulas above we can understand what drives the significance of the results. First of all, the higher is the absolute value of the coefficient the more significant will be the result. Secondly, the more observations we have the smaller will be the variance hence larger the significance. Finally, larger covariance will decrease the variance and increase the significance. This is why it is important to take out outliers, since they influence adversely the average of the coefficients.

2.3 Previous studies

We will briefly mention earlier studies that are of significance for this thesis. These are exposed below;

2.3.1 The cross section of Expected Stock returns

In their study Fama and French (1992) try to improve the Asset Pricing Model of Sharpe (1964), Lintner (1965) and Black (1972), in order to allow it to explain asset returns over time. Fama and French demonstrated that the three-factor model is more accurate than the CAPM in explaining expected asset returns. Their article takes into account data from 1963 to 1990. They excluded financial firms since they argued that these firms have different capital structures, which mean that these firms belong to the financial sector with high leverage in comparison to non-financial firms. They proceed to take into account data that includes 24 to 60 monthly returns as available prior to July of 1963. In addition, they do not take into account firms that have negative book equity (BE). This is based on the fact that negative BE results from negative earnings. Further, in their article book value (BE) is based by the sum between common equity and deferred taxes.

Further, after collecting their data they proceed to form pre-ranking portfolios betas with help of individual securities. They used portfolios since the estimates of market betas are more accurate for portfolios than for individual securities. In the next step, they calculated the equal-weighted monthly returns for July of the current year (t) to June of the next year (t+1). Then, from the resulting monthly returns they formed the post-ranking portfolios. Among the variables that they included were market beta, the Size effect determined by its market equity (ME), which is the number of stock outstanding times the stock price, Book equity to Market equity, Leverage, which is the difference between A/ME and A/BE and Earnings to price.

The results that they found are the following: BE/ME is stronger in explaining the cross-section returns. They found a January effect; they did not find a relation between beta and the average returns from 1963 to 1990. The main results were that, size and BE/ME can describe the variation in average stock returns.

2.3.2 Size and Book-to-Market factors in Earnings and Returns

Fama and French (1995) enlarge their previous studies from 1992 and 1993 to empirically test if factors such as Size and BE/ME could have value for sensing common risk factors in returns. This statement holds if stocks are rationally priced. By rationally priced it is meant that (i) There must exist common risk factor in returns associated with size and BE/ME and (ii) the size and book to market must be explained by the performance of the earnings of the firms. Their data is extracted from the Center for Research in Security Prices (CRSP) at the University of Chicago and is extended from 1963 to 1992 from the New York Stock Exchange. Their main purpose was to find a central relationship between average stock returns and size and average return and BE/ME respectively.

The authors find evidence of the two conditions mentioned above and the relation between these and profitability, which is illustrated below,

1. Firms with high BE/ME have a propensity to be distressed. However, firms with low BE/ME have a tendency to have persistent profitability.
2. The variable size is also associated to profitability, since when Fama and French found that the size effect in earnings is quite big for small stocks, because of those low profits of these ones after 1980. Before 1980, there is not much evidence of the size effect. Under this variable, they observed that the recession of the years 81 and 82 extended the time of the poor earnings for these stocks.
3. They found empirical results about profitability and earnings to price ratios associated with the other two variables mentioned above, which is due to the fact the stock prices must be rationally priced.

2.3.3 An Unconditional Asset pricing test and the role of firm Size as an Instrumental Variable for Risk

Chan and Chen (1988) developed a linear relationship between the unrestricted beta and the unrestricted expected returns under certain stationary assumptions about the stochastic process of size portfolio beta. Their data contain monthly returns and firms-size data from the Center for Research in Security Prices (CRSP) database, from January 1949 to December 1983. One requirement is that firms from NYSE must contain data from at least five years prior to the current year and that there must be available price information for December of the previous year. The variables to estimates are the following; (i) equally weighted previous share price inverse, (ii) yield of Baa bonds, (iii) T-.bill rate, (iv) long term government bond yield and (v) equally weighted NYSE index returns over the past two years. They found that their results were the same as earlier studies.

Their study is based on the size-ranked portfolio betas, which the authors assumed to be stationary under the time horizon. Since the volatility of the returns was significantly higher during the second world than after it, the authors decided to divide the data into two separate time segments. The first segment includes data from 1926 to 1948, and the second includes their empirical study from 1949 to 1983.
First, the authors proceed to estimate the betas with the equally weighted NYSE market index. Then, they conducted cross sectional regressions of the post ranking returns of the portfolios on the calculated betas, from 1954 to 1983, by using the GLS procedure, which captures the heteroscedasticity of the residuals.

Further, they also showed how to correct the standard approach for the errors-in-variables problem, to observe the firm size effect. They must use at most 60 monthly returns for the calculation of beta; otherwise this effect seems to disappear. Other important result is that among the size ranked portfolios the log of this variable cannot explain the cross-sectional returns after calculating the unrestricted equally weighted market beta.

2.3.4 Risk, Return and Equilibrium: empirical tests

Fama and MacBeth (1973) explore the relationship between average stock return and the risk measured by security beta, using a two-parameter model. This paper is of interest to us, because Fama and French (1992) used Fama and MacBeth (1973) regressions.

Fama and MacBeth test the two-parameter model, which is nothing else than a CAPM equation using a stochastic model for the returns:

$$\tilde{R}_{it} = \tilde{\gamma}_{ot} + \tilde{\gamma}_{1t}\beta_i + \tilde{\gamma}_{2t}\beta_i^2 + \tilde{\gamma}_{3t}s_i + \tilde{\eta}_{it}.$$

Note that:

1. Linearity of the relationship between the risk and the return of securities for any efficient portfolio. This is tested using the coefficient $\tilde{\gamma}_{2t}$; E($\tilde{\gamma}_{2t}$) = 0 if the linearity is present.

2. The beta of the stock is a complete measure of its risk. This implication is tested by the coefficient $\tilde{\gamma}_{3t}$, which is applied to another variable s_i that represents other risk not captured by β_i. Again for the suggestion to hold we must have E($\tilde{\gamma}_{3t}$) = 0.

3. Higher risk is associated with higher expected returns. This is tested by the coefficient $\tilde{\gamma}_{1t}$, which gives the slope (E[R_m]- E[R_{om}]) of the two-parameter equation. If the implication holds it must be positive.

The regression is recalculated monthly for each of the formed portfolios throughout the testing period. The tests for the coefficients are performed using t-statistic. Their tests do not reject the null hypothesis mentioned above.

An important application from their paper is that instead of using individual $\hat{\beta}_i$ estimates for the regression, they used $\hat{\beta}_p$ estimates for portfolios of stocks. This is done to avoid the problem of "errors-in-variables", because the estimates of betas are used, not the true betas. $\hat{\beta}_p$'s of portfolios are much more precise estimates of the true beta's then $\hat{\beta}_i$'s of individual securities. In our thesis we follow this method of forming portfolios of stocks. $\hat{\beta}_p$ of a portfolio is found by taking an average of the individual $\hat{\beta}_i$ of securities in a portfolio.

Another important data-collection criteria, used in the paper is that securities to be included in portfolios should trade for at least five years prior to the estimation period, and during the estimation period.

2.3.5 Size, Book to Market and Momentum Effects in the Australian Stock Market

This study written by Konstantinos Kassimatis (2008) is one of the most recent papers, which follows Fama and French approach in explaining the portfolio returns for the Australian stock market. Kassimatis uses Fama-French three factor model and complements it with a momentum factor. He finds that size, BM and less importantly momentum are statistically significant in explaining the Australian stock returns if static factor loadings are assumed. However, if unconditional time variation is included in the model BM and the momentum factor become insignificant and size is only significant for a few portfolios. In addition, he presents evidence, which is found in many papers recently, that traditional CAPM does not explain stock returns. Kassimatis finds that his four-factor model works much better.

2.3.6 On the Explanatory Power of Firm-Specific Variables in Cross-Sections of Expected Returns

Zhang (2008) investigates the criticism of Fama-French findings, whether two variables: size and BM capture the sensitivity of stock returns in relation with unobserved systematic risk or not. Zhang uses principal component analysis and shows that principal component factors extracted for individual stocks are not strongly correlated with the size and book to market variables. However, for portfolios principal component factors indeed show that size and BM are important variables for explaining stock returns. An explanation of this is that size and BM effects are not significant for individual stock returns, because there are many individual firm factors that are much more important. However, they disappear when taking portfolios of stocks.

2.3.7 Firm Characteristics, Relative Efficiency, and Equity Returns

This paper is based on finding the effectiveness of a firm by taking into account some firm's characteristics. Nguyen G.X. and Swanson P.E. investigate two different methodologies to find the efficiency of the firms. The first one is The Fama–French and Carhart model from 1997. The second one is Daniel, Grinblatt, Titman, and Wermers model from 1997. The first model is also known as the four factor model, which is an extension of The Fama – French three factor model from 1993. Further, the four factor model goes out by stating that the additional profits from a portfolio are the results of the sum of the risk-free asset and the outcome of the betas with the risk-premia variables. The model looks as follows;

$$E_{RP} = \alpha + \beta[RMRF] + s[SMB] + h[HML] + m[UMD] + \varepsilon_p$$

where E_{RP} is the expected return of portfolio *p*; RMRF is the risk premium of the market; SMB is the size premium; HML is the value premium; and UMD is the momentum factor. The last one is the differentiation between the profit on a portfolio which contains high-return stocks from the previous year and the profit on a portfolio which contains low-return stocks from the previous year. The four-factor model will produce the Jensen's alpha at the same time as this model controls for the covariance of portfolio returns with the different explanatory variables such as market return and size, B/M, and momentum factors.

Further, the second approach criticizes Fama-French approach because according to them this model is deficient in explaining the excess stock returns when it comes to firms characteristics. In contrast, the second approach is stronger statistically in explaining the excess returns associated to firms' characteristics than the combined risk premia factors. Because of that, the authors used the second approach from Daniel, Grinblatt, Titman, and Wermers (1997).

The authors analyze the relationship between firm level effectiveness, Size, book to market and the average stock returns. This analysis takes place by running cross-sectional regression on monthly returns. It is important to notice that the parameters estimated here are the time series averages of the cross-sectional regression slopes of the monthly returns. These are regressed against the explanatory variables Size, book to market. This methodology is in line with Fama and French approach from 1992. Further it is important to note that in this paper the authors choose not to include beta in the analysis, in view of the fact that previous studies have shown that beta has no statistic significance, projecting an influence on returns when size and B/M are present. This could also be observed in Fama and French (1992)

In conclusion, the authors found a significant indicator that the level of a firm effectiveness plays a significant roll determining the stock returns of a company and it should be integrated into the asset pricing models.

2.3.8 Portfolio Theory: A Step toward Its Practical Application

In this paper Blume (1970) deals with the problem of errors in variables by including it in the perspective of portfolios. He explained the procedure by pointing out that if investors estimated some variables, which were unbiased and the residuals in these estimations were independent among different assets. Then, the doubts involved into these estimations weighted average would have a tendency to become smaller. Blume states that the larger the number of assets in the portfolios, the smaller the percentage of this problem in each assets. This will result in that the errors in the estimation of the variables would tend to offset each other. For this manner, the author used data comprising 204 monthly investments relatives for each of 251 securities from 1944 to 1960. Further, he measures the project distributions for July 1951 by running regressions of the monthly investment relative number 102 from January 1944 to June 1951 against the equivalent market relatives. For this procedure the authors used the least squares regression.

Finally, the main empirical results of this paper involve the essential importance of the choice of a particular method for estimation of future performance or projecting distributions of future returns of portfolios using historical data have for the findings of accurate estimations.

2.3.9 The Errors-in-variables Problem in the Cross-Section of Expected Stock Returns

This paper also deals with the errors in variables approach. Dongcheol (1995) studied this approach, which arises from the underestimation of beta and the overestimation of the other cross sectional coefficients. However, there have been several methods that try to deal with this issue and which are mentioned in this paper, such as Litzenberger and Ramaswamy studied this approach in their paper from 1979, where their correction involved a weighted least squares. Another one was Shanken, who adjusted the traditional two pass estimation within a multifactor model in his paper from 1972. He also displayed a modification of the standards errors of the Cross-sectional regression estimators with a multifactor interpretation. Another one who tries to correct for this approach is Gibbons in his paper from 1982, where he applied the maximum likelihood approach to eliminate the errors in variables problem by concurrently estimating betas and the betas risk prices.

Nevertheless, the author Dongcheol K. arrived with a new approach applying to the independent variables market beta and size against the average stock returns. This procedure is based on the maximum likelihood under the assumption of homoscedasticity or heteroscedasticity of the error terms of the market model. It is important to notice that this procedure is more adaptable when it comes to individual stocks than portfolios. Since the formation of portfolios for the cross-sectional regressions can have the effect that large valuable information about individual assets would be lost.

Finally, the author found that after applying this approach to his data, market beta becomes statistically significant in explaining the average stock returns while size looses significance. These results are the same when size is present or not. The author concludes that Fama and French (1992) results are not correct since they do not correct properly for errors-in-variable approach.

2.3.10 Cross-sectional analysis of Swedish stock returns with time-varying beta: the Swedish stock market 1983-1996

The authors Asgharian and Hansson (2000) based their article on the Fama and French (1992) method and test Swedish stocks whether their returns can be described by the FF factors. In addition, this paper presents a way to improve the econometrical approach used for cross-sectional regression models. In the paper by Fama and French, the authors assume constant betas throughout the whole period. However, betas may change as the economic conditions change, or when the internal structure of a company changes. Later studies used rolling-beta to correct for this. The unconditional beta is calculated as follows:

$$R_{i\tau} = \alpha_{it} + \beta_{it} R_{m\tau} + e_{i\tau} \qquad \tau = t-36,\ldots,t-1$$

$$\mathrm{cov}(e_{i\tau}, e_{j\tau}) = 0 \qquad \text{for } i \neq j$$

$$= s_{it}^{2} \qquad \text{for i = j}$$

Nevertheless, this still assumes that betas are constant over the estimation period. Asgharian and Hansson improve this by using a bivariate GARCH(1,1) model for the conditional beta estimation.

Asgharian and Hansson check the performance of this beta versus the performance of unconditional beta and find that their beta is a superior measure.

In order to correct for possible heteroscedasticity and correlation in their data, authors use WLS method as it is more efficient then the OLS. They apply WLS instead of GLS as it is not practical to apply GLS for a big dataset.

Authors also point out that Fama & MacBeth approach of forming portfolios only decreases the errors in variables for the estimated market betas but does not eliminate it. They correct both conditional and unconditional beta estimates to get rid of this problem. However, the formulas used for correction are too complex and will not be presented in this brief overview.

For the dataset, Asgharian and Hansson use a similar approach to Fama & French, where they start monthly regressions from July of year t and take the accounting variables, e.g. earnings to price from the end of fiscal year t-1. However, unlike the Fama & French paper from 1992, they take lagged monthly beta and market equity.

In their findings they show that size and beta are not significantly priced in the Swedish market over their estimation period. However, they find a significant positive coefficient for Book to Market ratio and a highly significant negative leverage coefficient. In addition, the authors find a close dependence between risk premium for beta and size and book to market. These variables must be included together to avoid a possible statistical bias in the estimated market beta coefficient.

2.3.11 Conditioning Variables and the Cross Section of Stock Returns

Ferson and Harvey (1999) test the empirical performance of the Fama and French three factor model. This model includes following explanatory variables: return on the market portfolio, portfolio long in high book to market and short in low book to market stocks (HML) and portfolio long in small firms and short in large firms (SMB).

The authors find that lagged economy-wide instruments, used as proxies for time-variation in expected returns are also important cross-sectional predictors. Their lagged instrumental variables are: the difference between monthly returns for tree-month and one-month treasury bill, the dividend yield of S&P500 index, the spread between Moody's Baa and Aaa corporate bond yields, the difference between ten-year and one-year treasury bond yield. Their results show that size and book to market ratio are not sufficient to explain the expected returns, as they leave out important cross-sectional information. Hence this provides a ground for Ferson and Harvey to make a strong rejection of the Fama & French model. Ferson and Harvey also give evidence that market betas should be allowed to have time-variation, which goes against the assumption of Fama & French (1992) paper that market betas are constant over time.

In addition, the authors point out that cross-sectional data for stock returns is likely to be heteroscedastic and have correlation errors. Ferson & Harvey improve the method used by Fama & French to avoid these problems. Ferson & Harvey apply GLS and take weighted average of the time-series coefficients, where monthly coefficients with higher variance are given less weight.

3. Method

This chapter describes the analytical and the quantitative approach, the chosen software, the sample population, the overview of the methodology, which will contain the reasons for our choices of markets, data and time period. Thereafter, we present our variables, the statistical applications of our data and explain how we form portfolios. In the last section we discuss the quality of our data.

3.1 Analytical approach

The chosen analytical approach will follow two methodologies: one descriptive and one deductive. The first one is based on the description and explanation of the selected method that we have in the studied subject. This statement is due to the fact that we use terms that we already have knowledge of (Eriksson & Wiedersheim-Paul, 2006). The second one aims at coming up with specific suggestions and ideas based on general descriptions from the theory part, which is applied to the data (Bryman & Bell, 2007).

3.2 Quantitative approach

We must have in mind that there is an implicit difference between a quantitative and a qualitative approach. In the area of finance we are regularly interested in analyzing a quantitative approach (Westerlund, 2005). In our case, we are dealing with a quantitative approach, which is frequently used in finance, economics researches and so on. This kind of approach helps the researcher to judge which variables are those that could describe or analyze a special phenomenon in the studied area. This can take place via the testing of hypotheses, which is the next step after the collection of the sample data. (Lundahl & Skärvad, 1999).

3.3 Software

We have decided to use Microsoft Excel and EViews for the treatment of our material. These two programs helped us with both the descriptive part and the statistical part. First, we run the regressions for each explanatory variable and then we proceed to run different combinations of them. This was done in order to observe any associations between firm returns and our explanatory variables.

3.4 Sample Population

We will follow the approach adopted by many studies after Fama and French (1992), e.g. Kassimatis (2008), when we leave out the financial firms, such as banks and insurance companies from our data sample. This judgment is based on the different capital structure that these firms usually have in comparison with the non-financial firms.

Further, we have decided to modify the approach of Fama and French to suit our time constraints. Instead of taking the whole population of the stocks from the three exchange markets, we start by taking a random sample of 400 stocks for each year of our time period. However, after taking this sample we deleted some companies, as DataStream does not contain needed information for them. Hence, we end up with fewer companies for each period. This sample is sufficiently large in statistical terms to give a good estimation of the constants for the population in relation with the regression variables.

3.5 Overview of the method

We collect the data from Thompson DataStream for the period of 30/06/1985 to 30/06/2008. Our regressions start 01/07/1990. However, we use data from the previous five years to estimate beta and to make sure that the security was traded five years before the regression period. Due to our time and software constraints we decided to choose a random sample of 400 firms from the three US exchange markets: ALTERNEXT (former AMEX), NYSE and NASDAQ. Further, we make a new random sample of firms for each period of 12 months, when portfolios are reformed. This ensures that our sample portraits an accurate estimate of the markets. We decided not to take the same firms for all the periods, because then we might have a bias, as those firms would be well performing throughout the whole 17-year period. While with our approach, we have some firms that were delisted from the stock exchange in the later periods.

We form the portfolios, following the Fama and French (1992) approach. First we sort stocks by market equity (size) and create four quartiles. Next we sort stocks by the pre-ranking individual betas to form four portfolios inside each quartile to allow for the variation in betas. Afterwards the equal-weighted returns of formed size-beta portfolios are calculated for each of the years. Then, we calculate post-ranking portfolios betas using the whole period, from 01/07/1990 to 01/06/2008. We assign the post-ranking betas to all individual stocks in the corresponding portfolios. Finally we make monthly regressions with yearly returns as dependent variable and yearly independent variables:

1. Post-ranking beta. (which comes from the portfolios)
2. Size, measured by market equity.
3. Book equity to market equity ratio.
4. Leverage 1, measured by assets to market equity, assets to book equity.
5. Leverage 2, measured by total debt to market equity and total debt to book equity.
6. Earnings to price ratio

Then we proceed to take an average of the obtained monthly regression coefficients and calculate their t-values. The t-values are calculated by dividing the average of the coefficients by the standard error of the coefficients. The formulas for this were presented in the theory part of this paper.

To complement our method, we decided to run three more combinations of cross-sectional regressions, with monthly returns of individual stocks with the most important variables: post-ranking beta, market equity and book to market. We do only three combinations of this type due to time constraints. Finally, we took 9000 firms from NASDAQ, NYSE and ALTERNEXT and made a cross-sectional regression using monthly returns vs. monthly market equity. This will be presented in more detail in the empirical part of the thesis. The remainder of this chapter will explain the methodology in more detail.

3.6 Variables

Here, we follow selection criteria. This means that our data must fulfill some requirements; the first one is that firms must have stock prices for December of the previous year (t-1) and for June of the current year (t). The second is that our data requires at most 60 months returns prior to July of the current year (t), in order to calculate the pre-ranking betas. The third one is that firms must have positive book value otherwise they will not be taking into consideration. This is based on the fact that negative BE are results of negative earnings. However, we do not expect many companies to contain negative BE in our sample data.

This part explains specifically how we work with our variables and how we calculate them.

- **Stock returns.** We obtain time-series data of the monthly stock prices and dividends. Following the approach of Kassimatis (2008) we get the data for annual dividends equally spread over the months throughout the year. This is done in order to smooth the monthly returns. Then, we simply add the monthly stock price to the dividends. Further, we take a natural logarithm of the ratio of t and t-1 monthly prices to obtain monthly stock returns.

$$r_t = \ln\left(\frac{P_t + D_t}{P_{t-1}}\right)$$

Finally to find annual returns, we take the average of the monthly returns and multiply it by 12.

- **Market beta.** As it was done in the study by Chan and Chen (1988) where they showed that in order to correct the standard approach of the errors-in-variables problem, and to observe the firm size effect. We must use at least 60 monthly returns prior to the portfolio formation period for estimating the beta; otherwise this effect seems to disappear. For the proxy for the U.S. stock market we take the Dow Jones U.S. Total Stock Market Index^{SM}, which measures all American equity securities. Then, we proceed to take monthly log returns of the index and apply the following formula to calculate the market beta for the individual stocks from our sample:

$$\beta = \frac{Cov(R_m, R_t)}{Var(R_m)}$$

- **Size, Market equity (ME),** this data is in millions of dollars and is directly taken off the DataStream. Further, we changed it to thousands in order to match to the rest of our data that is in thousands.
- **Book equity (BE),** to calculate the book equity we follow Fama and French (1992) and take common equity plus deferred taxes.
- **Leverage 1,** measured by;
    - **Assets to market equity,** here we take the natural logarithm of total assets divided by the market equity. Both values come from t-1.
    - **Assets to book equity,** here we take the natural logarithm of total assets divided by the book equity. Both values come from t-1.

For the calculation of these variables we follow the same approach from Fama and French (1992).

- **Leverage 2,** measured by;
  - **Total debt to market equity**, here we take into account total debt, which includes long term debt and short term debt divided with market equity. These values belong to the year t-1.
  - **Total debt to book equity**, here we take into account the same measure for total debt as mentioned above, this divided by book equity. These values belong to the year t-1.

  We decided to complement the two variables used by Fama and French to proxy the leverage with an additional one.
- **Earnings to price ratio,** To calculate earnings we follow Fama and French (1992) approach and take net income before preferred dividends plus deferred taxes minus extraordinary items**,** while stock prices are directly taken off the DataStream.

We must make an important note on the timing of the variables used. In this paper it is done in the same way as in Fama and French (1992). We form yearly portfolios from 1st of July year *t* to 31 June year *t+1*. This is done to ensure that all accounting data is known before the returns are used, as some US companies do not comply with the 90-day rule to present their reports on 31st of March. To form the portfolios we use the ME and the market beta for the 1st of July year *t*. However, for all the accounting variables, such as book equity and assets we use the data of the fiscal year end, 31st December year t-1. For example, to form the portfolio for the period 01/07/1990 – 31/06/1991 we use the ME of the companies for 30/06/1990; the market beta calculated over the period of 30/06/1986 to 30/06/1990, all the accounting data is annual, taken for the fiscal year of 1989.

3.7 Portfolio formation

We form our portfolios in the following manner. First we order the stocks by their market equity. Then we use the approach of Fama and MacBeth (1973) if we have an even amount of stocks the middle two quartiles have int(N/4) securities, then first and the last quartile has int(N/4) + ½[N-4int(N/4)] securities. In case off the odd amount of stocks, the last quartile gets additional stock. Then we form portfolios in each quartile according to their individual beta's. So again we split it into four quartiles using the above approach. In total we get 16 portfolios. Then portfolios are reformed for every year in this way.

3.8 Statistical applications

In our thesis we will use regression methods such as the Ordinary Least Squares method (OLS) in the form of:

$$y_t = \alpha + \beta X_t + u_t$$

Where α is a scalar y-intercept, β is an 1*n vector of coefficients, X_t is an n*1 vector of regression variables and u_t is a scalar random error term with $E(u_t)=0$ and $V(u_t)=\sigma^2$.

If certain assumptions hold, then the OLS estimator will have attractive properties, called Best Linear Unbiased Estimators (BLUE):

1. The estimated coefficients of the regression, $\hat{\alpha}$ and $\hat{\beta}$ are estimates of the true values of α and β
2. The estimates $\hat{\alpha}$ and $\hat{\beta}$ are linear functions of the observations.
3. The estimates $\hat{\alpha}$ and $\hat{\beta}$ are unbiased, which means that $E(\hat{\alpha}) = \alpha$ and $E(\hat{\beta}) = \beta$
4. The estimate $\hat{\beta}$ has minimum variance among all other unbiased linear estimators.
5. The estimates $\hat{\alpha}$ and $\hat{\beta}$ are consistent, i.e. when the sample size approach infinity the difference between the true value and the estimate will converge to zero.

Now, we will discuss the assumptions that are needed to be fulfilled for the OLS to be BLUE.

1. $E(u_t) = 0$. This assumption cannot be violated when we have a constant term - α.

2. $Var(u_t) = \sigma^2 < \infty$.This is the assumption of homescedasticity. If the variance of the error terms is not constant then we have heteroscedasticity. When the errors are heteroscedastic the OLS estimator will still be consistent and unbiased, but the estimated coefficients will not have the smallest variance among the class of unbiased estimators. The standard errors could be misleading; and thus also the corresponding t-statistics. We used the White's (1980) general test for heteroscedasticity, to see if our data are heteroscedastic. We find that this is indeed the case. This is why we apply the method developed by Fama and MacBeth when we calculate the t-statistic only based on the coefficient estimates which are unbiased even in the presence of heteroscedasticity.

3. $Cov(u_i,u_j) = 0$ for $i \neq j$. This is the assumption of errors being uncorrelated with each other over time. However, for our data autocorrelation problem should be limited, because the composition of stocks that we use for regressions changes every twelve periods.

4. Non-stochastic regression variables – x_t. Following the assumption of Fama and MacBeth (1972) we assume that disturbance term – u_t is independent of any other variables.

5. $u_t \sim N(0,\sigma^2)$. This is the assumption of normal distribution of the error terms. (Brooks C., 2008).

3.8.1 Multicollinearity

A tacit implication that is assumed when OLS estimation is performed is the absence of multicollinearity, which is based on the fact that independent variables should be uncorrelated with each other. If this statement is encountered, we are dealing with variables that are orthogonal to each other. This means that if we include or remove one or more variables from the regression this will not affect the values of the coefficients. On the other hand, if this statement is not encountered we are dealing with independent variables that are correlated with each other; we are dealing with multicollinearity (Brooks C., 2008).

Further, we find two types of multicollinearity, which are (i) perfect and (ii) near. The first one is when an independent variable is used more than once in a regression. The second one, which is more common, is when there exists a correlation between two or more than two independent variables, which maybe in some cases are not so high and could be ignored. The best way to detect if there is some near multicollinearity among the independent variables is to study the correlation matrix and see if there are any variables that are correlated with each other. A good measure should be not to tolerate variables that are correlated with each other with a value of 80 percentages or more (Brooks C., 2008).

In order to deal with this problem Brooks recommended some solutions that could be applied to reduce this problem or eliminate it.

- **Ignore it**, if we are dealing with a model that is passable, which means that the obtained coefficients and t values are appropriate, we can state that the presence of near multicollinearity does not affect our results.
- **Drop one of the collinear variables**, which will reduce the problem. This might be a very drastic solution if there is a special reason to have the variable in the regression.
- **Transform the highly correlated variables into a ratio and include only the ratio and not the individual variable in the regression**, which will reduce the problem. It might be wrong if the ratio does not play a significant role in the study and does not explain the dependent variable.

3.8.2 Portfolio Approach for minimizing Errors-in-variables

Another possible statistical problem is the errors in variable for the market beta, since it is estimated, not observed. Errors-in-variables, occurs when a variable used in regression has errors not only for the y-axis, but also for the x-axis. We follow Fama and MacBeth (1973) approach to minimize this problem by estimating the market beta using portfolios and taking their beta average over time. A simplified explanation of this method is the following. According to Central Limit Theorem "*the average of data observed over time tends to be distributed as a normal distribution*"[7]. Since we take the average stock returns for portfolios to calculate their monthly beta and we have a sufficiently large period of 216 month we can assume that errors for the market beta will be close to zero. Therefore, when we run the regressions using stock returns as dependent variable and market beta as independent the beta values have errors decreased for the x-axis.

3.8.3 Stationarity

This is a statistical approach that should be taken into account when it comes to performing regressions. Stationarity plays an important role since the data that ia not stationary must be treated differently from that data which is truly stationary. Otherwise a non stationary data could lead to spurious regressions, which means that two variables could still show a relationship with each other and have a high adjusted R^2, but still do not have any association to each other (Brooks C., 2008).

However, in this thesis we do not perform any test for stationarity, due to the fact that we comprise a large amount of data and due also to the time constraint. On the other side, Chan and Chen made some implications in their paper from 1988, where they assumed that their expected returns are stationary, which gives a stochastic process of size portfolio beta. This is a common assumption that many others researches have done, when they run this kind of method which contains a large

[7] Business Dictionary , "Central Limit Theorem"

amount of data. Finally, we also decided to assume that our expected returns and the data of our variables are assumed to be stationary.

3.9 Data Criticisms

We suspect that the DataStream selection might be biased and could have influenced our results, since for our sample we only took companies that have all the data for our variables available. For many companies some of the variables are not available in DataStream, and we do not know on which grounds the software presents company information or not.

Another criticism against our data is that we do not have as many companies for our regressions as Fama and French have in their paper 1992. Unfortunately, we did not have the time and software ability to handle such massive data samples. However, in order to observe if this could be a reason for criticism, we download data for one regression combination (monthly returns versus monthly ln(ME)), where we took a much larger sample than for the other regression combinations. Nevertheless, the results seem to be the same.

4. Empirical Studies

This chapter will present the descriptive part and its results. Thereafter, we will present the diagrams showing the results from our regressions and also two tables showing the results from the cross-sectional regressions.

4.1 Descriptive data

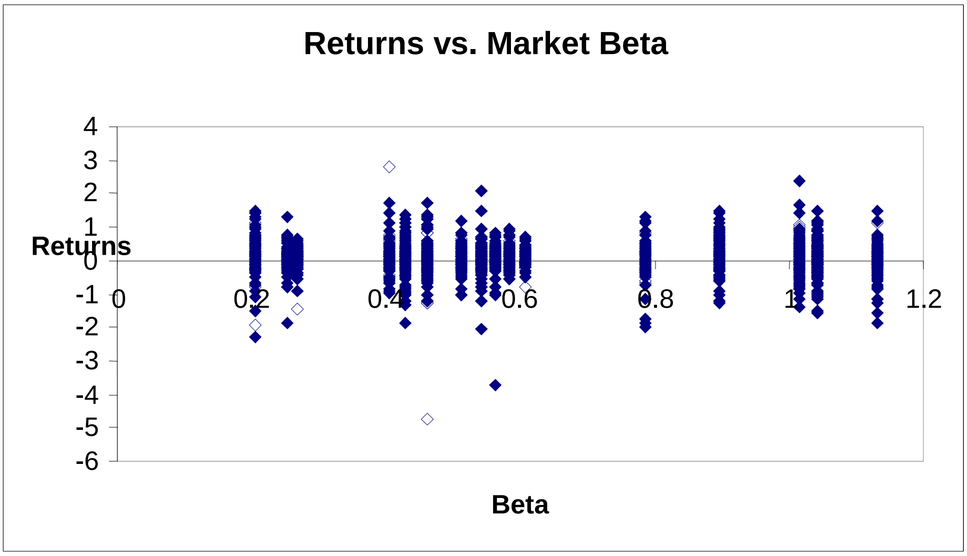
Below in the appendix section, we present the tables that contain our descriptive data, which comes from the data used for the performing of the yearly regressions. These tables show the mean, the standard deviation, the maximum and the minimum value of each variable for each year. This was done to observe the variation that exists in our collected data among these firms and also to identify any outliers that we might have.

Further, from these tables we observed that for the years 1995-1996 the data for the variables ln(A/ME) and ln(A/BE) contains a maximum value equal to 40,69 and 97,26 respectively which are considered as outliers. The same situation occurs in 2001-2002 but this time with the variable Debt/BE with 77,32. This could also be observed in 2003-2004 where Debt/BE has a maximum value of 42,83, while under 2007-2008 this value has a remarkable number of 137,34. We proceed to take out these values out of our regressions.

4.2 Diagrams

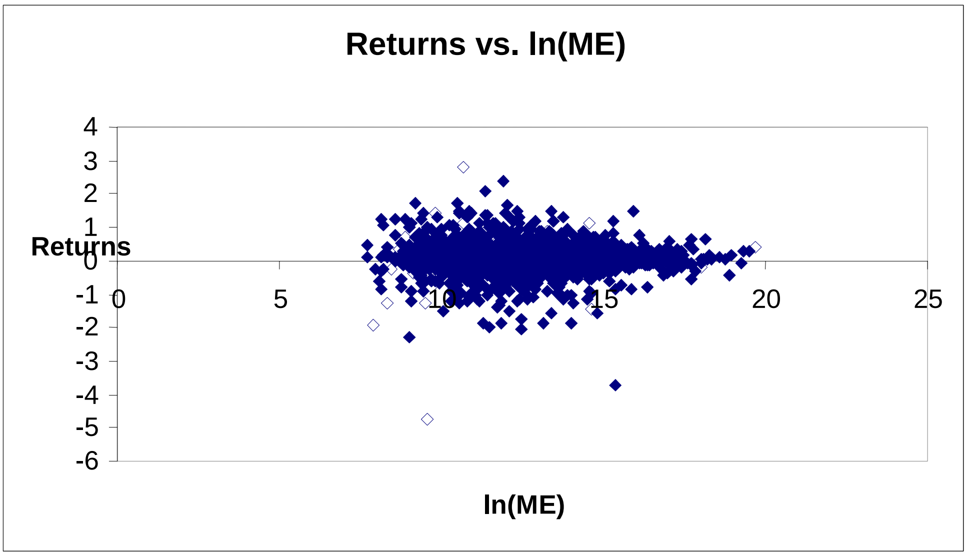
In this section, we present the graphs based on the yearly data. We plotted our returns against individual variables with the exception of leverage, since leverage 1 and leverage 2 contain two variables. These graphs exhibit if there is any relationship between the stock returns and each variable, and if this could be seen directly. These plots correspond to yearly data of individual companies. We have used our total sample of 2041 companies over the 18 years to plot these graphs.

Graph 1.



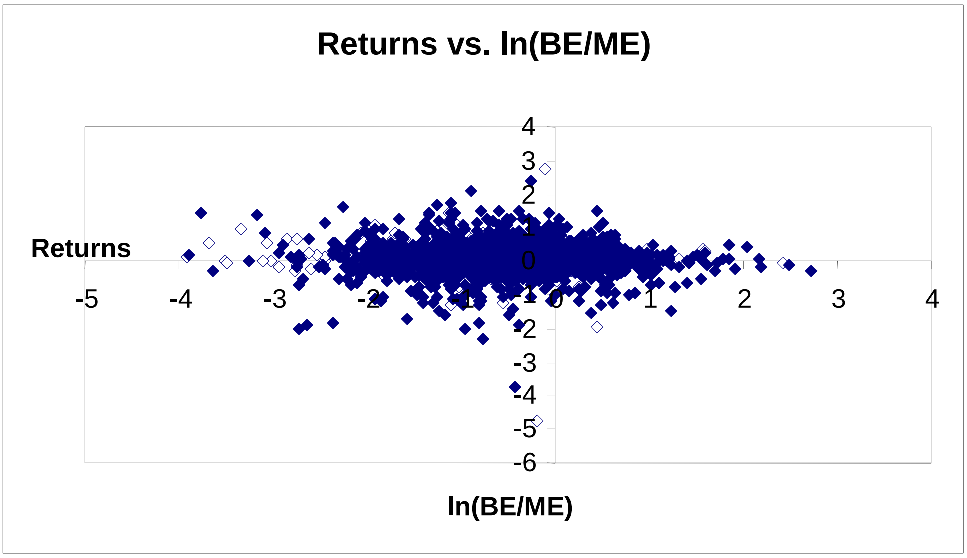
In this graph we can clearly see that we have 16 fixed betas, which were formed using portfolios and then assigned to individual stocks. We can also see that the returns are quite equally dispersed between positive and negative. However we cannot see any clear patterns between betas and returns.

Graph 2.



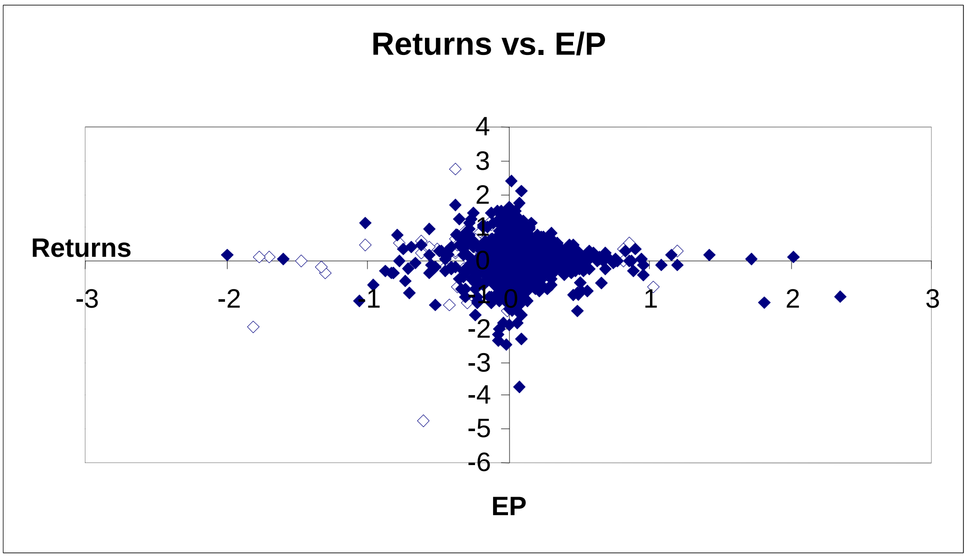
This graph shows the scattered-plot of returns against size, measured as ln(ME). If we would draw a line of best fit through these points it would pass somewhere through zero. And later we obtained similar results from the cross-sectional regressions. In addition we can see that our sample of firms is scattered on the left side, the lower market equity, meaning that we have more relatively small firms than big.

Graph 3.



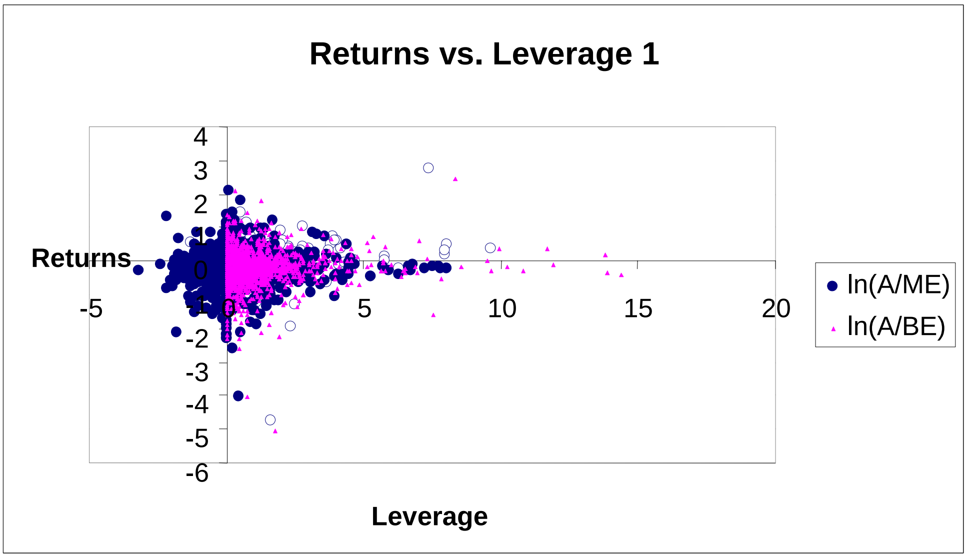
This graph shows the relationship between returns and natural logarithm of book to market ratio. High book to market ratio is a signal of financial distress, usually meaning that the price of shares have dropped, hence pushing the market equity of the firm down. We can see that our sample contains less firms with book equity larger then market equity (ln[BE/ME]>0), hence we can conclude that our sample mostly contains healthy firms. According to the evidence presented by Fama & French (1992) the slope of this regression should be positive, however we cannot see any clear relation.

Graph 4.



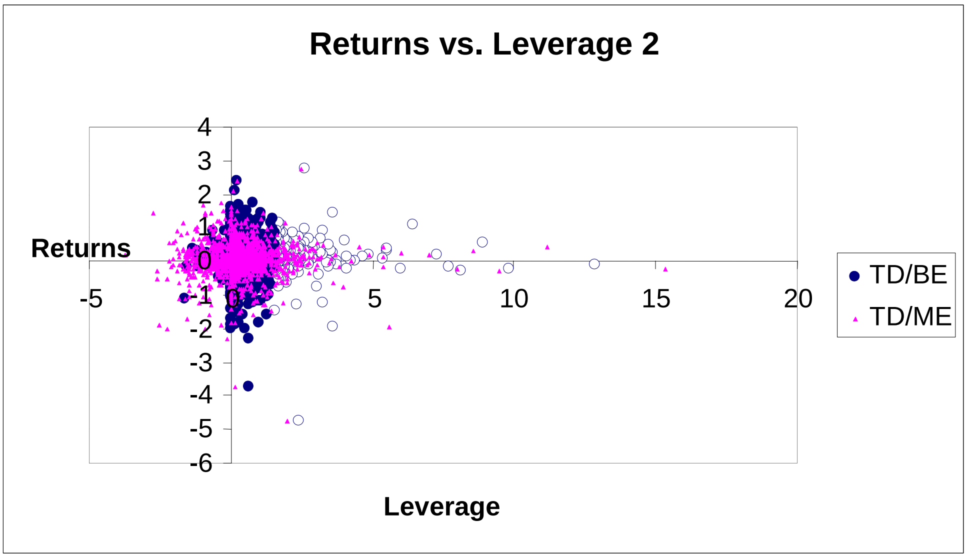
This graph shows the plot of returns versus earning to price ratio. High earnings are associated with high risk, so the market price of shares will be lower and the E/P would be higher. This logic however can only be applied to positive E/P ratio. We can see that in our sample the returns have most variance around lower earnings to price ratio.

Graph 5.



This graph shows returns plotted against two variables of Leverage 1. A/ME shows a measure of market leverage, and A/BE a measure of book leverage. High ratios show high leverage as Assets are less backed up by the equity and hence more with the debt. We can see that returns have the highest variance around 0 leverage, which is quite strange, because leverage should add to risk and hence variance of returns. An interesting fact we can see from this graph is that for our data after ln(A/ME) and ln(A/BE) > 5 the returns tend to be mostly positive.

Graph 6.



This graph shows the relationship between returns and a variable that we decided to add to complement the Fama & French variables. As we can see it looks very similar to Graph 5.

4.3 Multicollinearity test

Before performing the cross-sectional regressions, we decided to test for multicollinearity, which could be observed by constructing a correlation matrix with the independent variables included in the equations and then observe which variables are correlated with each other. We compute correlation matrices for each year, each one containing the total number of variables. In year 1990 we can observe from Table 21 that the variables ln(A/ME) and ln(A/BE) are highly correlated with debt/ME and debt/BE, respectively. This is the reason why we do not perform regressions which have such variables together in order to eliminate multicollinearity.

Additionally, we observe the same type of correlation through the studied time period. Therefore, we decided to continue with the same numbers of variables and combinations since we know that in our case we do not have problem with multicollinearity.

Finally, we do not perform regressions that include ln(BE/ME) with Leverage 1 and Leverage 2, respectively. Since Fama and French 1992 found the ln(BE/ME) and the difference between ln(A/ME) and ln(A/BE) are concurrent with each other. This means that they give almost the same results.

4.4 White test

We have run the White test in EViews to check for heteroscedasticity in our data. From this test we obtain each time 2 values of the test statistic: F–value and χ^2-value. We present the p-value of the test results in Tables 39-49 in Appendix. Further, we can observe that for the regression combinations we have at least one year of data which is heteroscedastic. For these cases we run the regression again using White's modified standard error estimates in EViews and present the obtained t-value with eliminated heteroscedasticity. If we do not find heteroscedasticity for a year, we proceed to show the t-statistic from unadjusted OLS regression.

4.5 Cross-Sectional Regressions

Below, we present our results of the cross-sectional regressions between yearly dependent variable - returns and various yearly independent variables. They are shown in Table 1.

Table 1

Beta	ln(ME)	ln(BE/ME)	ln(A/ME)	ln(A/BE)	E/P	dummy	Debt/ME	Debt/BE
-0,04917								
-0,91563								
	-0,00181							
	-0,18997							
		-0,00568						
		-0,27742						
-0,00293	**-0,04328**							
-0,30354	*-0,77776*							
			-0,00732	**0,013242**				
			-0,31122	*0,43035*				
					-0,04761	**-0,01083**		
					-0,97939	*-0,28448*		
							-0,01291	**0,017715**
							-0,73384	*0,95354*
	-0,00253						**-0,0172**	**0,0172**
	-0,26582						*-0,98199*	*0,97912*
	-0,00163		**-0,02227**	**0,017953**	**-0,05605**	**-0,02349**		
	-0,18184		*-0,75092*	*0,48934*	*-1,24335*	*-0,62875*		
	-0,00411	**-0,0068**			**-0,03917**	**-0,01649**		
	-0,43958	*-0,29096*			*-0,82003*	*-0,46016*		
	-0,00444				**-0,01743**	**0,012479**	**-0,03534**	**-0,01713**
	-0,49183				*-0,94475*	*0,65494*	*-0,65929*	*-0,44847*

The coefficients of the regressions are shown in bold and the respective t-values are shown in italics.

In Table 2 we present the results of cross-sectional regressions between monthly between monthly dependent variable - returns and three yearly independent variables. This is the way the regressions are done in the paper by Fama & French (1992), with the exception of Leverage 2.

Table 2

Beta	ln(ME)	ln(BE/ME)
-0.0033		
-0.6344		
	-0.0003	
	-0.3907	
		-0.0005
		-0.3209

Notice that we only studied three variables because of time constraints. Nevertheless, two of these variables, namely the natural logarithm of Market Equity and the natural logarithm of Book to Market ratio are found highly significant in Fama & French (1992).

Finally, we perform a regression with monthly returns versus monthly ln(ME). We take ln(ME) lagged by one period from returns, in other words we take the returns for month t and ln(ME) for month t - 1 as is done in the paper by Hossein & Bjorn (2000). For this regression we decided to take a much larger sample to find a more accurate estimation of the coefficient and the corresponding t-statistic. We have used all the companies from NASDAQ, NYSE and ALTERNEXT (former AMEX) for the period from July 1990 to June 2008 that had relevant data available on DataStream. The number of companies in the sample grows from 4970 for July 1990 to 8870 for June 2008. After running the regression we get the average coefficient of ln(ME) variable equal to **-0.000044** and the t-statistic of *-0.200480*. This contradicts the findings of Fama & French (1992), as we do not get significant result for one of their important explanatory variables even with a massive dataset.

To judge if the t-test statistic is significant or not we use n-1 degrees of freedom (d.f.), where n is the number of periods that we are using for testing. For yearly regression we have 18 years, hence 17 d.f. and t-value at 95% (prob. 0.05) confidence will be 2.1098. For other regression combination we use 216 monthly returns, hence we have 215 d.f. and the t-value above (or below in case that its negative) which we reject H_0 is 1.9711. As we can see form Table 1 and Table 2 we cannot reject the null-hypothesis of our coefficients being equal to zero.

Finally, when we observed the individuals yearly regressions (tables 39-49) in appendix III, we notice that for some years some variables are significant, however most of them are not.

5. Analysis

In this chapter we will apply the theory described in chapter 2 to offer an explanation and an analysis of the results shown in chapter 4.

5.1 Analysis of the variables

Below, we display a detailed analysis of the impact of each variable.

5.1.1 Market beta

There have been a number of different papers which consider Market Beta to explain the variation of stock returns. Among those, we have mentioned Fama and French (1992) as our main source. Nevertheless, it should be noted that in that paper the variable Beta could not explain the variation of stock returns of American firms. Further, the authors pointed out that the results coming from market beta are due to the high correlation between true beta and other explanatory variables. The same results are also observed when this variable is all alone in the cross-sectional regression. In this thesis we have performed different cross-sectional regressions which contain yearly returns against yearly independent variables and also monthly returns against yearly independent variables. The results obtained from these regressions for the market beta do not show any significance. This means that Market Beta does not explain the stock returns for the American firms for the studied period, from 1990 to 2008. It should also be mentioned that Fama and French do not include this variable among those variables that they tested in their paper in 1995. This decision might be due to the fact that they did not find any significance in their paper from 1992. Additionally, Nguyen and Swanson decided not to include Market Beta in their analysis, in view of the fact that previous studies have shown that this variable is not statistically significant when explaining for stock returns, especially when size and B/M are present. This is a fact that we could verify in our results, since the t-statistic for beta is equal to -0.91563, which is not significant.

The evidence found in our thesis is also consistent both with Fama & MacBeth and other papers, which show that beta does not explain stock returns. Further, it is important to mention that Chan and Chen (1988) explained how to correct the standard approach of the errors-in-variables problem. This approach should help to observe the size effect. The authors recommended using at most 60 monthly returns for the calculation of Market Beta; otherwise the size effect seems to disappear. This is exactly the time period we used to perform our calculations of Beta, but it did not improve our results. However recent papers, for example an article by Asgharian and Hansson (2000) gives criticism on the portfolio method of beta calculation. Perhaps if would use rolling betas or betas measured by a conditional GARCH(1,1) model we would find results of more interest.

We would like to note how the significance changes in presence of other variables. When we add ln(ME) to the yearly regression, the significance of beta drops from t=-0,91563 to t=-0,30354. In addition, when we apply monthly returns versus betas we get t=-0.6344 which is less significant then when we run regressions for yearly returns. Hence we come with the same conclusion as Fama & French that relation between beta and returns diminishes when controlled with size. This could be due to a fact that size captures the explanatory power of the market beta.

5.1.2 Size

Another important variable that we were expecting to explain the stock returns of American firms was Size. In our case, this variable was calculated by taking the natural logarithm of market equity of year t-1, as in the paper of Fama and French (1992). According to that paper, the authors found a strong relationship between average returns and this variable. Afterwards, Fama and French in 1995 associated the size variable to profitability. The authors found that the size effect in earnings is quite big for small stocks. Finally, after our performance of the cross-sectional regressions containing this variable, we find that the Size variable cannot explain the variation of stock returns, where we get a coefficient equal to -0.00181 and a t-statistic value equal to -0.18997. This corroborate the results from Chan and Chen (1988), where they found that among the size ranked portfolios the log of this variable cannot explain the cross-sectional returns. Likewise, still when we run cross-sectional regressions including this variable with other independent variables the results seem to be the same. Here follows the results from the regressions containing Market Beta and Size, where Size gives a coefficient equal to -0.0433 with a t-statistic value equal to -0.77776. In both cases these values contain insignificant results. When we run a cross-sectional regression of monthly returns against yearly ln(ME) we get a t-value equal to -0.3907, which is also insignificant.

Further, it is important to mention that even when we run cross-sectional regressions between monthly ME against monthly returns with a huge data sample we get a coefficient equal to -0.000044 with a t-statistic value of -0.200480, which is also insignificant. So this variable cannot explain the variation of stock returns in American firms for the studied period from 1990 to 2008.

Even though our results are statistically insignificant, we would like to comment that the coefficients are negative for all the cross-sectional regressions that we did, using the ln(ME) variable. This is consistent with the Fama & French findings and it means that larger firms have smaller returns on average and it makes sense, because generating same returns as for smaller firms would mean raising much higher profits in absolute terms, so that the stock price rises sufficiently.

Zhang (2008) finds evidence that market equity as a proxy for size is only significant when portfolios are used in the regressions, not individual stocks, because of the noise involved in individual measures. Kassimatis (2008) also finds that size is an important measure of stock returns for the Australian market.

Dongcheol (1995) used a procedure based on the maximum likelihood under the assumption of homoscedasticity or heteroscedasticity of the errors terms of the market model. Moreover, this procedure is more adaptable when it comes to individual stocks than portfolios. The formation of portfolios for the cross-sectional regressions can have an effect when large valuable information about individual assets would be lost. In contrast, we have not used this method, but we could possibly improve the results in our thesis if this method would be used.

We also want to mention that the author found that after applying the errors-in-variable approach to their data, market beta become statistically significant in explaining the average stock returns while size loose impact.

5.1.3 Book to market equity

In the paper from Fama and French (1992), it could also be observed that Book to Market plays a significant role in their analysis. Since this is a variable that strongly explains the variation of stock returns for American firms during 1963–1990. Unfortunately, our results cannot reflect these outcomes, given that we got the same results as for the other variables mentioned above.

Further, Fama and French in their paper of 1995 found that those firms that contain high values of BE/ME have the tendency to be distressed, while firms that contain this ratio low tend to be profitable. The coefficient of this variable is equal to -0.0057 and the t-statistic value is equal to -0.2774, which is not significant. Our coefficient value is negative which contradicts the findings of Fama & French. However, it is very close to zero so we will not make any conclusions about it. For the cross-sectional regressions between monthly returns and yearly ln(BE/ME) we obtain the t-value of -0.3209 which is not significant.

Zhang (2008) found evidence that market to book ratio was only significant when portfolios were used in the regressions, not individual stocks, because of the noise involved in individual measures.

5.1.4 Leverage 1

This variable is based on the Fama and French article from 1992, where they include it as the ratio equal to total assets to market equity and total assets to book equity. According to this paper, the outcomes from the Book to market equity variable are very close to Leverage 1 variables in absolute terms. Since, this variable is based on the difference between ln(A/ME) and ln(A/BE). Here, we proceed to take the natural logarithm of these variables since we know that this is a good way to determine the leverage effects on companies. Further, these ratios should be interpreted as the market leverage of the firm while the second one as the book leverage of the firm, respectively. Further, this variable cannot explain the stock returns for American firms since the t-value is not significance.

An interesting observation from the results of our regressions is that leverage 1 variables' absolute t-value increases when the regressions performed together with market equity and earnings to price which could be due to the fact that leverage 1 variables works better when it has other variables in the regression.

5.1.5 Leverage 2

As we mentioned before this variable was added to our analysis in order to see if it could explain the variation of the stock returns for the American firms better than leverage 1 and then make a comparison between these two. However, we found that as the same as for leverage 1, leverage 2 also gets outcomes that are insignificant. This means that these variables cannot explain the stock returns for American firms during the studied period.

A remarkable observation is that this variable seems to increase in significance when it is regressed together with market equity, but drops in significance when it is regressed together with earnings to price and the dummy.

5.1.6 Earnings To price

Here, we also follow the approach of Fama and French article from 1992 in the construction of this variable, where we take into account firms that contain positive earnings. In contrast, when firms have negative earnings, we include a dummy to the regression with the value equal to 1. Further, it is also important to mention that firms that have high earnings to price contain high ln(BE/ME), too. This statement means that high earnings are associated with high risk, so the market price of shares is low and the E/P is higher. Unfortunately, we also do not find any significance, so this variable cannot explain the variation of American stock returns.

Please note, that the mean of the dummy variable shows the percentage of negative earnings out of all the earnings. The lowest mean of the dummy variable is 0,07692 for the 1990-1991 data. The largest two are 0,47475 for 2002-2003 and 0,42857 for 2007-2008. Since the E/P variable is lagged one year a possible explanation for having this high amount of negative stocks are the recent recessions, one that followed September the 11th and the other related to the subprime loans mortgage crisis.

Finally, we would like to add that Blume (1970) also deals with the problem of errors-in-variable. He states that the larger the numbers of individuals assets in portfolios the better since this problem become smaller. This is exactly what we tried to do when we form portfolios by pre-ranking betas and then ranking those by size and form post-ranking betas. Unfortunately, the amount of assets in a portfolio should be quite large which we fail to have due to the time constraints.

5.2 Validity and Reliability

In these studies we must always have in mind the importance of validity and reliability approaches as significant tools. This will help us to be critical with the collected data and used methods, and not take for granted that the collected data set and the methods are correct for the chosen subject.

We start with validity, which is a measure that determines what we are supposed to analyze is what we really are analyzing (Bryman & Bell, 2007). This means that the sources of information and material collected for this study should correspond to the studied phenomena. Five of the chosen variables are based on the Fama and French article from 1992, while one of them are based on our own judgments for the finding of a relationship between this variable and American stock returns. In our case, we can implicitly say that this statement is suitable, since we know that the variables that we have chosen for the studied subject might explain what we are analyzing.

On the other side, reliability is a measure, which determines if the source used in the paper is consistent (Johannessen & Tufte, 2003). In this paper we have two main sources of possible errors. The first one is the reliability of the Database, *Thompson DataStream* and the second one is the reliability of the *methods* used in this thesis. The Thompson DataStream has a database based on external reports, from which firms at the first sight could be considered trustworthy, given that this is used by researchers as a secondary information source, where the primary is annual reports. For example

DataStream is used in the paper of Kassimatis (2008). Nevertheless, we question strongly this Database, since in several cases we noticed that some ratios or values available there do not match the same ratios when calculated manually. This leaves us with the conclusion that even if DataStream is available for students at Lund's university as a main source, we should keep in mind that there is still room for deficiencies in the data material.

When it comes to method we have based this thesis on earlier research papers, such as Fama and French (1992). They have used the methodology of building portfolios based on post-ranking betas to correct errors-in variables for Beta, followed by the performance of regressions based on individual stocks. This procedure gives no significance for all our variables in our sample data, which leaves us with the conclusions that this method does not work for this specific time period. Further, there have been many other papers that have critized Fama and French method from 1992 such as Nguyen & Swanson (2009), where the authors choose not to include beta in the analysis, given the fact that previous studies have shown that beta has no significant influence on returns when size and B/M are present.

Reliability of data "pertains to the "representativeness" of the result found in our specific sample for the entire population"[8]. Hence, if our random sample for some reason does not represent the relations found in the population our results would not be correct. In order to check for this we take a big sample of all the firms available on three stock markets that have available data. Still we find no relation between returns and market equity, even with a much larger sample that should follow the patterns seen in the population.

[8] Electronic Stats book "Stat soft"

6. Conclusions

This chapter presents the results from our analytical approach. Then, we submit our conclusions and implications for further research.

In this paper we have applied cross-section regressions developed by Fama and MacBeth (1973) and later used in the article by Fama & French (1992). We have analyzed the performance of American stocks using their returns as a dependent variable and a number of variables as independent. We have used the following explanatory variables: market beta, market equity, book to market ratio, earnings to price, leverage 1 measured as assets over book equity and assets over market equity and leverage 2 measured as total debt over book equity and total debt over market equity. We have used annual returns versus annual variables, complemented by three cross-sectional regressions, using monthly returns against market beta, market equity and book to market equity and one cross-sectional regression using monthly returns versus monthly market equity.

For all of our variables and all different cross-sectional regressions we find no significance of the variables coefficients. In other words we did not find evidence that our variables explain the cross-section of the American stock returns. This contradicts the evidence found in the papers by Fama & French and other papers that followed. However, there were also many of them who used this method and did not find any results. This has lead to much criticism such as their lack of accuracy of their errors-in-variables approach, which could have an impact for the variation of stock returns.

Finally, for future research, we recommend to apply different statistical approaches to get better results, such as GLS or WLS for the performance of the regressions and also for the measure of heteroscedasticity. Another important point is the using of portfolios to correct for errors-in-variables might not be the best approach and it would be better to use more advanced methods, such as the maximum likelihood approach proposed by Dongcheol (1995). For the market beta, it is probably better not to assume it to be constant over the whole period. It might be better to use rolling beta or even better to use conditional market beta, because it estimates the true beta more accurately, as for example done by Asgharian and Hansson (2000).

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8. APPENDIX

I. Descriptive data

1990-1991	Returns	Beta	ln(ME)	ln(BE/ME)	ln(A/ME)	ln(A/BE)	Debt/BE	Debt/ME	E/P	Dummy
Mean	0,02888	0,61707	12,59249	-0,46065	0,36430	0,82495	0,86327	0,62203	0,12570	0,07692
Standard Dev.	0,31685	0,29253	1,99250	0,78593	0,90185	0,53922	1,15952	0,74899	0,16128	0,26819
Minimum	-1,31570	0,20582	7,72312	-2,80392	-1,88956	0,00898	0,00000	0,00000	-0,44646	0,00000
Maximum	1,17852	1,13241	17,14547	2,18561	2,75204	2,65550	7,69403	3,79761	0,81659	1,00000

Table 3. Descriptive data containing all the American firms under the studied period from 1990 to 1991.

1991-1992	Returns	Beta	ln(ME)	ln(BE/ME)	ln(A/ME)	ln(A/BE)	Debt/BE	Debt/ME	E/P	Dummy
Mean	0,00625	0,61128	12,58692	-0,32986	0,44624	0,77611	0,90057	0,70201	0,13509	0,14706
Standard Dev.	0,56891	0,28751	2,10127	0,66491	0,78139	0,52342	1,97633	1,12971	0,33848	0,35547
Minimum	-4,72295	0,20582	7,90470	-2,02384	-2,01159	0,01225	0,00000	0,00000	-1,80185	0,00000
Maximum	1,44034	1,13241	18,08860	1,42821	2,70708	3,75732	21,08333	7,37609	2,37535	1,00000

Table 4. Descriptive data containing all the American firms under the studied period from 1991 to 1992.

1992-1993	Returns	Beta	ln(ME)	ln(BE/ME)	ln(A/ME)	ln(A/BE)	Debt/BE	Debt/ME	E/P	Dummy
Mean	0,11441	0,62228	12,58852	-0,39025	0,34774	0,73799	0,87035	0,59904	0,09667	0,11429
Standard Dev.	0,36034	0,29099	1,88878	0,66625	0,73106	0,44549	2,54298	0,85429	0,22480	0,31930
Minimum	-1,5905	0,20582	8,50714	-2,72077	-1,26667	0,06512	0,00000	0,00000	-1,7717	0,00000
Maximum	1,44692	1,13241	17,80496	1,42067	2,33154	3,59956	29,58900	6,99180	0,67908	1,00000

Table 5. Descriptive data containing all the American firms under the studied period from 1992 to 1993.

1993-1994	Returns	Beta	ln(ME)	ln(BE/ME)	ln(A/ME)	ln(A/BE)	Debt/BE	Debt/ME	E/P	Dummy
Mean	0,01527	0,61930	12,63610	-0,53170	0,14474	0,67644	0,65288	0,63273	0,08684	0,08911
Standard Dev.	0,27928	0,28913	1,90985	0,88009	0,95393	0,41507	1,01435	1,46364	0,18553	0,28632
Minimum	-0,7628	0,20582	8,37101	-3,68034	-1,90338	0,06652	0,00000	0,00000	-0,77048	0,00000
Maximum	0,82284	1,13241	17,17737	2,03724	3,26373	2,43089	8,89942	11,20506	1,20139	1,00000

Table 6. Descriptive data containing all the American firms under the studied period from 1993 to 1994.

1994-1995	Returns	Beta	ln(ME)	ln(BE/ME)	ln(A/ME)	ln(A/BE)	Debt/BE	Debt/ME	E/P	Dummy
Mean	0,14366	0,62220	12,55103	-0,50382	0,16691	0,67073	0,64212	0,53712	0,07781	0,15534
Standard Dev.	0,41500	0,29152	1,80655	0,86222	0,96701	0,44317	1,31894	1,01420	0,22151	0,36400
Minimum	-0,6738	0,20582	9,18502	-3,25571	-3,15391	0,05673	0,00000	0,00000	-1,30436	0,00000
Maximum	2,41221	1,13241	17,13468	1,90525	2,89606	3,50427	12,88399	7,98648	0,77467	1,00000

Table 7. Descriptive data containing all the American firms under the studied period from 1994 to 1995.

1995-1996	Returns	Beta	ln(ME)	ln(BE/ME)	ln(A/ME)	Ln(A/BE)	Debt/ME	Debt/BE	E/P	Dummy
Mean	0,19750	0,60623	12,48382	-0,57625	1,88967	2,87377	0,55356	0,74137	0,10218	0,15074
Standard Dev.	0,37005	0,28086	1,92335	0,93882	3,13197	6,17628	1,12242	1,17685	0,20855	0,35845
Minimum	-0,92687	0,20582	8,13153	-8,85254	0,01391	1,06411	0,00000	0,00000	-0,40169	0,00000
Maximum	2,09634	1,13241	18,29475	2,80566	40,69281	97,26316	11,50879	10,11003	1,84207	1,00000

Table 8. Descriptive data containing all the American firms under the studied period from 1995 to 1996.

1996-1997	Returns	Beta	ln(ME)	ln(BE/ME)	ln(A/ME)	ln(A/BE)	Debt/BE	Debt/ME	E/P	Dummy
Mean	-0,0352	0,61773	12,32478	-0,38907	0,22020	0,60927	0,49625	0,52369	0,09178	0,16393
Standard De.	0,47407	0,29000	1,94711	0,70908	0,83042	0,32799	0,53169	1,05886	0,17678	0,37174
Minimum	-1,8410	0,20582	8,14613	-2,36681	-1,81785	0,04475	0,00000	0,00000	-0,52476	0,00000
Maximum	0,95977	1,13241	17,72323	2,72628	3,62547	1,56173	2,99063	9,48400	1,15636	1,00000

Table 9. Descriptive data containing all the American firms under the studied period from 1996 to 1997.

1997-1998	Returns	Beta	ln(ME)	ln(BE/ME)	ln(A/ME)	ln(A/BE)	Debt/ME	Debt/BE	E/P	Dummy
Mean	0,15221	0,61037	12,56127	-0,63696	0,01824	0,65520	0,40745	0,53430	0,04418	0,22609
Standard Dev.	0,31521	0,28525	1,93977	0,75574	0,94821	0,49659	0,78842	0,80515	0,22706	0,42013
Minimum	-0,53900	0,20582	8,76873	-2,73334	-2,34687	0,00240	0,00000	0,00000	-1,69866	0,00000
Maximum	1,16675	1,13241	18,95203	1,01050	3,01971	2,53653	5,36128	4,67845	0,49606	1,00000

Table 10. Descriptive data containing all the American firms under the studied period from 1997 to 1998.

1998-1999	Returns	Beta	ln(ME)	ln(BE/ME)	ln(A/ME)	ln(A/BE)	Debt/ME	Debt/BE	E/P	Dummy
Mean	-0,1501	0,62182	12,71839	-0,71491	0,04073	0,75564	0,46057	0,88015	0,07608	0,23333
Standard Dev.	0,40355	0,29328	2,03671	0,90986	0,88105	0,59140	1,63396	2,46695	0,16313	0,42532
Minimum	-1,2630	0,20582	7,99294	-4,50100	-1,82030	0,06862	0,00000	0,00000	-0,45285	0,00000
Maximum	0,95885	1,13241	17,68524	1,55519	3,25724	3,66202	15,35235	20,02410	0,52885	1,00000

Table 11. Descriptive data containing all the American firms under the studied period from 1998 to 1999.

1999-2000	Returns	Beta	ln(ME)	ln(BE/ME)	ln(A/ME)	ln(A/BE)	Debt/ME	Debt/BE	E/P	Dummy
Mean	0,06440	0,61652	12,38280	-0,63379	0,09771	0,73149	0,63383	0,67146	0,07673	0,30702
Standard Dev.	0,62237	0,28532	2,24569	0,80004	0,85446	0,43050	2,28551	0,95537	0,28447	0,46329
Minimum	-2,30170	0,20582	8,19974	-3,76008	-2,71614	0,04130	0,00000	0,00000	-0,4527	0,00000
Maximum	1,70475	1,13241	19,71490	2,78720	3,79643	2,32086	22,83129	7,54185	2,01580	1,00000

Table 12. Descriptive data containing all the American firms under the studied period from 1999 to 2000.

2000-2001	Returns	Beta	ln(ME)	ln(BE/ME)	ln(A/ME)	ln(A/BE)	Debt/ME	Debt/BE	E/P	Dummy
Mean	-0,02478	0,61241	12,47631	-0,56296	0,13226	0,69522	0,49505	0,64028	0,04799	0,26168
Standard Dev.	0,62497	0,29078	2,05966	0,88276	0,90449	0,47498	1,01997	0,86485	0,25470	0,44162
Minimum	-1,99720	0,20582	8,36171	-3,33003	-2,22195	0,02739	0,00000	0,00000	-0,95955	0,00000
Maximum	1,74241	1,13241	17,39579	1,84386	2,51862	2,62609	7,54227	5,23876	0,87517	1,00000

Table 13. Descriptive data containing all the American firms under the studied period from 2000 to 2001.

2001-2002	Returns	Beta	ln(ME)	ln(BE/ME)	ln(A/ME)	Ln(A/BE)	Debt/ME	Debt/BE	E/P	Dummy
Mean	0,02651	0,62066	12,39261	-0,71008	0,01706	0,72714	0,67031	1,83533	0,01830	0,23762
Standard Dev.	0,52343	0,28778	1,97889	0,86965	1,05066	0,69121	1,70844	9,32030	0,40611	0,42775
Minimum	-2,03660	0,20582	7,85554	-3,61931	-2,59985	0,03813	0,00000	0,00000	-3,3203	0,00000
Maximum	1,12760	1,13241	16,37672	1,01218	3,07466	4,83286	13,32657	77,32080	0,95048	1,00000

Table 14. Descriptive data containing all the American firms under the studied period from 2001 to 2002.

2002-2003	Returns	Beta	ln(ME)	ln(BE/ME)	ln(A/ME)	ln(A/BE)	Debt/ME	Debt/BE	E/P	Dummy
Mean	-0,13788	0,61104	11,93966	-0,43905	0,24831	0,68736	0,70104	0,72001	-0,10016	0,47475
Standard Dev.	0,55118	0,28604	2,15613	1,13943	1,21949	0,53485	1,33928	1,58336	0,53977	0,50190
Minimum	-3,72569	0,20582	7,27932	-3,64765	-2,56884	0,00159	0,00000	0,00000	-3,64310	0,00000

Maximum	0,96508	1,13241	17,14555	3,75094	4,02214	3,41408	8,04834	13,89043	0,65553	1,00000

Table 15. Descriptive data containing all the American firms under the studied period from 2002 to 2003.

2003-2004	**Returns**	**Beta**	**ln(ME)**	**ln(BE/ME)**	**ln(A/ME)**	**ln(A/BE)**	**Debt/ME**	**Debt/BE**	**E/P**	**Dummy**
Mean	0,34829	0,62067	12,35667	-0,80378	0,03065	0,83443	0,63952	1,48140	0,01846	0,32632
Standard Dev.	0,45400	0,29378	2,08220	1,05385	1,08831	0,80718	1,30867	4,81442	0,29734	0,47135
Minimum	-0,52065	0,20582	8,19146	-3,94996	-2,18949	0,00251	0,00000	0,00000	-1,0192	0,00000
Maximum	2,77347	1,13241	18,55623	1,78431	2,65410	4,77155	7,42492	42,83384	1,72963	1,00000

Table 16. Descriptive data containing all the American firms under the studied period from 2003 to 2004.

2004-2005	**Returns**	**Beta**	**ln(ME)**	**ln(BE/ME)**	**ln(A/ME)**	**Ln(A/BE)**	**Debt/ME**	**Debt/BE**	**E/P**	**Dummy**
Mean	0,02753	0,61874	13,31207	-0,41365	0,25457	0,26409	0,63319	0,61307	0,00011	0,32584
Standard Dev.	0,40556	0,29348	2,17556	0,84002	0,98528	0,98731	1,35727	0,95857	0,28051	0,47134
Minimum	-1,23371	0,20582	8,80837	-2,52006	-1,62762	-1,62762	0,00000	0,00000	-1,46509	0,00000
Maximum	0,93262	1,13241	19,48567	2,42779	2,93147	2,93147	9,66504	5,78263	0,81021	1,00000

Table 17. Descriptive data containing all the American firms under the studied period from 2004 to 2005.

2005-2006	**Returns**	**Beta**	**ln(ME)**	**ln(BE/ME)**	**ln(A/ME)**	**Ln(A/BE)**	**Debt/ME**	**Debt/BE**	**E/P**	**Dummy**
Mean	0,20359	0,61088	13,00297	-0,63966	0,12577	0,76543	0,58889	1,03172	0,01981	0,25439
Standard Dev.	0,39088	0,28468	1,82852	0,81783	0,94900	0,63458	1,06436	2,58824	0,62101	0,43744
Minimum	-0,71409	0,20582	8,14613	-3,89388	-3,71484	0,05710	0,00000	0,00000	-6,20455	0,00000
Maximum	1,50310	1,13241	18,90184	2,51989	2,90317	3,72868	5,92022	21,80832	1,42778	1,00000

Table 18. Descriptive data containing all the American firms under the studied period from 2005 to 2006.

2006-2007	**Returns**	**Beta**	**ln(ME)**	**ln(BE/ME)**	**ln(A/ME)**	**ln(A/BE)**	**Debt/ME**	**Debt/BE**	**E/P**	**Dummy**
Mean	0,13370	0,62586	13,40418	-0,88271	-0,16619	0,71652	0,45660	0,91648	0,06380	0,25243
Standard Dev.	0,39465	0,29225	2,15666	0,84514	0,95411	0,65509	1,29714	2,34800	0,16288	0,43653
Minimum	-1,73496	0,20582	8,05833	-3,50516	-2,06838	0,02976	0,00000	0,00000	-0,46961	0,00000
Maximum	1,26937	1,13241	19,30349	1,85576	2,45227	3,48167	10,91065	16,94857	0,65938	1,00000

Table 19. Descriptive data containing all the American firms under the studied period from 2006 to 2007.

2007-2008	**Returns**	**Beta**	**ln(ME)**	**ln(BE/ME)**	**ln(A/ME)**	**Ln(A/BE)**	**Debt/ME**	**Debt/BE**	**E/P**	**Dummy**
Mean	-0,18925	0,63059	13,36830	-0,79440	-0,09672	0,69768	0,37738	2,18109	0,01661	0,42857
Standard Dev.	0,11447	0,29061	2,01070	0,87347	0,83391	0,67552	0,70682	14,96380	0,30224	0,49784
Minimum	-0,82717	0,20582	9,31560	-4,19933	-1,65524	0,00520	0,00000	0,00000	-1,32941	0,00000
Maximum	-0,02889	1,13241	18,00088	1,69227	2,46651	5,25260	4,48251	137,34142	1,08593	1,00000

Table 20. Descriptive data containing all the American firms under the studied period from 2007 to 2008.

II. Multicollinearity tables

1990	**BETA**	**LN_ME_**	**LN_BE_ME_**	**LN_A_ME_**	**LN_A_BE_**	**DEBT_ME**	**DEBT_BE**	**E_P**	**DUMMY**
BETA	1.000000	0.065193	-0.021721	-0.040271	-0.035694	0.031808	-0.081942	-0.126383	0.096458
LN_ME_	0.065193	1.000000	-0.107556	-0.049783	0.073505	-0.009968	0.148689	0.261100	-0.282899
LN_BE_ME_	-0.021721	-0.107556	1.000000	0.804371	-0.112224	0.423797	-0.118208	0.421437	-0.222691

LN_A_ME_	-0.040271	-0.049783	0.804371	1.000000	0.500104	0.725861	0.416623	0.478768	-0.121960
LN_A_BE_	-0.035694	0.073505	-0.112224	0.500104	1.000000	0.596308	0.869099	0.186480	0.120603
DEBT_ME	0.031808	-0.009968	0.423797	0.725861	0.596308	1.000000	0.706429	0.177165	0.112038
DEBT_BE	-0.081942	0.148689	-0.118208	0.416623	0.869099	0.706429	1.000000	0.134603	0.112753
E_P	-0.126383	0.261100	0.421437	0.478768	0.186480	0.177165	0.134603	1.000000	-0.503863
DUMMY	0.096458	-0.282899	-0.222691	-0.121960	0.120603	0.112038	0.112753	-0.503863	1.000000

Table 21. Multicollinearity tables containing the American firms under the studied period from 1990 to 1991

1991	BETA	LN_ME_	LN_BE_ME_	LN_A_ME_	LN_A_BE_	DEBT_ME	DEBT_BE	E_P	DUMMY
BETA	1.000000	0.100060	-0.085732	-0.142664	-0.103627	-0.134437	-0.089450	-0.038488	0.060088
LN_ME_	0.100060	1.000000	-0.300068	-0.284118	-0.042174	-0.176498	-0.111712	0.185720	-0.322611
LN_BE_ME_	-0.085732	-0.300068	1.000000	0.748336	-0.155099	0.325576	-0.137823	0.072369	-0.029902
LN_A_ME_	-0.142664	-0.284118	0.748336	1.000000	0.539227	0.735067	0.409129	0.018208	0.092122
LN_A_BE_	-0.103627	-0.042174	-0.155099	0.539227	1.000000	0.681397	0.784307	-0.064763	0.175164
DEBT_ME	-0.134437	-0.176498	0.325576	0.735067	0.681397	1.000000	0.701132	-0.052346	0.121630
DEBT_BE	-0.089450	-0.111712	-0.137823	0.409129	0.784307	0.701132	1.000000	-0.165204	0.260968
E_P	-0.038488	0.185720	0.072369	0.018208	-0.064763	-0.052346	-0.165204	1.000000	-0.500155
DUMMY	0.060088	-0.322611	-0.029902	0.092122	0.175164	0.121630	0.260968	-0.500155	1.000000

Table 22. Multicollinearity table containing the American firms under the studied period from 1991 to 1992.

1992	BETA	LN_ME_	LN_BE_ME_	LN_A_ME_	LN_A_BE_	DEBT_ME	DEBT_BE	E_P	DUMMY
BETA	1.000000	0.056320	-0.139933	-0.037498	0.147740	0.041448	0.134713	-0.180136	0.136699
LN_ME_	0.056320	1.000000	-0.364828	-0.305674	0.043999	-0.257366	0.023975	0.094865	-0.026894
LN_BE_ME_	-0.139933	-0.364828	1.000000	0.800581	-0.181773	0.435975	-0.269160	0.286606	-0.207310
LN_A_ME_	-0.037498	-0.305674	0.800581	1.000000	0.443718	0.725556	0.191677	0.221158	-0.035198
LN_A_BE_	0.147740	0.043999	-0.181773	0.443718	1.000000	0.538634	0.717088	-0.065707	0.252280
DEBT_ME	0.041448	-0.257366	0.435975	0.725556	0.538634	1.000000	0.316262	0.203094	-0.007675
DEBT_BE	0.134713	0.023975	-0.269160	0.191677	0.717088	0.316262	1.000000	-0.063034	0.241006
E_P	-0.180136	0.094865	0.286606	0.221158	-0.065707	0.203094	-0.063034	1.000000	-0.565151
DUMMY	0.136699	-0.026894	-0.207310	-0.035198	0.252280	-0.007675	0.241006	-0.565151	1.000000

Table 23. Multicollinearity table containing the American firms under the studied period from 1992 to 1993.

1993	BETA	LN_ME_	LN_BE_ME_	LN_A_ME_	LN_A_BE_	DEBT_ME	DEBT_BE	E_P	DUMMY
BETA	1.000000	0.163136	-0.227601	-0.202745	0.016632	-0.237155	-0.069108	-0.176275	-0.041924
LN_ME_	0.163136	1.000000	-0.298683	-0.287787	-0.028099	-0.295472	-0.072790	-0.101661	-0.139730
LN_BE_ME_	-0.227601	-0.298683	1.000000	0.900643	-0.050430	0.538954	-0.177028	0.418516	-0.004180
LN_A_ME_	-0.202745	-0.287787	0.900643	1.000000	0.388589	0.664123	0.190875	0.309175	0.103214
LN_A_BE_	0.016632	-0.028099	-0.050430	0.388589	1.000000	0.383559	0.814036	-0.176830	0.246074
DEBT_ME	-0.237155	-0.295472	0.538954	0.664123	0.383559	1.000000	0.278490	0.199778	0.180788

DEBT_BE	-0.069108	-0.072790	-0.177028	0.190875	0.814036	0.278490	1.000000	-0.305154	0.251637
E_P	-0.176275	-0.101661	0.418516	0.309175	-0.176830	0.199778	-0.305154	1.000000	-0.538771
DUMMY	-0.041924	-0.139730	-0.004180	0.103214	0.246074	0.180788	0.251637	-0.538771	1.000000

Table 24. Multicollinearity table containing the American firms under the studied period from 1993 to 1994

1994	**BETA**	**LN_ME_**	**LN_BE_ME_**	**LN_A_ME_**	**LN_A_BE_**	**DEBT_ME**	**DEBT_BE**	**E_P**	**DUMMY**
BETA	1.000000	0.130911	-0.154653	-0.183195	-0.098850	-0.118144	-0.084860	-0.170292	0.084684
LN_ME_	0.130911	1.000000	-0.422122	-0.377312	-0.002037	-0.247666	-0.003963	0.106827	-0.255079
LN_BE_ME_	-0.154653	-0.422122	1.000000	0.888810	-0.006162	0.511265	-0.145691	0.267117	-0.080710
LN_A_ME_	-0.183195	-0.377312	0.888810	1.000000	0.452790	0.640675	0.256667	0.222698	-0.065661
LN_A_BE_	-0.098850	-0.002037	-0.006162	0.452790	1.000000	0.403274	0.843517	-0.033762	0.013753
DEBT_ME	-0.118144	-0.247666	0.511265	0.640675	0.403274	1.000000	0.249867	0.210655	0.020615
DEBT_BE	-0.084860	-0.003963	-0.145691	0.256667	0.843517	0.249867	1.000000	-0.033854	-0.012344
E_P	-0.170292	0.106827	0.267117	0.222698	-0.033762	0.210655	-0.033854	1.000000	-0.506079
DUMMY	0.084684	-0.255079	-0.080710	-0.065661	0.013753	0.020615	-0.012344	-0.506079	1.000000

Table 25. Multicollinearity table containing the American firms under the studied period from 1994 to 1995

1995	**BETA**	**LN_ME_**	**LN_BE_ME_**	**LN_A_ME_**	**LN_A_BE_**	**DEBT_ME**	**DEBT_BE**	**E_P**	**DUMMY**
BETA	1.000000	0.112128	-0.138091	-0.054785	0.005519	-0.043535	0.024878	-0.178548	0.016901
LN_ME_	0.112128	1.000000	-0.278497	-0.218913	0.005345	-0.224750	-0.025124	0.062301	-0.214050
LN_BE_ME_	-0.138091	-0.278497	1.000000	0.482564	-0.568191	0.412973	-0.132799	0.387232	-0.088143
LN_A_ME_	-0.054785	-0.218913	0.482564	1.000000	0.076113	0.848208	0.163600	0.385698	0.054953
LN_A_BE_	0.005519	0.005345	-0.568191	0.076113	1.000000	0.059494	0.237792	-0.077214	0.088417
DEBT_ME	-0.043535	-0.224750	0.412973	0.848208	0.059494	1.000000	0.388045	0.363573	0.030016
DEBT_BE	0.024878	-0.025124	-0.132799	0.163600	0.237792	0.388045	1.000000	-0.063888	0.214531
E_P	-0.178548	0.062301	0.387232	0.385698	-0.077214	0.363573	-0.063888	1.000000	-0.485930
DUMMY	0.016901	-0.214050	-0.088143	0.054953	0.088417	0.030016	0.214531	-0.485930	1.000000

Table 26. Multicollinearity table containing the American firms under the studied period from 1995 to 1996

1996	**BETA**	**LN_ME_**	**LN_BE_ME_**	**LN_A_ME_**	**LN_A_BE_**	**DEBT_ME**	**DEBT_BE**	**E_P**	**DUMMY**
BETA	1.000000	0.211229	-0.214960	-0.205250	-0.054938	-0.133624	-0.065726	-0.092386	-0.073150
LN_ME_	0.211229	1.000000	-0.294395	-0.232297	0.048313	-0.196807	-0.007178	0.151926	-0.220444
LN_BE_ME_	-0.214960	-0.294395	1.000000	0.921154	0.170313	0.622246	0.150610	0.485158	-0.139088
LN_A_ME_	-0.205250	-0.232297	0.921154	1.000000	0.540398	0.716753	0.478561	0.528199	-0.157847
LN_A_BE_	-0.054938	0.048313	0.170313	0.540398	1.000000	0.469470	0.886037	0.288454	-0.098949
DEBT_ME	-0.133624	-0.196807	0.622246	0.716753	0.469470	1.000000	0.474949	0.464276	-0.076480
DEBT_BE	-0.065726	-0.007178	0.150610	0.478561	0.886037	0.474949	1.000000	0.223229	-0.078909
E_P	-0.092386	0.151926	0.485158	0.528199	0.288454	0.464276	0.223229	1.000000	-0.468926
DUMMY	-0.073150	-0.220444	-0.139088	-0.157847	-0.098949	-0.076480	-0.078909	-0.468926	1.000000

Table 27. Multicollinearity table containing the American firms under the studied period from 1996 to 1997

1997	BETA	LN_ME_	LN_BE_ME_	LN_A_ME_	LN_A_BE_	DEBT_ME	DEBT_BE	E_P	DUMMY
BETAS	1.000000	0.180601	-0.302417	-0.274514	-0.063934	-0.022096	-0.056593	-0.141122	-0.041612
LN_ME_	0.180601	1.000000	-0.294593	-0.205907	0.055161	-0.116758	-0.062085	0.234095	-0.367170
LN_BE_ME_	-0.302417	-0.294593	1.000000	0.853788	0.108404	0.223268	0.015343	0.070286	-0.045135
LN_A_ME_	-0.274514	-0.205907	0.853788	1.000000	0.610107	0.404179	0.445134	-0.087575	0.051973
LN_A_BE_	-0.063934	0.055161	0.108404	0.610107	1.000000	0.431979	0.826616	-0.274187	0.167931
TD_ME	-0.022096	-0.116758	0.223268	0.404179	0.431979	1.000000	0.430918	-0.395440	0.112924
TD_BE	-0.056593	-0.062085	0.015343	0.445134	0.826616	0.430918	1.000000	-0.436747	0.221500
E_P	-0.141122	0.234095	0.070286	-0.087575	-0.274187	-0.395440	-0.436747	1.000000	-0.602555
DUMMY	-0.041612	-0.367170	-0.045135	0.051973	0.167931	0.112924	0.221500	-0.602555	1.000000

Table 28. Multicollinearity table containing the American firms under the studied period from 1997 to 1998

1998	BETA	LN_ME_	LN_BE_ME_	LN_A_ME_	LN_A_BE_	DEBT_ME	DEBT_BE	E_P	DUMMY
BETAS	1.000000	0.099493	-0.308815	-0.270741	0.071766	-0.072420	0.090710	-0.162450	-0.006122
LN_ME_	0.099493	1.000000	-0.236526	-0.209054	0.052450	-0.072527	-0.092138	0.142872	-0.223417
LN_BE_ME_	-0.308815	-0.236526	1.000000	0.782366	-0.372941	0.207477	-0.407862	0.490128	-0.166569
LN_A_ME_	-0.270741	-0.209054	0.782366	1.000000	0.286110	0.510566	0.121733	0.383267	-0.133222
LN_A_BE_	0.071766	0.052450	-0.372941	0.286110	1.000000	0.441423	0.808842	-0.183076	0.057795
TD_ME	-0.072420	-0.072527	0.207477	0.510566	0.441423	1.000000	0.415340	-0.062347	0.140998
TD_BE	0.090710	-0.092138	-0.407862	0.121733	0.808842	0.415340	1.000000	-0.257350	0.180813
E_P	-0.162450	0.142872	0.490128	0.383267	-0.183076	-0.062347	-0.257350	1.000000	-0.655886
DUMMY	-0.006122	-0.223417	-0.166569	-0.133222	0.057795	0.140998	0.180813	-0.655886	1.000000

Table 29. Multicollinearity table containing the American firms under the studied period from 1998 to 1999

1999	BETA	LN_ME_	LN_BE_ME_	LN_A_ME_	LN_A_BE_	DEBT_ME	DEBT_BE	E_P	DUMMY
BETAS	1.000000	0.194415	-0.025883	-0.051713	-0.054434	0.099048	-0.038958	0.015018	-0.106992
LN_ME_	0.194415	1.000000	-0.181516	-0.029283	0.278620	0.052952	0.093646	0.099857	-0.168204
LN_BE_ME_	-0.025883	-0.181516	1.000000	0.866061	-0.139003	0.551494	-0.049055	0.644794	-0.316416
LN_A_ME_	-0.051713	-0.029283	0.866061	1.000000	0.374701	0.614707	0.357083	0.593178	-0.255778
LN_A_BE_	-0.054434	0.278620	-0.139003	0.374701	1.000000	0.194873	0.798293	-0.020800	0.080146
TD_ME	0.099048	0.052952	0.551494	0.614707	0.194873	1.000000	0.237271	0.625774	-0.099420
TD_BE	-0.038958	0.093646	-0.049055	0.357083	0.798293	0.237271	1.000000	-0.034579	0.047895
E_P	0.015018	0.099857	0.644794	0.593178	-0.020800	0.625774	-0.034579	1.000000	-0.443367
DUMMY	-0.106992	-0.168204	-0.316416	-0.255778	0.080146	-0.099420	0.047895	-0.443367	1.000000

Table 30. Multicollinearity table containing the American firms under the studied period from 1999 to 2000

2000	BETA	LN_ME_	LN_BE_ME_	LN_A_ME_	LN_A_BE_	DEBT_ME	DEBT_BE	E_P	DUMMY

BETAS	1.000000	0.116454	-0.197170	-0.271275	-0.151199	-0.192574	-0.139826	0.002519	0.052081
LN_ME_	0.116454	1.000000	-0.436028	-0.456032	-0.058716	-0.359996	-0.153461	0.148847	-0.309710
LN_BE_ME_	-0.197170	-0.436028	1.000000	0.860685	-0.220153	0.402587	-0.149929	0.038517	0.046427
LN_A_ME_	-0.271275	-0.456032	0.860685	1.000000	0.307164	0.600988	0.298035	0.144933	0.028081
LN_A_BE_	-0.151199	-0.058716	-0.220153	0.307164	1.000000	0.398944	0.851250	0.205686	-0.032980
TD_ME	-0.192574	-0.359996	0.402587	0.600988	0.398944	1.000000	0.551093	0.302519	-0.035350
TD_BE	-0.139826	-0.153461	-0.149929	0.298035	0.851250	0.551093	1.000000	0.178880	0.038236
E_P	0.002519	0.148847	0.038517	0.144933	0.205686	0.302519	0.178880	1.000000	-0.642540
DUMMY	0.052081	-0.309710	0.046427	0.028081	-0.032980	-0.035350	0.038236	-0.642540	1.000000

Table 31. Multicollinearity table containing the American firms under the studied period from 2000 to 2001

2001	BETA	LN_ME_	LN_BE_ME_	LN_A_ME_	LN_A_BE_	DEBT_ME	DEBT_BE	E_P	DUMMY
BETAS	1.000000	0.131193	-0.317658	-0.305731	-0.065056	-0.031503	0.057531	-0.127550	0.130425
LN_ME_	0.131193	1.000000	-0.204028	-0.212257	-0.065937	-0.216754	-0.162754	0.376436	-0.446874
LN_BE_ME_	-0.317658	-0.204028	1.000000	0.756482	-0.108282	0.203757	-0.267454	0.213233	-0.081512
LN_A_ME_	-0.305731	-0.212257	0.756482	1.000000	0.568256	0.635668	0.319197	-0.158803	0.066906
LN_A_BE_	-0.065056	-0.065937	-0.108282	0.568256	1.000000	0.709874	0.821687	-0.509666	0.204254
TD_ME	-0.031503	-0.216754	0.203757	0.635668	0.709874	1.000000	0.683125	-0.562158	0.136648
TD_BE	0.057531	-0.162754	-0.267454	0.319197	0.821687	0.683125	1.000000	-0.658126	0.125499
E_P	-0.127550	0.376436	0.213233	-0.158803	-0.509666	-0.562158	-0.658126	1.000000	-0.467864
DUMMY	0.130425	-0.446874	-0.081512	0.066906	0.204254	0.136648	0.125499	-0.467864	1.000000

Table 32. Multicollinearity table containing the American firms under the studied period from 2001 to 2002

2002	BETA	LN_ME_	LN_BE_ME_	LN_A_ME_	LN_A_BE_	DEBT_ME	DEBT_BE	E_P	DUMMY
BETAS	1.000000	0.091140	-0.357222	-0.421185	-0.197400	-0.340234	-0.131868	0.109661	0.165781
LN_ME_	0.091140	1.000000	-0.298831	-0.276379	0.008129	-0.288495	0.059116	0.458471	-0.450045
LN_BE_ME_	-0.357222	-0.298831	1.000000	0.899545	-0.084957	0.584450	-0.181069	-0.290985	-0.173941
LN_A_ME_	-0.421185	-0.276379	0.899545	1.000000	0.358826	0.698559	0.189327	-0.334889	-0.065618
LN_A_BE_	-0.197400	0.008129	-0.084957	0.358826	1.000000	0.344541	0.818750	-0.142095	0.222002
TD_ME	-0.340234	-0.288495	0.584450	0.698559	0.344541	1.000000	0.239377	-0.588830	0.167115
TD_BE	-0.131868	0.059116	-0.181069	0.189327	0.818750	0.239377	1.000000	-0.114867	0.172751
E_P	0.109661	0.458471	-0.290985	-0.334889	-0.142095	-0.588830	-0.114867	1.000000	-0.472229
DUMMY	0.165781	-0.450045	-0.173941	-0.065618	0.222002	0.167115	0.172751	-0.472229	1.000000

Table 33. Multicollinearity tables containing the American firms under the studied period from 2002 to 2003

2003	BETA	LN_ME_	LN_BE_ME_	LN_A_ME_	LN_A_BE_	DEBT_ME	DEBT_BE	E_P	DUMMY
BETAS	1.000000	0.172846	-0.291497	-0.321653	-0.053102	-0.203838	-0.030544	-0.220759	0.070674
LN_ME_	0.172846	1.000000	-0.313849	-0.297747	0.008312	-0.110337	-0.033123	0.059143	-0.222925
LN_BE_ME_	-0.291497	-0.313849	1.000000	0.716478	-0.339579	0.380451	-0.353160	0.289010	-0.120051

LN_A_ME_	-0.321653	-0.297747	0.716478	1.000000	0.412855	0.704569	0.245366	0.069559	0.132502
LN_A_BE_	-0.053102	0.008312	-0.339579	0.412855	1.000000	0.453245	0.791907	-0.283545	0.335389
TD_ME	-0.203838	-0.110337	0.380451	0.704569	0.453245	1.000000	0.259161	0.128874	0.175941
TD_BE	-0.030544	-0.033123	-0.353160	0.245366	0.791907	0.259161	1.000000	-0.120006	0.102535
E_P	-0.220759	0.059143	0.289010	0.069559	-0.283545	0.128874	-0.120006	1.000000	-0.565289
DUMMY	0.070674	-0.222925	-0.120051	0.132502	0.335389	0.175941	0.102535	-0.565289	1.000000

Table 34. Multicollinearity table containing the American firms under the studied period from 2003 to 2004

2004	**BETA**	**LN_ME_**	**LN_BE_ME_**	**LN_A_ME_**	**LN_A_BE_**	**DEBT_ME**	**DEBT_BE**	**E_P**	**DUMMY**
BETAS	1.000000	0.092529	0.145922	-0.010346	-0.017457	-0.080719	-0.207788	-0.159949	0.199643
LN_ME_	0.092529	1.000000	-0.204640	-0.236422	-0.243022	-0.194867	-0.178855	0.277989	-0.305128
LN_BE_ME_	0.145922	-0.204640	1.000000	0.846563	0.839780	0.485239	0.040962	0.045687	0.029112
LN_A_ME_	-0.010346	-0.236422	0.846563	1.000000	0.995854	0.709348	0.528889	-0.099953	0.099877
LN_A_BE_	-0.017457	-0.243022	0.839780	0.995854	1.000000	0.703335	0.521560	-0.107467	0.113622
TD_ME	-0.080719	-0.194867	0.485239	0.709348	0.703335	1.000000	0.590890	-0.326214	0.227291
TD_BE	-0.207788	-0.178855	0.040962	0.528889	0.521560	0.590890	1.000000	-0.279862	0.193239
E_P	-0.159949	0.277989	0.045687	-0.099953	-0.107467	-0.326214	-0.279862	1.000000	-0.648616
DUMMY	0.199643	-0.305128	0.029112	0.099877	0.113622	0.227291	0.193239	-0.648616	1.000000

Table 35. Multicollinearity table containing the American firms under the studied period from 2004 to 2005

2005	**BETA**	**LN_ME_**	**LN_BE_ME_**	**LN_A_ME_**	**LN_A_BE_**	**DEBT_ME**	**DEBT_BE**	**E_P**	**DUMMY**
BETAS	1.000000	0.100777	-0.253706	-0.257885	-0.058515	-0.151968	0.085133	-0.171469	0.407074
LN_ME_	0.100777	1.000000	-0.203328	-0.097941	0.116129	-0.062753	0.059070	0.127214	-0.221212
LN_BE_ME_	-0.253706	-0.203328	1.000000	0.753076	-0.164260	0.421800	-0.217906	-0.171236	-0.288780
LN_A_ME_	-0.257885	-0.097941	0.753076	1.000000	0.525296	0.749485	0.373332	-0.115066	-0.196082
LN_A_BE_	-0.058515	0.116129	-0.164260	0.525296	1.000000	0.578155	0.841547	0.048950	0.079507
TD_ME	-0.151968	-0.062753	0.421800	0.749485	0.578155	1.000000	0.463133	-0.103217	-0.081169
TD_BE	0.085133	0.059070	-0.217906	0.373332	0.841547	0.463133	1.000000	0.013009	0.112913
E_P	-0.171469	0.127214	-0.171236	-0.115066	0.048950	-0.103217	0.013009	1.000000	-0.308392
DUMMY	0.407074	-0.221212	-0.288780	-0.196082	0.079507	-0.081169	0.112913	-0.308392	1.000000

Table 36. Multicollinearity table containing the American firms under the studied period from 2005 to 2006

2006	**BETA**	**LN_ME_**	**LN_BE_ME_**	**LN_A_ME_**	**LN_A_BE_**	**DEBT_ME**	**DEBT_BE**	**E_P**	**DUMMY**
BETAS	1.000000	0.155683	-0.214500	-0.153877	0.052614	-0.104279	0.037163	-0.235347	0.132433
LN_ME_	0.155683	1.000000	-0.188511	-0.082794	0.122615	-0.010807	0.058651	0.249281	-0.430924
LN_BE_ME_	-0.214500	-0.188511	1.000000	0.741262	-0.210501	0.222883	-0.171430	0.473916	-0.157561
LN_A_ME_	-0.153877	-0.082794	0.741262	1.000000	0.500140	0.585246	0.406899	0.403672	-0.088064

LN_A_BE_	0.052614	0.122615	-0.210501	0.500140	1.000000	0.564838	0.813793	-0.023478	0.075009
TD_ME	-0.104279	-0.010807	0.222883	0.585246	0.564838	1.000000	0.827973	0.092781	0.068719
TD_BE	0.037163	0.058651	-0.171430	0.406899	0.813793	0.827973	1.000000	-0.024713	0.096706
E_P	-0.235347	0.249281	0.473916	0.403672	-0.023478	0.092781	-0.024713	1.000000	-0.579071
DUMMY	0.132433	-0.430924	-0.157561	-0.088064	0.075009	0.068719	0.096706	-0.579071	1.000000

Table 37. Multicollinearity table containing the American firms under the studied period from 2006 to 2007

2007	BETA	LN_ME_	LN_BE_ME_	LN_A_ME_	LN_A_BE_	DEBT_ME	DEBT_BE	E_P	DUMMY
BETAS	1.000000	0.051189	-0.016609	-0.044754	-0.033773	-0.099080	0.133430	-0.122982	0.092594
LN_ME_	0.051189	1.000000	-0.053478	0.030750	0.107110	0.053596	-0.039140	0.277561	-0.401779
LN_BE_ME_	-0.016609	-0.053478	1.000000	0.687837	-0.443912	0.327144	-0.430664	0.326998	-0.219888
LN_A_ME_	-0.044754	0.030750	0.687837	1.000000	0.345087	0.742069	0.179903	0.143149	-0.136031
LN_A_BE_	-0.033773	0.107110	-0.443912	0.345087	1.000000	0.493064	0.778952	-0.246105	0.116395
TD_ME	-0.099080	0.053596	0.327144	0.742069	0.493064	1.000000	0.303191	0.118085	-0.046927
TD_BE	0.133430	-0.039140	-0.430664	0.179903	0.778952	0.303191	1.000000	-0.137839	0.124183
E_P	-0.122982	0.277561	0.326998	0.143149	-0.246105	0.118085	-0.137839	1.000000	-0.538256
DUMMY	0.092594	-0.401779	-0.219888	-0.136031	0.116395	-0.046927	0.124183	-0.538256	1.000000

Table 38. Multicollinearity table containing the American firms under the studied period from 2007 to 2008

III. Heteroscedasticity

Table 39

year	1990-1991	1991-1992	1992-1993	1993-1994	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008
prob. F	0.7768	0.4884	0.0010	0.0026	0.0897	0.6575	0.0179	0.0376	0.4561	0.5827	0.3414	0.3690	0.9146	0.8963	0.4581	0.4611	0.4982	0.8596
prob. Chi-Square	0.7733	0.4847	0.0011	0.0029	0.0881	0.6549	0.018	0.0373	0.4505	0.5787	0.3367	0.3640	0.9135	0.8949	0.4524	0.4566	0.4934	0.8575
coefficient beta	**0.0741**	**0.1947**	**-0.1114**	**0.0522**	**0.1114**	**-0.1132**	**-0.0883**	**0.0222**	**0.0388**	**0.5172**	**-0.4499**	**-0.3729**	**-0.0147**	**0.0095**	**-0.3774**	**0.0516**	**-0.2507**	**-0.1783**
prob beta	*0.5519*	*0.258*	*0.2481*	*0.3514*	*0.0719*	*0.1577*	*0.4068*	*0.8521*	*0.7917*	***0.012***	***0.0321***	***0.0397***	*0.9401*	*0.9529*	*0.9529*	*0.6937*	*0.0611*	*0.323*

Table 40

year	1990-1991	1991-1992	1992-1993	1993-1994	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008
prob. F	0.2399	0.0596	0.4655	0.0243	0.2366	0.0136	0.0536	0.8532	0.5374	0.2301	0.5225	0.3370	0.1932	0.1978	0.0155	0.0307	0.0886	0.0073
prob. Chi-Square	0.2344	0.0589	0.4619	0.0244	0.2324	0.0139	0.0530	0.8516	0.5321	0.2265	0.5179	0.3321	0.1894	0.1939	0.0157	0.0306	0.0870	0.0078
coefficient ln(ME)	**0.0151**	**0.0207**	**-0.0260**	**-0.018**	**-0.0077**	**0.0140**	**0.0559**	**-0.0082**	**0.0885**	**-0.0032**	**-0.0392**	**-0.0138**	**-0.0587**	**-0.0791**	**0.0111**	**-0.0405**	**0.0216**	**0.0350**
prob ln(ME)	*0.4094*	*0.3762*	*0.1085*	*0.1106*	*0.7352*	*0.1269*	***0.011***	*0.5938*	***0***	*0.9022*	*0.1848*	*0.6031*	***0.0222***	***0.0003***	*0.5354*	*0.0532*	*0.234*	*0.2151*

Table 41

year	1990-1991	1991-1992	1992-1993	1993-1994	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008
prob. F	0.9952	0.7331	0.4064	0.0137	0.8910	0.5244	0.0009	0.3356	0.0893	0.8414	0.0096	0.2910	0.9890	0.7889	0.7594	0.9129	0.4412	0.7524
prob. Chi-Square	0.9951	0.7308	0.4028	0.0140	0.8897	0.5215	0.0010	0.3313	0.0874	0.8396	0.0099	0.2863	0.9888	0.7862	0.7561	0.9120	0.4363	0.7488
coefficient ln(BE/ME)	**-0.1046**	**-0.0703**	**0.0818**	**-0.0033**	**-0.0589**	**-0.0334**	**0.1087**	**0.0163**	**-0.0909**	**-0.1764**	**0.0263**	**0.2016**	**-0.0454**	**0.0642**	**-0.0336**	**0.0198**	**0.0206**	**-0.0249**
prob ln(BE/ME)	***0.0218***	*0.3416*	*0.0744*	*0.934*	*0.2181*	*0.1633*	*0.1881*	*0.6784*	*0.0527*	***0.0153***	*0.7486*	***0.0006***	*0.3554*	*0.1493*	*0.5175*	*0.663*	*0.6577*	*0.6786*

Table 42

year	1990-1991	1991-1992	1992-1993	1993-1994	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008
prob. F	0.4822	0.1490	0.0027	0.0012	0.1355	0.0450	0.0160	0.0837	0.1986	0.2914	0.3598	0.2810	0.3993	0.4641	0.0241	0.0705	0.1715	0.0351
prob. Chi-Square	0.4718	0.1467	0.0030	0.0015	0.1329	0.0456	0.0167	0.0828	0.1937	0.2857	0.3529	0.2749	0.3915	0.4556	0.0249	0.0700	0.1679	0.0357
coefficient ln(ME)	**0.0144**	**0.0182**	**-0.0283**	**-0.0177**	**-0.0075**	**-0.0123**	**0.0574**	**-0.0091**	**0.0888**	**-0.0144**	**-0.0324**	**-0.0069**	**-0.0596**	**-0.0818**	**0.0160**	**-0.0417**	**0.0276**	**0.0364**
coefficient beta	**0.0677**	**0.1813**	**-0.1227**	**0.0508**	**0.1113**	**-0.1038**	**-0.0974**	**0.0333**	**-0.0225**	**0.5394**	**-0.4230**	**-0.3667**	**0.0469**	**0.1097**	**-0.3884**	**0.0787**	**-0.2824**	**-0.1912**
prob ln(ME)	*0.4329*	*0.4396*	*0.087*	*0.1146*	*0.7402*	*0.1701*	***0.0022***	*0.5626*	***0***	*0.5816*	*0.2702*	*0.7955*	***0.0222***	***0.0002***	*0.3693*	***0.0402***	*0.1284*	*0.1936*
prob beta	*0.5885*	*0.2951*	*0.2109*	*0.358*	*0.0734*	*0.2124*	*0.3579*	*0.754*	*0.8656*	***0.0105***	***0.0448***	***0.0459***	*0.8088*	*0.4725*	***0.0117***	*0.5445*	***0.0363***	*0.2459*

Table 43

year	**1990-1991**	**1991-1992**	**1992-1993**	**1993-1994**	**1994-1995**	**1995-1996**	**1996-1997**	**1997-1998**	**1998-1999**	**1999-2000**	**2000-2001**	**2001-2002**	**2002-2003**	**2003-2004**	**2004-2005**	**2005-2006**	**2006-2007**	**2007-2008**
prob. F	0.5589	0.0729	0.8114	0.9910	0.8342	0.8223	0.1001	0.8297	0.3885	0.9417	0.1745	0.3695	0.9155	0.0023	0.8138	0.3866	0.1334	0.7695
prob. Chi-Square	0.5486	0.0724	0.8080	0.9908	0.8299	0.8190	0.0988	0.8259	0.3801	0.9402	0.1710	0.3622	0.9131	0.0028	0.8084	0.3799	0.1309	0.7627
coefficient ln(A/ME)	**-0.1006**	**-0.0867**	**0.0925**	**0.0014**	**-0.0595**	**-0.0130**	**0.0935**	**0.0149**	**-0.1275**	**-0.2128**	**0.0728**	**0.2155**	**-0.0485**	**0.0867**	**-0.0649**	**0.0130**	**0.0361**	**-0.0514**
coefficient ln(A/BE)	**0.1520**	**-0.0504**	**-0.0044**	**0.1958**	**-0.1281**	**0.0123**	**0.0989**	**0.0040**	**-0.0235**	**-0.2768**	**0.3150**	**-0.0541**	**-0.0329**	**-0.0005**	**0.0779**	**-0.0667**	**0.0587**	**-0.0259**
prob ln(A/ME)	***0.0285***	*0.2451*	***0.0471***	*0.9647*	*0.2064*	*0.2928*	*0.1267*	*0.7065*	***0.011***	***0.0023***	*0.2878*	***0.0002***	*0.3268*	*0.9958*	*0.8945*	*0.7784*	*0.4458*	*0.444*
prob LN(A/BE)	***0.0473***	*0.6498*	*0.9535*	***0.0066***	*0.2124*	*0.2739*	*0.5221*	*0.9581*	*0.7489*	***0.0432***	***0.0169***	*0.5276*	*0.7697*	***0***	*0.8733*	*0.3352*	*0.395*	*0.7546*

Table 44

year	**1990-1991**	**1991-1992**	**1992-1993**	**1993-1994**	**1994-1995**	**1995-1996**	**1996-1997**	**1997-1998**	**1998-1999**	**1999-2000**	**2000-2001**	**2001-2002**	**2002-2003**	**2003-2004**	**2004-2005**	**2005-2006**	**2006-2007**	**2007-2008**
prob. F	0.1572	0.0022	0.7230	0.8942	0.9806	0.1657	0.1350	0.0629	0.3273	0.4979	0.0025	0.8690	0.7626	0.2187	0.0013	0.0081	0.0177	0.9885
prob. Chi-Square	0.1529	0.0025	0.7185	0.8912	0.9800	0.1644	0.1328	0.0625	0.3196	0.4908	0.0029	0.8655	0.7568	0.2135	0.0017	0.0088	0.0185	0.9880
coefficient E/P	**-0.1220**	**0.2701**	**0.0275**	**-0.0047**	**-0.2022**	**-0.3344**	**0.3807**	**0.1000**	**-0.2125**	**-0.1758**	**0.3462**	**-0.1864**	**-0.2194**	**-0.1724**	**0.0139**	**-0.0239**	**-0.1708**	**-0.1708**
coefficient dummy	**0.1983**	**-0.1387**	**-0.0038**	**0.0241**	**-0.0882**	**0.1009**	**-0.1104**	**0.0594**	**-0.2051**	**0.2356**	**0.0036**	**-0.2315**	**0.0513**	**0.2319**	**-0.2950**	**0.1877**	**-0.1075**	**-0.1075**
prob E/P	*0.6363*	*0.4106*	*0.8686*	*0.9791*	*0.3520*	***0.0056***	*0.1655*	*0.5431*	*0.5409*	*0.4373*	*0.1933*	*0.2017*	*0.0610*	*0.3484*	*0.9248*	*0.2132*	*0.4213*	*0.5829*
prob dummy	*0.2033*	*0.5817*	*0.9741*	*0.8373*	*0.5040*	*0.1489*	*0.3966*	*0.5039*	*0.1259*	*0.0916*	*0.9876*	*0.0959*	*0.6810*	***0.0474***	***0.0261***	*0.0935*	*0.4168*	*0.8555*

Table 45

year	**1990-1991**	**1991-1992**	**1992-1993**	**1993-1994**	**1994-1995**	**1995-1996**	**1996-1997**	**1997-1998**	**1998-1999**	**1999-2000**	**2000-2001**	**2001-2002**	**2002-2003**	**2003-2004**	**2004-2005**	**2005-2006**	**2006-2007**	**2007-2008**
prob. F	0.9427	0.4011	0.8260	0.7208	0.9084	0.8231	0.5149	0.7103	0.7212	0.8025	0.5065	0.5378	0.9435	0.0000	0.7620	0.4240	0.7873	0.9907
prob. Chi-Square	0.9405	0.3954	0.8227	0.7144	0.9058	0.8199	0.5082	0.7046	0.7140	0.7981	0.4990	0.5251	0.9417	0.0000	0.7555	0.4171	0.7821	0.9898
coefficient TD/ME	**-0.1945**	**-0.1405**	**0.0409**	**0.0203**	**-0.0800**	**-0.0235**	**-0.0067**	**0.0226**	**-0.0091**	**-0.0396**	**-0.0567**	**0.1030**	**0.0141**	**0.0730**	**0.0231**	**-0.0383**	**0.0202**	**0.0030**
coefficient TD/BE	**0.0944**	**0.0533**	**0.0037**	**0.0638**	**-0.0265**	**-0.0012**	**0.1539**	**-0.0088**	**-0.0183**	**-0.1838**	**0.1859**	**-0.0131**	**-0.0020**	**0.0273**	**0.0434**	**-0.0051**	**-0.0065**	**0.0162**
prob TD/ME	***0.0039***	***0.0208***	*0.2802*	*0.2941*	*0.0545*	*0.2812*	*0.8842*	*0.5895*	*0.7536*	*0.1156*	*0.4218*	***0.0274***	*0.7558*	*0.3877*	*0.5598*	*0.3320*	*0.7097*	*0.8952*
prob TD/BE	***0.0280***	*0.1224*	*0.7700*	***0.0238***	*0.4036*	*0.9531*	*0.0956*	*0.8293*	*0.3400*	***0.0026***	***0.0271***	*0.1811*	*0.9590*	*0.2326*	*0.4395*	*0.7544*	*0.8283*	*0.2642*

Table 46

year	1990-1991	1991-1992	1992-1993	1993-1994	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008
prob. F	0.8587	0.0529	0.9381	0.1513	0.8128	0.3885	0.2190	0.9642	0.9583	0.7566	0.5104	0.6805	0.7837	0.0000	0.2249	0.0537	0.5208	0.7522
prob. Chi-Square	0.8435	0.0552	0.9336	0.1501	0.7995	0.3839	0.2151	0.9606	0.9531	0.7431	0.4957	0.6638	0.7680	0.0000	0.2193	0.0565	0.5053	0.7333
coefficient ln(ME)	0.0065	0.0134	-0.0232	-0.0120	-0.0203	0.0000	0.0583	-0.0074	0.0867	0.0062	-0.0431	-0.0031	-0.0669	-0.0789	0.0182	-0.0420	0.0225	0.0185
coefficient TD/ME	-0.1905	-0.1357	0.0259	0.0156	-0.0895	-0.0236	0.0200	0.0206	-0.0046	-0.0398	-0.0911	0.1026	-0.0194	0.0509	0.0271	-0.0467	0.0273	0.0060
coefficient TD/BE	0.0910	0.0530	0.0057	0.0640	-0.0248	-0.0011	0.1301	-0.0091	-0.0130	-0.1851	0.1928	-0.0130	0.0099	0.0366	0.0474	-0.0017	-0.0110	0.0090
prob ln(ME)	0.7184	0.5682	0.1709	0.4210	0.3833	0.8861	0.0092	0.6329	0.0000	0.8023	0.1674	0.9080	0.0234	0.0001	0.3736	0.0385	0.2231	0.0032
prob TD/ME	0.0054	0.0273	0.5105	0.4394	0.0380	0.2804	0.6637	0.6260	0.8601	0.1156	0.2224	0.0293	0.6779	0.5091	0.4974	0.2337	0.6167	0.7843
prob TD/BE	0.0397	0.1258	0.6533	0.0236	0.4360	0.9577	0.1501	0.8250	0.4556	0.0026	0.0217	0.1863	0.7911	0.0533	0.4004	0.9140	0.7165	0.5227

Table 47

year	1990-1991	1991-1992	1992-1993	1993-1994	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008
prob. F	0.5160	0.0260	0.7483	0.0365	0.6730	0.1506	0.0125	0.1723	0.4459	0.7182	0.0039	0.3875	0.8069	0.6781	0.0094	0.0287	0.0690	0.0661
prob. Chi-Square	0.4937	0.0289	0.7357	0.0407	0.6547	0.1504	0.0152	0.1708	0.4289	0.7022	0.0058	0.3747	0.7908	0.6582	0.0128	0.0324	0.0726	0.0707
coefficient ln(ME)	0.0200	-0.0039	-0.0176	-0.0202	-0.0281	0.0000	0.0704	-0.0056	0.0784	-0.0080	-0.0569	0.0076	-0.0676	-0.0600	-0.0131	-0.0269	0.0263	0.0309
coefficient ln(BE/ME)	-0.0825	-0.0867	0.0649	-0.0152	-0.0797	-0.0014	0.1623	0.0113	-0.0565	-0.1695	-0.0333	0.2261	-0.1467	0.0580	-0.0362	0.0364	0.0592	-0.0328
coefficient E/P	0.0053	0.2844	-0.0031	-0.0145	-0.1147	-0.3315	-0.0180	0.0984	0.0046	0.1253	0.3217	-0.3028	-0.2909	-0.2805	0.0399	-0.0049	-0.3475	0.1235
coefficient dummy	0.2252	-0.1438	0.0093	0.0016	-0.1120	0.1015	-0.0750	0.0504	-0.0868	0.2189	-0.0841	-0.2300	-0.1574	0.1499	-0.3015	0.1908	-0.0716	0.0179
prob ln(ME)	0.3006	0.8739	0.3261	0.1409	0.2971	0.9733	0.0048	0.7530	0.0003	0.7727	0.1429	0.8002	0.0326	0.0087	0.4858	0.2056	0.2209	0.2922
prob ln(BE/ME)	0.1100	0.3172	0.2190	0.7443	0.1607	0.9559	0.1292	0.7897	0.2908	0.0909	0.7446	0.0003	0.0115	0.1997	0.4945	0.3722	0.2983	0.6144
prob E/P	0.9849	0.4256	0.9856	0.9439	0.6117	0.0120	0.9564	0.5535	0.9901	0.6625	0.2601	0.0394	0.0256	0.1223	0.8114	0.8601	0.3104	0.5669

prob dummy	*0.1493*	*0.5388*	*0.9363*	*0.9880*	*0.4100*	*0.1515*	*0.6028*	*0.5926*	*0.4882*	*0.1208*	*0.7365*	*0.0983*	*0.2653*	*0.1851*	***0.0257***	*0.0928*	*0.5470*	*0.8927*

Table 48

year	1990-1991	1991-1992	1992-1993	1993-1994	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008
prob. F	0.3469	0.0130	0.9184	0.2338	0.7685	0.4953	0.0123	0.3664	0.1127	0.9732	0.0005	0.3454	0.8942	0.0114	0.0138	0.0310	0.0411	0.1184
prob. Chi-Square	0.3318	0.0162	0.9099	0.2295	0.7478	0.4883	0.0158	0.3551	0.1167	0.9687	0.0012	0.3338	0.8795	0.0159	0.0184	0.0360	0.0468	0.1224
coefficient ln(ME)	0.0198	-0.0050	-0.0170	-0.0197	-0.0279	**-0.0152**	0.0696	-0.0071	0.0766	0.0205	-0.0404	-0.0007	-0.0639	-0.0598	-0.0068	-0.0250	0.0228	0.0345
Coefficient ln(A/ME)	**-0.0763**	**-0.1014**	**0.0754**	**-0.0119**	**-0.0792**	**0.0016**	**0.1588**	**0.0075**	**-0.0918**	**-0.1958**	**0.0285**	**0.2204**	**-0.1494**	**0.0627**	**-0.3029**	**0.0319**	**0.0776**	**-0.0575**
coefficient ln(A/BE)	**0.1171**	**-0.0138**	**0.0155**	**0.2164**	**-0.1098**	**0.0017**	**-0.0041**	**0.0221**	**-0.0484**	**-0.3412**	**0.3166**	**-0.0777**	**0.0343**	**-0.0424**	**0.3286**	**-0.0840**	**0.0217**	**-0.0253**
Coefficient E/P	**-0.0520**	**0.2927**	**-0.0318**	**0.0063**	**-0.1289**	**-0.3558**	**-0.0990**	**0.1172**	**0.0065**	**0.1801**	**0.1019**	**-0.1626**	**-0.3047**	**-0.2781**	**0.0239**	**-0.0027**	**-0.4145**	**0.0946**
coefficient dummy	**0.2015**	**-0.1129**	**-0.0295**	**-0.0635**	**-0.1130**	**0.1095**	**-0.0814**	**0.0476**	**-0.0895**	**0.2835**	**-0.1373**	**-0.2331**	**-0.1331**	**0.1405**	**-0.3156**	**0.1971**	**-0.0991**	**0.0179**
prob ln(ME)	*0.3087*	*0.8314*	*0.3408*	*0.1952*	*0.2916*	*0.2650*	***0.0052***	*0.6926*	***0.0003***	*0.4422*	*0.2837*	*0.9802*	***0.0439***	***0.0023***	*0.7169*	*0.2526*	*0.1348*	*0.2443*
prob ln(A/ME)	*0.1495*	*0.2636*	*0.1576*	*0.7456*	*0.1564*	*0.9018*	*0.1379*	*0.8622*	*0.0992*	***0.0378***	*0.7847*	***0.0004***	***0.0101***	*0.2621*	***0.0184***	*0.4283*	*0.1476*	*0.4138*
prob ln(A/BE)	*0.1414*	*0.9288*	*0.8514*	***0.0053***	*0.3088*	*0.8966*	*0.9795*	*0.7937*	*0.5125*	***0.0303***	***0.0040***	*0.4609*	*0.7652*	*0.6022*	***0.0108***	*0.2245*	*0.6870*	*0.7782*
prob E/P	*0.8613*	*0.4013*	*0.8543*	*0.9750*	*0.5625*	***0.0118***	*0.7702*	*0.4952*	*0.9858*	*0.5029*	*0.7581*	*0.3265*	***0.0199***	*0.0568*	*0.8658*	*0.9226*	*0.1138*	*0.6643*
prob dummy	*0.2135*	*0.6013*	*0.8062*	*0.6007*	*0.3985*	*0.1446*	*0.5701*	*0.6151*	*0.4671*	***0.0336***	*0.5925*	*0.0908*	*0.3506*	*0.1750*	***0.0201***	*0.0873*	*0.5122*	*0.8931*

Table 49

year	1990-1991	1991-1992	1992-1993	1993-1994	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008
prob. F	0.6884	0.0130	0.9651	0.3192	0.8225	0.4036	0.2905	0.6804	0.8409	0.9629	0.0280	0.2531	0.9542	0.0000	0.0884	0.0364	0.2062	0.9296
prob. Chi-Square	0.6589	0.0162	0.9606	0.3092	0.8038	0.3981	0.2838	0.6607	0.8204	0.9570	0.0332	0.2474	0.9455	0.0000	0.0939	0.0416	0.2038	0.9160
coefficient ln(ME)	**0.0190**	**-0.0050**	**-0.0238**	**-0.0130**	**-0.0225**	**0.0000**	**0.0489**	**-0.0061**	**0.0845**	**0.0172**	**-0.0649**	**-0.0204**	**-0.0454**	**-0.0702**	**-0.0035**	**-0.0319**	**0.0203**	**0.0175**
coefficient TD/ME	**-0.1883**	**-0.1014**	**0.0235**	**0.0170**	**-0.0846**	**0.0086**	**-0.0066**	**0.0316**	**-0.0010**	**-0.0332**	**-0.1369**	**0.1087**	**-0.0893**	**0.0897**	**0.0482**	**-0.0358**	**0.0356**	**0.0016**
coefficient TD/BE	**0.0799**	**-0.0138**	**0.0068**	**0.0676**	**-0.0266**	**-0.0245**	**0.1311**	**-0.0015**	**-0.0151**	**-0.1981**	**0.2000**	**-0.0133**	**0.0121**	**0.0035**	**0.0619**	**-0.0071**	**-0.0137**	**0.0122**
coefficient E/P	**-0.0329**	**0.2927**	**0.0165**	**-0.0059**	**-0.1011**	**-0.3498**	**0.2746**	**0.1550**	**-0.2608**	**0.0022**	**0.3279**	**-0.2557**	**-0.3708**	**-0.3416**	**0.1459**	**-0.0249**	**-0.2179**	**0.0222**
coefficient dummy	**0.2852**	**-0.1129**	**-0.0246**	**-0.0644**	**-0.0819**	**0.1134**	**-0.0642**	**0.0609**	**-0.1104**	**0.3015**	**-0.1231**	**-0.3009**	**-0.0632**	**0.0397**	**-0.3048**	**0.1554**	**-0.0746**	**0.0008**
prob ln(ME)	*0.3104*	*0.8314*	*0.1699*	*0.3948*	*0.3547*	*0.9204*	***0.0365***	*0.7158*	***0.0000***	*0.4905*	***0.0367***	*0.4957*	*0.1670*	***0.0001***	*0.8587*	*0.1167*	*0.3272*	***0.0127***
prob TD/ME	***0.0060***	*0.2636*	*0.5682*	*0.4453*	*0.0615*	*0.7192*	*0.9007*	*0.4780*	*0.9690*	*0.3249*	***0.0147***	***0.0224***	*0.1064*	*0.2880*	*0.2025*	*0.0753*	*0.5305*	*0.9457*
prob TD/BE	*0.0668*	*0.9288*	*0.6083*	***0.0286***	*0.4109*	*0.2435*	*0.1479*	*0.9725*	*0.4035*	***0.0016***	***0.0003***	*0.1715*	*0.7475*	*0.8841*	*0.2397*	*0.5249*	*0.6614*	*0.4460*
prob E/P	*0.8986*	*0.4013*	*0.9245*	*0.9765*	*0.6507*	***0.0100***	*0.3819*	*0.4128*	*0.4247*	*0.9940*	*0.2891*	*0.3658*	***0.0223***	*0.1478*	*0.4557*	*0.2236*	*0.4798*	*0.6841*
prob dummy	*0.0698*	*0.6013*	*0.8389*	*0.6000*	*0.5437*	*0.1210*	*0.6245*	*0.5241*	*0.3775*	***0.0303***	*0.6376*	*0.0576*	*0.6509*	*0.7162*	***0.0087***	*0.1628*	*0.5386*	*0.9782*