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A quantitative study of the P/E ratio on the Swedish market

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Abstract

Title: A quantitative study of the P/E ratio on the Swedish market
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Key words: P/E ratio, dividend yield, interest rate, risk, growth, debt to equity, market value, market to book, regression analysis and Swedish stock market

Purpose: The purpose of this study is to find out which variables influence the P/E ratio on the Swedish stock market. It also aims to specify how a change in these variables affects the P/E ratio.

Methodology: For this study we have chosen a quantitative approach and to divide the regression into two parts. In the first part we only included four macro variables and the second part containing all variables. The secondary data that we use is primarily based on international articles and book.

Theoretical perspectives: The theoretical review includes theories about the P/E ratio and the variables that are used in our study. It also includes theories about the regression analysis.

Empirical findings: In the empirical study we have conducted two regression analysis for every sector. The results are presented for each of the nine different sectors and finally the findings for the entire market are presented. These empirical results are presented together with the analysis, this has been done in order to facilitate the interpretation of the empirical findings.

Conclusions: The conclusions that could be drawn from this study are that the P/E ratio for the nine different sectors has different forces that drive them. These effects are backed up with statistically proved coefficients and for the market five out of seven variables are proved to affect the P/E ratio.

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1 Introduction

In this chapter we will present the background for the chosen topic, issues about the P/E ratio and the different factors. The purpose for this study is to identify what macro factors that affect the P/E ratio and what industry specific factors that have an impact on the ratio. We will also present previous studies that have been done in this field. Thereafter we will present the discussion of the problem and the purpose of this study.

1.1 Background

To value a company and its stock many investors look at the P/E ratio, price over earnings. It can be used as a multiple or just as an indication whether a company is "under or over valued". To use the P/E ratio as a benchmark for valuation is a very popular approach thanks to its uncomplicated procedure. The P/E ratio has been the matter of attention for many prior academic reports. The first study of the P/E ratio was done by Nicolson (1960), who showed that companies with low P/E ratio on average subsequently yield higher returns than high P/E companies. The difference, Nicolson demonstrated, was the value premium. According to Nicolson's results an investor of a common stock should place its investments in companies with low P/E ratio. These results were later confirmed by another study made by Basu (1975, 1977). The majority of studies done on P/E ratio, aim to identify the fundamental corporate factors and forces which describe the variations in the P/E ratio across stocks. There are some studies that have used the corporate fundamental factors as explanatory forces in cross-sectional variations of P/E ratio. Some of them are Malkiel and Cragg (1970), Beaver and Morse (1978), Bartholdy (1993) and Bourgeois and Lussier (1994), who all focused on trying to explain the variability of the P/E ratio. Other studies, including Basu (1977), Bauman and Miller (1977), Goodman and Peavy III (1983) and Johnson, Fiore and Zuber (1989) estimated the relative performance of low and high P/E portfolios. This was done in order to establish the strategy that stocks with low P/E ratio is under valued and therefore should outrun stocks with high P/E ratio.

In recent years the studies have become more focused on the P/E as an explanatory variable instead of its anomaly effect. These papers have often analysed to what extent one variable

can affect the P/E ratio. This was done by Amoako-Adu and Smith in 2002 when they analysed the relationship between the interest rate and the price earnings ratio in the Canadian market. This study looked at the TSE 300 index and seven under groups (financial services, utilities, merchandising, consumer products, industrial products, metal and minerals and gold and silver). They found that there was a negative correlation between the interest rate and the P/E ratio, in other words, when the interest rates increased the P/E ratio decreased. In 2005 Anderson and Brooks made a similar study, in which they decomposed the price earnings ratio to improve it as a tool for valuation. They say that the P/E ratio of a particular stock is partly determined by outside influences, for example the year it is measured, the size of the company and the sector in which the company is operating. In this study they examined all companies at the UK stock exchange during 1975-2003 and decomposed the outside effects. By giving the outside variables different weights and by that, isolate these influences, they were able to better predict the future returns.

Papers concerning this area are important due to the fact that the P/E ratio is widely used, for example as explanatory variable when trying to predict stocks future returns. Fama and French did this in a study in 1992 when they used the P/E ratio together with the book value of equity and the size of the company. The P/E ratio is also very important since many investors use the ratio as a comparable multiple for investment choices and when they valuing a company. The knowledge of the explanatory forces to the P/E ratio is therefore vast. Prior to this paper there have been similar studies on other markets, but none of them have focused on finding the total explanatory forces to P/E on both company basis and time basis. As mentioned above there have been some studies which resembles these ones and there has been several studies which examined the stock returns and its influences on the P/E ratio. The objective of this study is to map and examine the influences and explanatory forces to the price earnings ratio. We will try to identify how four macroeconomic factors affect the P/E ratio and thereafter attempt to spot what industry specific factors that influences the P/E ratio for nine different sectors. The study will be made upon data from the Swedish stock exchange over a period from 1998 to 2007. As far as we have found out this is the first time someone has done something similar on the Swedish market.

1.2 Discussion of problem

Studying the P/E ratio and what affects it is very importance since, as far as we know, no similar studies has been done on the Swedish market. All investors and business or economic students know that the macro environment often has a great impact on companies' performance and therefore affect the future earnings and stock price. Thus it is of great interest to try to explain how a change in these variables affects the P/E ratio.
In the first part of the study we will examine the following macro variables:

- What will happen with the P/E ratio when the interest rate fluctuates?
- When the risk on the stock market change, what influence will that have on the P/E ratio?
- Does the dividend yield have any affect on the P/E ratio?
- Is market growth a variable that will affect the P/E ratio?

In the second part we will add the following three industry specific variables and examine the following:

- Does the debt to equity ratio have any affect on the P/E ratio?
- Does size, expressed as the market value influence the P/E ratio?
- Does the similar multiple, market to book have any affect on the P/E ratio?

We will try to define to what extend these variables affect the P/E ratio and try to display differences and similarities in the nine biggest sectors of the Swedish market.

1.3 Purpose

The purpose of this study is to identify the variables that affect the P/E ratio on the Swedish market and its biggest sectors. By this we mean that the study will explain what factors that steers the P/E ratio. This paper can therefore be useful when investors or private persons analyze the market or specific companies with the P/E ratio

1.4 Target group

This study is primarily for investors in the Swedish market but also for finance students and people with an interest in the stock market. Since the study is presented in English it will also be available to international investors that have an interest in the Swedish market. To fully understand the material presented in this study the reader should have previous knowledge in the area as well as some econometric comprehension.

1.5 Outline

Chapter 2: In this chapter the procedures throughout the study will be illustrated. We present our choices of methodology and sources that provided information are presented. The chapter ends with a detailed presentation of the variables used.

Chapter 3: In this part of the study we display and explain the theory needed to understand the methodology and the analysis. It will cover both the theory of the multiple of interest and the theory used when conducting the tests to ensure the significance.

Chapter 4: In this fourth chapter, the results that we establish will be analyzed. We will use the theories and as thoroughly as possible tie the analysis back to them. We will also cover the variables one by one and in the end, tie the analysis together.

Chapter 5: In this last chapter our conclusions will be presented. The conclusion will try to answer the questions which we asked ourselves in the beginning of this study. In other words, will we display the significant variables to the P/E ratio on the whole market and the individual sectors.

Chapter 6: References

Chapter 7: Appendix

2 Methodology

In this chapter the procedures throughout the study will be illustrated. We present our choices of methodology and sources that provided information are presented. The chapter ends with a detailed presentation of the variables used

2.1 Methodological approach

The purpose of this empirical study is to explain the explanatory factors and forces of the P/E ratio, on the Swedish market. We will try to extend the current research in order to show the concept, both macro factors and the industry specific forces. It is also interesting to illustrate and examine the relationship between the variables and the ratio, in terms of correlation and sensitivities. Based upon our problem we are now able to find the most suitable method to use for this study. To verify or possibly dismiss our hypothesis, we will use a multiple time-series regression. We have also looked at earlier studies of similar kind, which we found looking into databases like Elin@Lund and Libris, and based our method upon those. We have chosen a quantitative approach when conducting this study, since it fits this study the best. The quantitative approach makes it possible to study more observations, thus making it more consistent when drawing conclusions, and making generalizations (Bryman 1995).

2.2 Data

To get started with the data collecting we searched in the literature and earlier studies of the P/E ratio to find out if there were a pattern. The studies that we have found most alike our used indexes. Therefore we used Affärsvärldens general index (AFGX) based on the Swedish market. We have chosen to collect data over a nine years period, starting from April 1998. The reason for this is that the index (AFGX) was changed 1998, so the data wouldn't be comparable if we had included earlier observations. To collect sufficient data from only nine years forced us to use monthly observations in order to get the amount of information which is needed to observe the characteristics of the P/E. The choice of using the index nine years back is as mentioned above based on the fact that the index added mid-cap companies in 1998. This will make a comparison before 1998 difficult and not very accurate. In the index

there are companies included which are dead as well and therefore lacks values for the rest of time

Affärsvärldens general index, AFGX, is the oldest index in Sweden and set up in 1937, but was changed a few years later. There is now a record of the index dating back to 1901. In February 2000 the AFGX was changed again, this time the base value 100 was moved forward from 1979-12-30 to 1995-12-29. This resulted in an adjustment from of 5094 at 2001-01-31 to 292,5 at 2001-02-01 (Affärsvärlden). This could be important to keep in mind when observing the index, but it doesn't affect our study. As part of our study we will attempt to describe the P/E ratio's forces to the sectors which are another reason for choosing AFGX. The index is divided into the nine biggest sectors in Sweden, they are even divided into smaller sectors however we have found it unnecessary to capture differences in them all. The sectors are: commodities, consumer goods, financials, healthcare, industrials, information technology, media and entertainment, services and telecommunications. The base value for these nine sectors is also 100. The index is calculated every minute without delay, it contains good information about the average development of the market and therefore it is widely used. The index is also calculated with the dividend replaced back to the prices.

The data material which is addressed above have been collected from DataStream and sorted in Ms Excel. To be able to study the P/E ratio we computed a regression analysis, with the help of the econometric program Eviews. In these three programs the data have been handled with our outmost care to avoid any possible mistakes. We have also cross-checked all values for any abnormal figures and excluded these to generate a high level of validity. The choice of data elimination was based on earlier studies. Every month when a company had a P/E ratio over 100 that particular monthly data were eliminated. For financials and commodities the expectant level were 50 and for industrials and consumer goods the cut-off was 80 (Amoako-Adu and Smith, 2002). In this study of the P/E ratio there will be several variables which will be tested in the regression. These variables will be addressed and motivated in greater detail later on in this chapter. The variables will be of altered character, some will be of macro characters which are outside the corporate control and others will be sector-specific ones.

2.3 The regression

Different methods of regression can be applied when analysing a relationship between variables. Our study will use a multiple regression analysis, the different variables will be analysed in order to determine the affect to the P/E ratio. We have chosen to set up a hypothesis which implies that the coefficients will be insignificant if they are explanatory, and they should also be proven to be statistically significant in affecting the P/E ratio. To do this we have chosen our level of significance at 90 %, based upon similar studies.

To exclude the possibility of other factors, which have any explanatory power in the regression, no factor should in advance be excluded. However there should be a possible way of adding the factor, so we have used seven factors which all were possible to gather information about. We have chosen to do both a time-series analysis and a pulled analysis regression. The advantage of the pulled regression is that it enables you to analyse both variables that are fixed as well as individual, which is exactly what we are intending to do.

2.4 The explanatory variables

The variables which we have chosen to study are mainly due to the study by Amoako-Adu and Smith (2002), where they studied the P/E on the Canadian market. The reason for using these variables is due to the high possibility of having a relationship to the P/E ratio. We have also added some variables to extend our study in order to examine which variables that have any affect to the P/E ratio. As mentioned above the variables are of two characteristics, the first four are the macro variables and the last three are the corporate-specific once.

2.4.1 Interest rate

As a macro variable we will analyse the relationship of the P/E ratio and interest rate, which will be represented by government bond rates with the maturity of one month (Sweden Treasury Bill 30 Day – Middle rate). Intuitively there should be a negative correlation between the price earnings ratio and the interest rates, which seems reasonable. When the interest rate is at low level it is cheap to borrow and the return on bonds is minor, in other words the alternative cost is small, therefore many agents invest.

2.4.2 Dividend yield

Another variable analysed is the dividend yield for the market. Dividend yield is derived by calculating the total dividend amount for a sector and expressing it as a percentage of the total market value for the constituents of that sector. This provides an average of the individual yields of the constituents weighted by market value. Mainly large dividends are associated with companies that expect high and stable future earnings. A company's management won't raise dividends unless they are certain that they can uphold that level in the future. The P/E ratio should thus be positively related to the dividend yield.

2.4.3 Growth rate

The growth of the market is the third variable, which will be analysed in terms of its relation to the P/E ratio. Growth should have a strong connection to all multiples, and is thus a large indicator of where the market is heading. Growth rate in our case will be represented by changes in the index of the entire market on monthly bases, thus it will correspond to the movements of the Swedish stock exchange. Therefore the growth should have a positive relationship to the P/E ratio.

2.4.4 Risk

In the analysis of the P/E ratio there should be a representation of some kind of risk variable. At first we wanted to express it with the risk premium, which is the spread between the corporate bond yield and the government bond yield. The relationship between the risk premium and the P/E ratio is intuitively negative, thus the higher the risk premium is the lower the price earnings ratio. This seemed to be the best solution, though the existence of corporate bonds on the Swedish market is not that wide spread as it is in many other countries for example, in the US. Therefore we calculated the volatility every month from the general index. This was done by first calculating the daily changes and then the standard deviation for every month. The relationship should then imply the same as for the risk premium, thus it should be negative. This is one way of seeing it; another is that if the risk increases the value

of the stock value, because the stock can be seen as a call option on the firm's assets, and the option value increases with higher volatility (Ogden, Jen and O'Connor, 2003). This implies that there could be a positive relationship.

2.4.5 Size, Market value

To investigate the forces driving the P/E ratio between different sectors it would be of no interest if not size would be included. The size of the company should be a driving factor to a P/E ratio, thus we try to model this relationship. We show size as the market value and therefore calculate the average of the different sectors market value at every point of time in our sample. Intuitively there is a positive relationship between size and the price earnings ratio. Larger companies often get more positive expectations upon future cash flows and related to less risk, therefore have higher P/E.

2.4.6 Debt to equity

As a corporate specific factor it is very interesting to analyse if there is a relationship between debt and the P/E ratio. In our study we have expressed this variable as the debt to equity ratio of the companies. Since this variable only change once a year when the companies release their annual reports, it might mean that there is no significance in our conclusion, though it is still an interesting variable. It is interesting to note about the debt variable is that the economic theory says that the value of a company should be affected in a positive, rather than a negative way, when adding more leverage. Therefore the dept to equity ratio and leverage of the company, as Miller and Modigliani (1958) declared, will increase its value with more leverage and therefore have a higher P/E ratio.

2.4.7 Market to book

The next relationship we choose to analyse is the one between the P/E ratio and market to book. The M-to-B is a ratio which indicates, most often positive, if companies in general are expected to produce future earnings, which in present value, will out run the book value of the asset used to generate them, that way firms are expected to be efficient in creating value for

their shareholders (Ogden, Jen and O'Connor, 2003). Therefore it is interesting to look at the part in the P/E ratio that represents future expectation, in other words the variable market to book. To include market to book is also interesting, because it is commonly used as a multiple for valuation, just as the P/E ratio is. Therefore it is fascinating to see if they have a high correlation and how strong the M-to-B influences the P/E ratio, there should a priori be a positive relationship between them.

2.5 Reliability and Validity

From the conditions given in this study the quantitative approach is the most reasonable since we are using statistical methods when dealing with the data. When doing a quantitative study there are two things that are important to take into consideration, reliability and validity (Holme and Solvang, 1997).

To obtain a high level of reliability it is important that the study is performed in a correct manner. To consider our study to obtain this level we have been using a method which reduces stochastic and systematic errors to an acceptable minimum. When observing the results we were unable to identify any problems with the reliability in our choice of approach.

As Holme and Solvang (1997) points out, with regards to the validity, the most important component is the choice of phenomena to study. The study's validity can according to Bryman (2002) be divided into different parts. When performing a quantitative study it is important to really measure the relevant variables to your problem at hand, i.e. reach a high level of theoretical validity. Another element of the validity according to Bryman (2002) is the internal validity, which is to be certain that there are a set of variables explaining another one, and that there isn't a different reason that produces a misleading relationship. In our case were we choose to study a market multiple it should be easier said than done to isolate all the external factors and display the complete explanatory forces to the P/E ratio. Another important part of the validity which to obtain is the external validity, which the study can prove if the result can be generalized outside its own specified context (Forsgårdh and Hertzen, 1975). To extend this discussion to this study, it would be the case if the result of the study can be applicable to other markets and similar conclusions can be drawn. This is really

hard to say because the different markets differ a lot even if it doesn't seem to be the case. To say anything about different markets other studies of the same kind on those markets would be necessary. This is one of the reasons why we try to be as elementary as possible in our explanation of our approach so the study is possible to replicate in the future and then be comparable.

3 Theoretical framework

In this part of the study we display and explain the theory needed to understand the methodology and the analysis. It will cover both the theory of the multiple of interest and the theory used when conducting the tests to ensure the significance.

3.1 P/E ratio and determination

In our model we take four macro variables in to consideration when we try to explain the variation in the P/E ratio for the entire market and the different sectors. As mentioned and discussed above they are interest rate, payout ratio which are measured as dividend yield, risk and growth in the market. We will try to define why we look at these four variables and how they are related to the P/E ratio.

To be able to do this we have to study the Gordon (1962) discounted dividend growth model, which is well known and commonly used for all investors. As Gordon explains and proves, that under all circumstances the only reliable and meaningful income stream that investors can use for valuing a company's shares is, the dividend expectation.

This model says that the current share price P_0 is the present value of a long series of future expected dividends, where D_1 is the next period dividend. The dividend is expected in this model to grow at a constant rate of g. All investors have a required return on their stock investment and that is k, which has to be greater than g in this case. This makes the equity valuation model look like this:

$$P_0 = \frac{D_1}{(k-g)}$$

The model shows that the current stock price is a function of dividends which is discounted back until today with the required return minus expected growth of the dividend. To derive the P/E ratio from this model is quite obvious. By dividing both sides of the equation with the expected earnings per share, which is E_1, this gives us the following equation:

$$\frac{P_0}{E_1} = \frac{D_1}{E_1} * \frac{1}{(k-g)}$$

From this equation we can identify what variable that drives and affect the P/E ratio. So if we rewrite the second equation we can see that the P/E ratio follows from a function as:

$$P_0 = \text{f (expected dividend payout, growth rate, equity required return)}$$

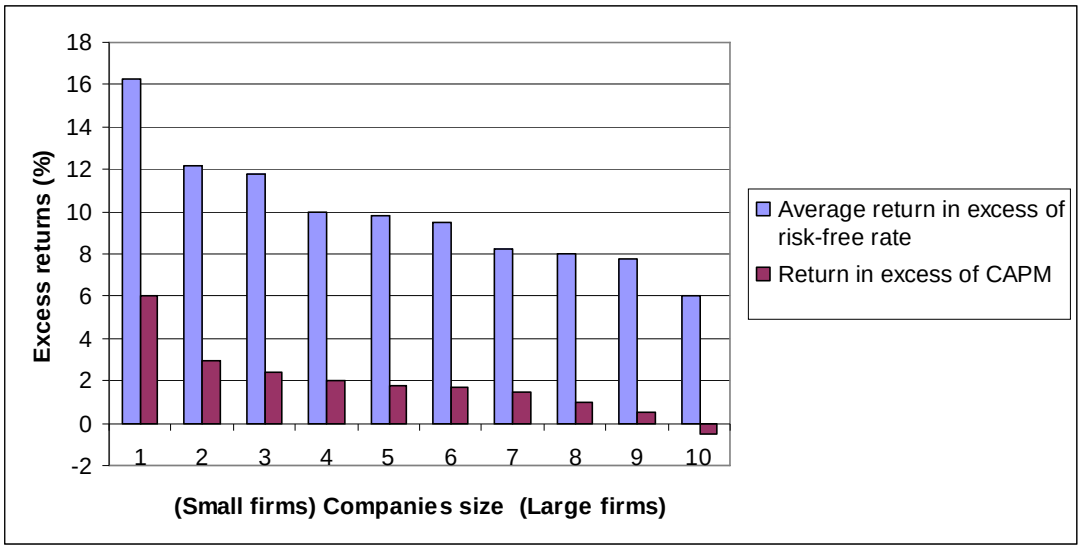
Since the required return of the stock, k, is a function itself of the risk of the stock, it is proper to have some risk variable to take into consideration. As Amoako and Smith (2002) states in their study any market risk can be used as a proxy for the equity required return. Hence in our paper we use the volatility for the entire stock market as a measure for risk. Some advocate that beta should be used, but here this is not possible, because we look at the entire market and as every one knows the beta for the market is always one. The deduce from using beta as the risk measure is because the required return on equity, k, derives from CAPM. The required return in this formula is a function of the risk of the stock (beta) times the market risk premium (the return on the stock market minus the risk free interest rate) plus the risk free interest rate. When calculating beta there are three variables that affect the beta and these are firm and market volatility and the covariance between them. Since one of these variables, market volatility, are used in the determination of beta and describes how risky and how much the market fluctuates. We believe that this variable is indeed the best measure to determine the risk of the market. The higher the volatility the more and the bigger fluctuations can be seen to the price changes and therefore more risk is related to the stock. One important implication for any stock valuation model is that (every thing else equal) riskier stocks will have a lower P/E ratio than a less risky stock. This can be derived from a constant growth model by examine the formula for the P/E ratio:

$$\frac{P}{E} = \frac{(1-b)}{(k-g)}$$

Where b is the plowback ratio and the rest is the same as above. Riskier firms will have a higher required return, higher k. Therefore, this gives the P/E multiple lower values (Bodie, Kane, Marcus, 2007).

3.2 Market value

The so-called size or small-firm effect was first documented by Banz in 1981. He shows that the historical performance of portfolios formed by dividing the NYSE stocks into 10 portfolios according to the size of the firm each year, were different. The firm size was measured by valuing the total outstanding equity, in other words the market value. The annual average return is consistently higher for the small firms compared to the portfolio with larger companies. The difference in returns between the portfolio with the biggest companies and the portfolio with smallest companies was 10, 3 % from 1936-1976. On the other hand, the smaller companies tend to be riskier. But even when the returns were adjusted to the risk by CAPM, there was still a consistent premium for the companies with a smaller market value. After the risk was adjusted the annual average return was 6, 7 % higher than the bigger-sized companies.

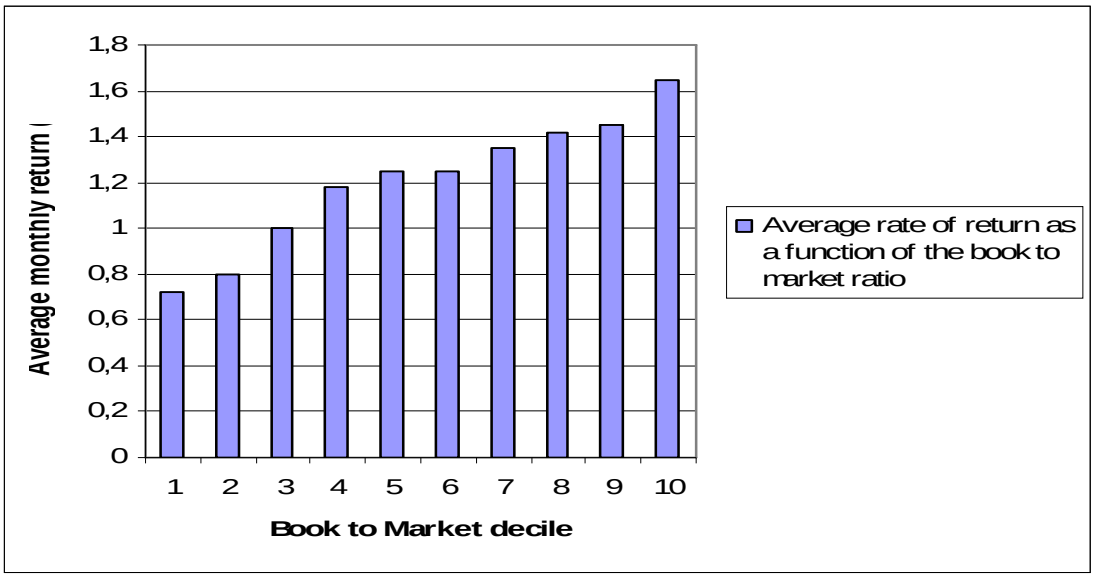


The diagram shows the average return in excess of the risk-free rate and the return in excess of CAPM during 1926-2003. Where 1 is the portfolio with the smallest firms and 10 is the portfolio with the largest firms. (Bodie, Kane, Marcus, 2007).

3.3 Market to book ratio

The market value of equity divided with the book value of equity has been investigated by many. Some analysts considers a firm with low market to book value to be a "safer" investment, seeing the book value as a floor for the value of the firm and therefore supporting the market price. They view the book value as the level below which market price will not fall because the company always has an option to sell its asset for the book value. But of course in some cases a firm has been sold for less then the book value. Nevertheless, a low market to book value can be seen as some kind of margin of safety. It should be mentioned that the book value does not necessarily represent the liquidation value of the firm which makes the margin of safety notion unreliable. The theory of a high market to book value indicates that investors think that the firm has opportunities of earning a rate of return that is greater than the market capitalization rate, k. (Bodie, Kane, Marcus, 2007)

Fama and French (1992) tried to predict returns across securities by the ratio of book value of the firm's equity to the market value of the equity. They divided firms into 10 groups according to there book to market value and examined the average monthly return of the stocks in the 10 different groups during July 1963 to December 1990. They found that the decile with the highest book to market value (lowest market to book value) had an average monthly return of 1, 65%, while the lowest decile only hade an average of 0, 72% a month.



The diagram shows the average monthly return as a function of the book to market value with ten as the decile with the highest book to market value. The dramatic dependence of returns on book to market value is independent of beta, which indicates that either high book to market ratio firms (low market to book value) are relative under priced or that the book to market ratio serves as a proxy for a risk factor that can affects the equilibrium expected returns.

3.4 Debt to equity ratio

The debt to equity ratio and how it affects the value of the firm has been widely argued. The most famous theory is the Modigliani and Millers (1958) proposition. We start to look at how it affects the firm in a world with corporate taxes but no bankruptcy cost. In this world the value of the firm is an increasing function of leverage. Is it the same to maximize the value of the firm as maximize the value of shareholders? The capital structure that maximizes the firm value is also the one that benefits the interest of the stockholders. Of course this result may not hold in a more complex case where debt has a significant possibility of default. The debt has a positive effect on the value of the firm because of the tax shield on the balance sheet. The tax shield has a value since it reduces the stream of future taxes. The value of leverage firms can be expressed as:

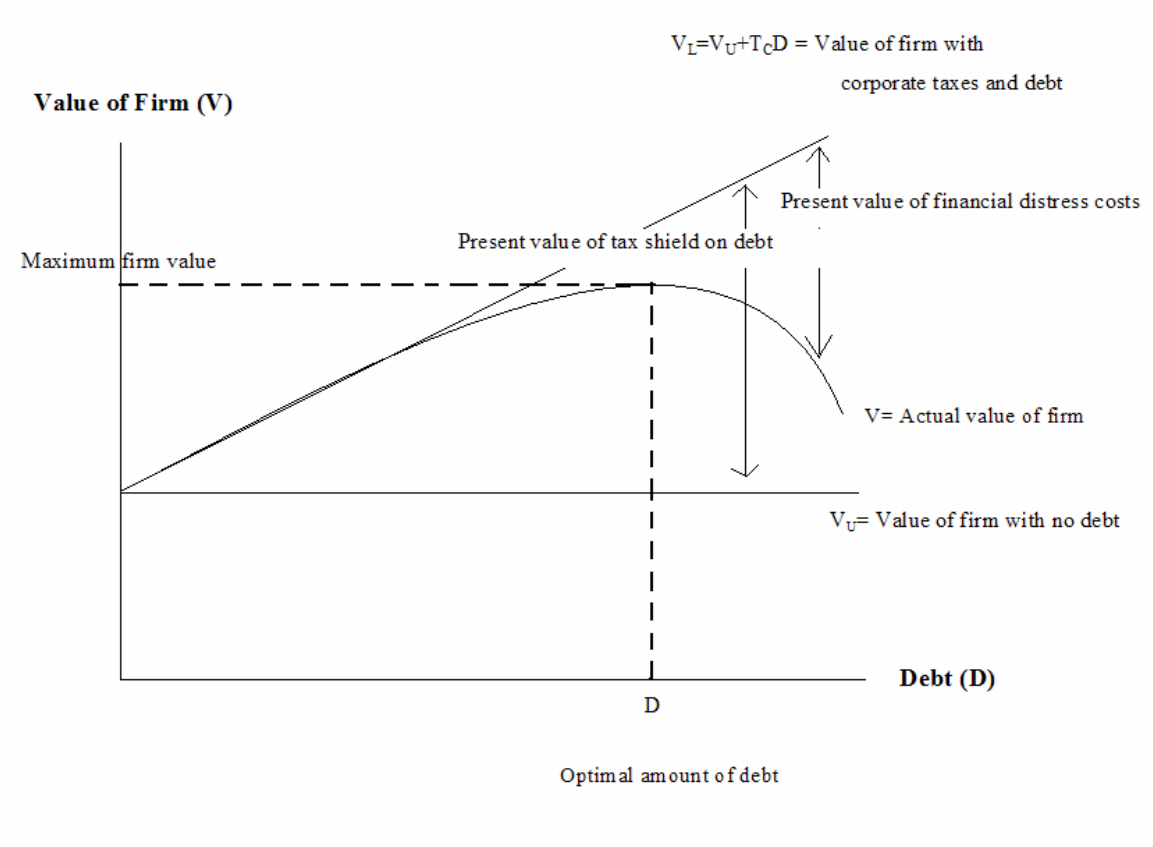
$$V_L = V_U + T_C D$$

Where V_U is the value of a firm with no debt and T_C is the tax rate, D is the value of debt and V_L as the value of the leveraged firm. From this we can obtain the expected return on levered equity as:

$$r_E = r_0 + (1 - T_c) * (r_0 - r_D) * \frac{D}{E}$$

Where r_E is the cost of equity, r_D is the cost of debt, r_0 is the cost of capital for an all equity firm, T_C is the tax rate. This indicates that the firm should have a capital structure almost entirely composed of debt. This is of course not true in the real world where firms have a

more moderate level of debt (Ross, Westerfield, Jaffe, 2005). This since bankruptcy costs and other related costs reduces the value of firms. Too much debt makes the firm less reliable and therefore reduces the value of the firm. The integration of tax effects and bankruptcy cost is presented in the diagram below.



As showed in the diagram above the tax shield increases the value of the levered firm. Financial distress costs lower the value of the levered firm and the two factors offsets an optimal amount of debt at point D. The u-shaped curve rises as the firm moves from an all equity firm to a small amount of debt financing. In the beginning the present value of financial distress cost is minimal because the probability of distress is so small. However, as more debt is added, the present value of these costs rises as an increasing rate. At some point for the firm the increase in present value of these costs from an additional dollar of debt equals the increase in present value of the tax shield. This is where the optimal capital structure is and it is showed in the diagram at point D. Bankruptcy costs increase faster then the tax shield after this point which indicates that the firm value will decrease from further leverage. It should also be mentioned that the weighted average cost of capital (WACC) goes

down as debt is added to the capital structure. The optimal amount of debt at point D produces also the lowest weighted average cost of capital. This implies that a firm's capital structure is a trade-off between the tax shield and the cost of financial distress. So the optimal amount of debt or the target debt level is where the firm maximizes the value. But in the real world the financial distress cost can not be expressed in a precise way so there are yet no precisely formula for determine the optimal debt level (Ross, Westerfield, Jaffe, 2005).

3.5 Regression analysis

A regression analysis is a way of trying to clarify and estimate the relationship between different variables. In other words it is an attempt to explain movements in a dependant variable by reference to movements in one or more variables. In the regression the dependant variable is in most cases represented with y and the explanatory variables with x. The y variable is assumed to be random and therefore have a probability distribution. Au contraire to the y variable the x variable is assumed to have fixed values in repeated samples, i.e. non-stochastic (Brooks, 2004).

When conducting a regression analysis there are two values which are interesting. One of those two coefficients is the Goodness of fit statistics, which is denoted R^2. This coefficient answers the question of how well the model containing the explanatory variables actually explain the variations in our dependant variable. In other words how well the regression fits the data, therefore a measure of how adequate the model is. The other value of interest is the standard deviation, which measures whether the residuals in the model are normally distributed.

3.5.1 Multiple regression analysis

The common purpose of a multiple regression is to analyse and evaluate the relationship between several explanatory variables and a dependent variable. The general formula representing this multiple regression is the subsequent:

$$y_t = \alpha + \beta_1 x_{1t} + \beta_2 x_{2t} + ... + \beta_q x_{qt} + u_t$$

Where:

$t = 1, 2, 3,..., n$

y_t = Dependant variable

x_t = Independent explanatory variable

α = Intercept, i.e. the value of Y_t when all X_t equals zero

β_t = Is the power of a change of an independent variables on the dependent variable (keeping all the other variables fixed)

u_t = The residual errors

There are five assumptions which must be fulfilled about the residuals for the regression to estimate the coefficients validly. These are the subsequent:

Assumption 1: E (u_t)= 0, which imposes linearity.

Assumption 2: var (u_t) = $\sigma^2 < \infty$, homoscedasticity

Assumption 3: Cov (u_i, u_j) = 0 where i ≠ j, imposes no autocorrelation

Assumption 4: Cov (x_t, u_i) = 0, x_t is stochastic

Assumption 5: $u_t \sim N(0, \sigma^2)$, imposes normality in the disturbances

3.6 Testing the regression coefficients

When estimated the coefficients for the variables it should be in order to test these as well, to evaluate if these coefficients are significantly different from zero, i.e. if the explanatory variable affect the dependent variable at a significantly permanent level. To test whether this is the case, we use the following hypothesis and a t-test, i.e. we discover if x_t affect y.

$H_0: \beta_t = 0 \qquad H_1: \beta_t \neq 0 \qquad t_{B_t} = \frac{\beta_t}{s_{\beta_t}}$

When you use a multiple regression it is important to test the coefficients also with the presence of all the others. This is done by an F-test which is a joint t-test where you test all the coefficients at the same time, where H_0 is $\beta_t = \ldots = \beta tq = 0$ and H_1 is at slightest $\beta_{tq} \neq 0$.

3.7 Heteroscedasticity

Homoscedasticity implicates that the variance of the errors are constant, σ^2, if not they are heteroscedastic. Thus if the residual variance don't maintain a constant value and you still conduct your regression upon the values the result will be unacceptable. This is because the estimators no longer obtain the lowest possible variance. To detect this heteroscedasticity you can off course plot your values but it is often hard to really say anything, instead you can compute White's (1980) test for heteroscedasticity. To deal with the problem you can either transform the variables to logs, divide them with a constant (GLS) or use White's approximate estimate. This last approach is the most used and practically feasible, it produces correct standard errors granted that our sample is big enough.

3.8 Autocorrelation

It is assumed that the error terms are uncorrelated with one another, i.e. the covariance between the errors is zero. If they are not uncorrelated with one another the data at hand is autocorrelated, in other words serially correlated. If there is sign of autocorrelation it is possible to determine an outline in the residuals, it is then possible to foresee the value of the residuals through this pattern. If you experience autocorrelation the t- and F-test will be invalid. To detect the presence of autocorrelation you compute a Durbin-Watson test, to see if the residuals are related in some way. The DW test has its null and alternative hypothesis as follows

H_0: $\rho = 0$ and H_1: $\rho \neq 0$

Thus under the null hypothesis the residual at time t and t + 1 are independent of one another, and if it was rejected this would conclude that there is evidence of a relationship between them.

$$DW = 2(1 - \hat{\rho})$$

Since the normal distribution of d depends upon the x-values, an upper and lower boundary d_L and d_U is set up, the exact critical value can not be determined. The null hypothesis is rejected

if $d < d_L$ and it is accepted if $d > d_U$. If the d is in between these values there are no conclusions to be made.

3.9 Multicollinearity

This is a problem of a linear relationship between the explanatory variables which means that they quantify the same phenomena, i.e. highly correlated negatively or positively. The expression of this problem is often that you have a low overall p-value but high individual p-values, the effect is an over fitting of the regression. The desirable regression is the one where the explanatory variables have low correlation with each other but each high correlated to the dependant variable, this is called "low noise". To detect this multicollinearity you are forced to study the variables correlation with each other. If there is a correlation between to variables higher than 0,8 (a figure which deviate allot between studies) there is reason to believe that multicollinearity exists.

3.10 Normal distribution of the residuals

The last assumption is required in order to compute the joint hypothesis test of the coefficients, i.e. it is important to choose a functional form that ensures that the models errors are normally distributed. To test your model for normality the most common approach is the Bera-Jarque test. The test uses the property of the normal distributions first two motions, the mean and the variance. From those two the third and fourth moment is known, kurtosis and skewness (*k, s*). The first one mentioned measures how fat the tails of the distribution are, the later one measure the extent to which the distribution is symmetric or not. The course of action of the BJ-test is to investigate whether the two coefficients are equal to zero, and in the statistic the kurtosis value should be three for normal distribution. The formula for the test is:

$$JB = \frac{T}{6}\left(S^2 + \frac{(k-3)^2}{4} \right)$$

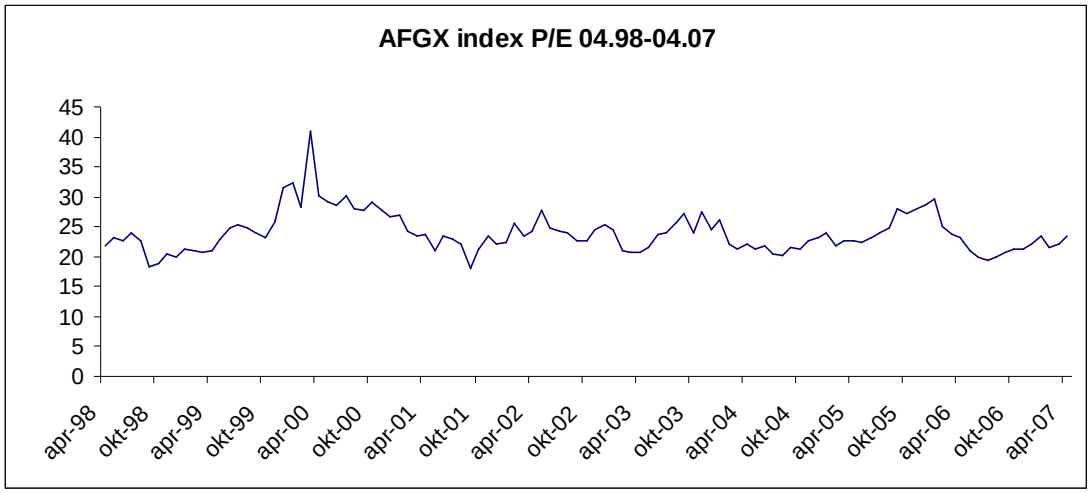
4 Empirical findings and Analysis

In this fourth chapter, the results will be analyzed. We will use the theories covered and as thoroughly as possible tie the analysis back to them. We will present the variables one by one and in the end tie the analysis together.

4.1 P/E

We have chosen to gather the empirical findings and the analysis in the same chapter to give the reader an easier overview of the results. This is due to the fact that our study examines seven variables of two different characteristic, thus it simplifies it to keep it to one chapter.

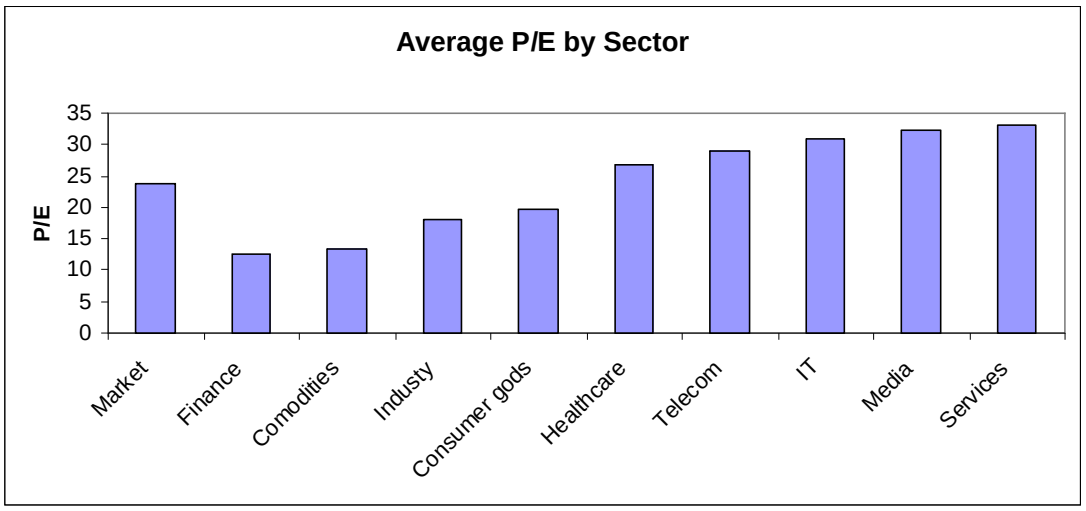
To give the reader an understanding of the Swedish stock market, we first start with a general discussion of the P/E ratio and how it has developed over the chosen time period (1998-2007).



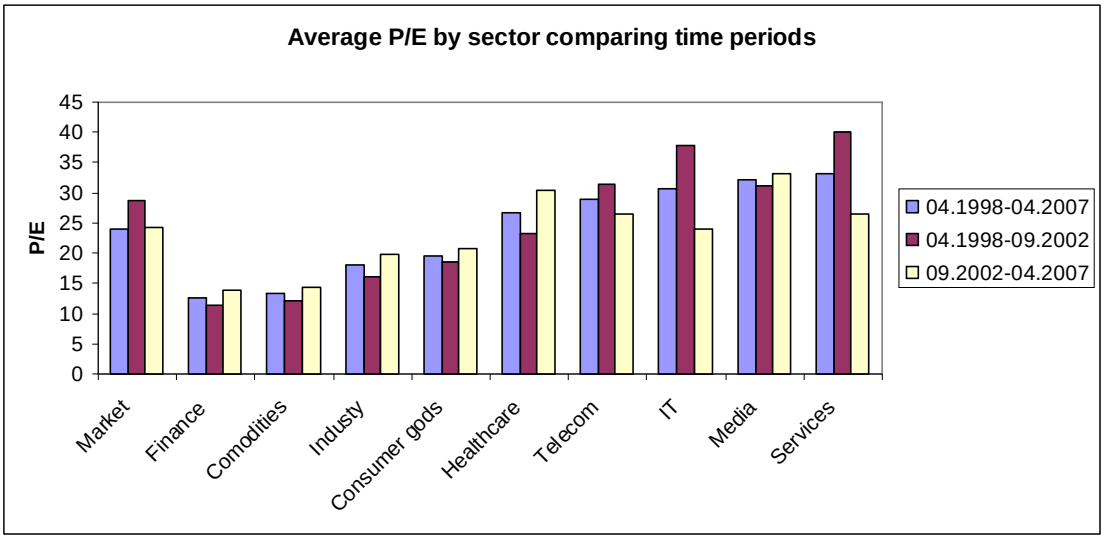
The diagram shows how the P/E ratio has evolved during the time period. We can clearly see that in the "normal" time periods the P/E ratio is around 20, but during the IT-boom this ratio was up to almost 45, during March 2000. Then, post "the crash" the ratio decreased back to more normal levels, around April-October 2001. We are aware that this may have an influence on our study and it may not be the optimal period to observe due to the abnormal P/E ratio during April 1999 to April 2001. The problem is that the variables may not have the

affect it normally has on the market, since the stock market during this time had other forces that affected the ratio. For example IT-companies were valued to billions of SEK without making a single SEK in revenue.

In this study we look at the entire market and the nine different sectors that AFGX is dividend into. Different sector has of course different P/E ratios depending on what affects them.



The diagram shows the average P/E ratio for the market and the nine different sectors during 1998-2007. No surprises are showed in the diagram where finance has had the lowest P/E ratio and among the highest we find the IT sector. To give a deeper understanding of the P/E ratio, and display the differences over time, we will show how it has appeared in three time periods. First from April 1998 to September 2002 and the second period from September 2002 to April 2007 and at last for the entire period.



As displayed in the diagram the P/E ratios are highest during the IT-boom which occurred in the first period (April 1998 to September 2002). Some has their highest value in the last period (September 2002 to April 2007), healthcare and industry. This is expected because during the boom it was mainly the IT- and telecom-sector that faced an incredibly bull market.

4.2 IT sector

Analysing the results of the IT sector was very interesting based on its volatile past. From the correlation between the P/E ratio and the different variables, we could see that the IT sector has had a positive relationship to the changes in interest rates, dividend yield, risk and growth. This should imply that the regression of the macro variables should have positive coefficients in front of the variables. In relation to our hypothesis this contradicts our priori assumption that interest rate should have a negative correlation to P/E. This should also imply that the hypothesis stating a positive relationship between risk and the P/E ratio was correct. The correlations between the three corporate specific variables showed positive figures for debt to equity, market value and negative for market to book. These results confirmed our a priori assumptions, except for market to book.

When conducting the simple time series, with the macro variables, the results showed that only growth was significant, and had a positive coefficient. When we included the corporate

specific factors, this changed, and the only significant coefficient was now the market value, with a positive sign. These results don't contradict the above mentioned correlations which are good and imply that the IT sector is strongly connected to the market. This seems reasonable, since the sector has been one of the most influential to the market, in particular around the year 2000. It didn't only contribute to the strong bull market at that time, but also to its heavy fall a few years later. One explanation to these results could be this sectors strong volatile feature, which makes the other mentioned variables obsolete as explanatory to the P/E ratio.

4.3 Telecommunication sector

This sector should be similar to the already discussed IT sector, with its volatile past on the Swedish stock market. The company with the highest influence on the Swedish market has for many years been Ericsson. Thus the sectors P/E ratio should have a fairly strong link to the market. When observing the correlation between the P/E ratio and the variables, we discovered that for the first four macro variables the relationship were positive for interest rate, dividend yield, risk and negative for growth, although very low (appendix, chart 7). When observing the correlation for growth closer, in three time periods, the relationship is better illustrated. The correlation is positive in the first period until Sept 2002 and then negative in the remaining time. This could again be sign of Ericsson's great influence on the sector, where Ericsson followed the market almost perfectly during the boom and recession. Therefore the correlation between the P/E ratio and growth over the entire time has been almost zero (appendix, chart 7). When observing the correlations between P/E and the remaining variables the result displayed positive correlation for market value and debt to equity and negative for market to book.

For the time series with the four macro factors, we discovered that dividend yield and interest rate were significant. The interest rate with a positive coefficient and the dividend yield with a negative coefficient. This contradicts the correlation for dividend yield but is in line with the findings concerning interest rates. Our hypothesis concerning dividend yield is therefore rejected. In other words the P/E ratio increases when the dividend yield decreases. It is difficult to have a good explanation to this phenomenon, but it could indicate that an increase in the P/E ratio do not have to generate an increase in the dividend yield. For the interest rate

we received a significant positive coefficient, which also is against our hypothesis. This is against prior studies, and it is not easy to give a good explanation why it should have a positive influence on the P/E ratio. Regarding the time series, when including the other three variables, we obtain the same result as before. We will continue this discussion about these problematic findings later when we discuss the explanatory factors for the market.

4.4 Media and Entertainment sector

This sector showed positive correlation between the P/E ratio, interest rate and risk. Dividend yield and growth were negatively correlated to the macro factors. For the corporate specific factors there were almost no correlations at all.

For the time series analysis, when conducting the two regressions, the only significant coefficient was dividend yield and it had a negative affect on the P/E ratio. Therefore our hypothesis concerning the dividend yield is once again rejected. This sector is also one where there may be great expectations incorporated in the stock prices and the companies don't generate that stabile earnings compared with other sectors. This could indicate that when the P/E ratio for this sector has had a positive development, the market may not have generated greater earnings, and therefore the dividend yield has not increased. This could be one explanation why dividend yield has had a negative relationship to the P/E ratio. Growth is not statistical proved as an explanatory variable and there are almost no correlation to the P/E ratio, which may also indicate that this sector don't follow the market. One other thing that is worth mentioning is that there was only one variable that we could statistical prove to have an influence on this sector, which is quite remarkable. This makes it difficult to analyse what factors that affect the P/E ratio.

4.5 Services sector

This sector is very interesting since most of the companies don't have any "real" value instead there value is in the human capital, in terms of its employees. The sectors P/E should also have a close relationship to the market, since these companies often are very exposed to changes in the business cycle. When studying the correlation relationships between the P/E

ratio and the macro variables all indicated positive correlation. For the corporate specific factors, debt to equity and market value had positive correlation and market to book was the only variable with a negative correlation to the P/E ratio. These findings are almost in line with our prior assumptions. Once again our findings indicate a positive correlation between the P/E ratio and the interest rate.

When conducting the time series regression with the macro variables, the only variables coefficient which was significant in explaining changes in the P/E ratio was growth. This relationship is positive, which is reasonable since the service sector is sensitive to the business cycle. This result is also in line with our findings for the correlation, as well as for our priori assumptions. When adding the three corporate specific factors to the regression, the result changes. The significant factors are now market value and debt to equity. Market value with a positive coefficient and debt to equity with a negative coefficient. That the P/E ratio is influenced by the debt to equity was more surprising. This result implicates that less debt, gives a higher P/E ratio which seems logic in a risk point of view, but wrong according to the theory. The sector is sensitive to the changes in the business cycle and therefore may be sensitive towards the risk, when adding more leverage.

4.6 Financials sector

For this sector it is interesting to see whether there is an explanatory force in the debt to equity variable. This is due to the extreme financial structure of this sector, with often very high debt to equity ratio. The relationships between the variables and the P/E ratio were first analysed in terms of correlation. For the financial sector almost all variables indicated negative correlations. The only variable which had a positive correlation to the P/E ratio was market value. Almost every finding was contradicting our priori assumptions, except for the interest and risk variables. Why we got these results is difficult to say, but it might have something to do with the special financial structure of these companies.

For the regression including the corporate specific factors, we obtained the same result. The result showed that the explanatory variables with significant coefficients were dividend yield, interest rate and risk. They all had a relationship of a negative character, which were interesting since the prior sectors has had positive significant coefficient to the interest rate.

This time it confirms the hypothesis which is good, but the other two were against the prior assumptions which are peculiar. For the dividend yield, this sector is one were there aren't great expectations incorporated in the prices and the companies generates fairly stabile earnings compared with companies in other sectors. Which indicates that when the P/E ratio for this sector has hade a positive development the market may not have generate greater earnings and therefore the dividend yield has not increased. This could be one explanation why the dividend yield has had a negative relationship with the P/E ratio for the financials sector.

4.7 Healthcare sector

For this sector the most interesting thing to analyse would be the relationship between the P/E ratio and Research and Development cost. Though it seems interesting it is not possible to retain useful information about these costs. The study therefore continues with the same variables as before. After computing the correlation between these variables and the P/E ratio, we can see that growth, debt to equity and market value have had a positive relationship to the P/E ratio. Interest rate, dividend yield and risk have had a negative relationship and market to book is almost not correlated at all. These findings are in line with what we assumed except for the dividend yield.

The peculiar with this sector is that when conducting the simple regression analysis with the four macro variables, none of the coefficients were significant. This is the first sector for which this phenomenon appears, though when we added the corporate specific variables the coefficient for market value was significant with a positive relationship to the P/E ratio. This is in acutance with our prior assumption and is as earlier stated, that larger the companies often has greater P/E ratio.

4.8 Commodities sector

When viewing the results for the commodities sector, we can see that there is a negative correlation between the P/E ratio and dividend yield and risk, which is not as we believed. We could see a positive correlation between the P/E ratio and growth. It showed the strongest correlation of all the sectors, when comparing the correlation between the P/E ratio and growth (appendix, chart 7). If we then look at the corporate specific factors, the results from the correlation calculations are positive between market value, market to book and P/E ratio. We can also see that commodities have had the strongest correlation between the P/E ratio and the market to book variable of all sectors (appendix, chart 13). These two were as we predicted with a positive correlation between them and the P/E ratio. Debt to equity had a negative correlation with the P/E ratio and this is not what we had assumed.

When looking at the time series analysis for only the macro variables we could see that there were three variables that could be statistically proved. We found a negative coefficient for the dividend yield, and the interest rate had a positive coefficient. These two results were not as we hade assumed, but they prove that there are a relationship between them and the P/E ratio. The third variable that we could statistically prove was growth, which was as we hade assumed with a positive coefficient. This indicates that when there is growth in the market the P/E ratio for commodities becomes higher. This last result was quite expected, as we earlier could observe, it had a positive correlation between the P/E and growth. Commodities may follow the market quite well and that's why the P/E ratio increases when there is growth in the market. Why we get negative coefficient for the dividend yield is not that easy to explain. This indicates that when the dividend yield increases the P/E ratio decreases, and the correlation between them was fairly strong as well.

When including the other three variables in the regression we get a different result. Now the only statistically proved variable is the interest rate and it had a positive coefficient. None of the other variables are even close to be in the 10% probability, and the interest rate is just in the range to be statistically proved. So when including more variables it is only the interest rate that affects the P/E ratio for commodities and when the interest increases the P/E ratio also increases.

4.9 Industrials sector

The macro variables indicate quite strong correlations to the P/E ratio for the industry sector. This sector has had the strongest negative correlation of all sectors, between the interest rate and the P/E ratio (appendix, chart 1). The same applies for the dividend yield and risk. For growth we can see a positive correlation to the P/E, which is in accordance with our hypothesis. The same goes for the interest rate and risk, which also are as we had assumed. The only variable that was against our prior assumptions was the dividend yield. For the corporate specific factors we can see a very strong negative correlation between the P/E ratio and the debt to equity ratio (appendix, chart 9). This contradicts what our hypothesis and the remarkable about these findings is that the correlation is so strong. For the market to book and market value there were positive correlations.

When looking at the macro factors in the time series we got two statistically proven variables, dividend yield and growth. The latter had a positive coefficient, which indicates a positive relationship to the P/E ratio. Dividend yield had a negative coefficient, which we didn't expect. Again, this variable indicates that when the dividend yield increases on the market, it decreases the P/E for the sector and therefore this invert relationship, which is in opposite to the theory. From the second regression when we include all seven variables, dividend yield can be statistically proved and still obtains negative coefficients. Growth can not be proven to have any influence on the P/E ratio, but instead the market value is statistically proven and it has a positive coefficient. When including more variables we can see that the only macro variable that is proven to have any affect on the P/E ratio is the dividend yield. This sector can be seen as fairly stable, and therefore it is not strange that it is only the market value that can prove to have a positive affect on the P/E ratio. The market value had also quite strong correlation with the P/E ratio.

4.10 Consumer goods sector

For the consumer goods sector we found that the interest rate had a negative correlation to the P/E ratio. The dividend yield showed the most negative correlation to the P/E ratio for all the sectors and this result is contradictory to our assumption. On the other hand, this sector

showed a negative correlation to risk, and the strongest negative correlation of all sectors. The growth variable indicated a positive correlation to the P/E ratio. For the corporate specific variables, the debt to equity gave us a negative correlation to the P/E ratio, and the most negative one of all industries. This was not as we believed. The other two, market value and market to book value, showed positive correlation to the P/E ratio, which were as we hade assumed.

From the regression made on the macro variables, we could only statistically prove dividend yield to have any influence to the P/E ratio. Although, it was not as we had expected, this indicated that it is a negative relationship between dividend yield and P/E ratio. It is quite strange, that neither interest rate nor risk can be proven to have any influence on the P/E ratio, even when these were the ones that had the highest correlation. On the other hand, risk becomes statistically significant when we make the regression with all seven variables, and the relationship to the P/E ratio is negative. This is in accordance with what we had assumed in the beginning. Market to book and market value could also be significant proved at 10% level and both hade a positive coefficient which indicates that when they increase the P/E ratio for consumer goods also increases. This was also in line with what we hade stated in our hypothesis. As mentioned before, risk suddenly becomes proven to have an influence on the P/E ratio, the opposite occur with the dividend yield, that after adding more variables it is no longer a significant variable.

4.11 Market

In this last part of the chapter we will handle the market and try to cover the whole area concerning the P/E ratio. The analysis of the market will give a more conclusive picture and a more wide-ranged description of the relations between the P/E ratio and the variables. Since we study the whole market we believe that there will be more coefficients which will be significant and statistically proved. We started by studying the correlation between the variables and the P/E ratio. This was done to get a better picture of the reality. The results of this analysis gave us both anticipated and not anticipated values, those who contradicted our predictions were interest rate, dividend yield, debt to equity and market to book. This is in line with the results for the sectors which we have discussed above. The variables that were as we

predicted were growth, market value and risk. The correlation to interest rate, risk and market to book is although more or less zero.

When we had conducted the time series regression on the market with the macro explanatory variable, we computed the same regression for all the variables including the corporate specific variables. In the last regression we did a pulled regression which most often delivers very accurate result due to the large amount of observations. Intuitively 1000 observations add more significance than 109. Therefore this gave us hope for a more describing regression, upon which we could base our analysis and conclusion. The first market analysis gave three significant variables that are explanatory in affecting the P/E ratio, which were dividend yield, growth and interest rate. The coefficients were negative for dividend yield and positive for interest rate. These two results are in line with almost every sector which we have studied, though this gives us a result which is interesting. The prior studies and our theories have indicated that the relationship would be of the opposite character. Another difference compared to the prior analysis is that the significances now are at higher levels, and can be statistically proven at 5 %. We then computed the last regression, the pulled regression. This should according to the theory be of a well describing regression since it has so many observations and include all variables at all observations. The result from this regression gave us a well defined picture of the relationships to the market, since five out of seven could be proven to be statistically significant in explaining the P/E ratio. The not significant variables were risk and growth, though the significance for growth was just outside the 10% level. These findings are pleasant and of great interest because this analysis is the one we intended to base our conclusions upon. The prior analysis was made to be able make conclusions about the individual sectors differences. The coefficients for the variables continued in some cases to contradict our prior assumptions of the relationship to the P/E ratio. These variables were interest rate, dividend yield, market value and debt to equity. The one which was in line with our findings was market to book. These observations are again against our prior belief of the relationships, as well as for the prior studies.

The results regarding the interest rate were interesting, since it wasn't in accordance with prior studies and our assumptions. A possible explanation may be that the Swedish market is sensitive to the interest rate changes of foreign markets, which are directly incorporated in the Swedish stock prices. Therefore when the Swedish interest rate changes it does not affect the

Swedish stock market. We believe that the negative coefficients for dividend yield can be a reaction from the market, that when this factor increases the market believes that the companies don't have enough good investment opportunities. Which indicates that the company gives there owners dividend instead of invest the earnings, and that this only happens when the possible investment choice only generate less than the required return. If this is the case, the expectations on the futures earning will decrease and as a result of this stock price won't be "high" compared to there earnings, so the P/E ratio will decrease. As mentioned above we get a negative relationship between the market value and the P/E ratio for the market. This can be as the theory states, that "bigger" companies has not that much expectations on future earnings and therefore the stock price is in line with their earnings. As in most stock markets, bigger companies are often more analyzed then smaller companies, which may be one explanation for the more accurate price compared to their earnings. When companies get bigger (higher market value) and their earnings gets higher, maybe investors don't believe that they can continue in this expansion so the P/E decreases. The last variable that contradicts our assumption was the debt to equity ratio. One reasonable explanation we can think of is that when the companies increase its debt to equity ratio the firms become riskier. Therefore gets higher required returns and investors don't believe that companies can fulfill this higher required return. In other words the investor's future expectations decreases and therefore the P/E ratio react and turn outs to be lower.

5 Conclusion

In this last chapter our conclusions will be drawn upon the analysis above which is based on our data. The conclusion will try to answer our questions which we asked ourselves when starting this study of the P/E ratio. In other words will we display the significant explanatory variables to the P/E ratio on the whole market and the individual sectors.

5.1 Conclusion

The purpose of this study was to try to analyze the explanatory factors that affect the P/E ratio on the Swedish market. Our intention was to create a guide for investors to rely on and have as a support when making investment decisions, based on the P/E ratio. The conclusions that can be drawn from our findings are that almost all our chosen variables have an explanatory power to the P/E ratio for the Swedish market. This indicates that they are the primarily force on this market and this conclusion has been drawn from the pulled regression. These variables are: dividend yield, interest rate, market to book, market value and debt to equity. The different variables had different influences on the P/E ration, where the dividend yield, market value and debt to equity had a negative affect. This means that when these variables increase the P/E ratios on the Swedish market decreases. We will again point out that these influences are for the entire market and not for specific companies or sectors. The variables that have a positive relationship with the P/E ratio are interest rate and market to book value.

The other part of the study was to analyze the nine sectors on the Swedish market and how these seven variables affect the P/E ratio, and try to identify differences or similarities. When studying these sectors we conducted two tests, one with only four macro factors and one with these factors plus the three corporate specific factors. The sectors in which the P/E ratio were negatively affected of the dividend yield were; media, financial and industrials. We can see that healthcare, IT, service and industrials have market value as the main force. All of them, except healthcare, also had growth as an explanatory variable of the P/E ratio. This indicates that they are strongly positively connected to the market variation. Telecommunication and commodities had there strongest force in interest rate and it was a positive relation. The

financial sector was the only one that had a strong relation to the risk of the market. This relationship was negative and it is as we had assumed that this sector is quite special, since it has a different structure of there income.

The prior studies which analysis the P/E ratio have been the inspiration to this study on the Swedish market, and our values contradicting theirs are peculiar. This study was conducted in the same way as the once mentioned, and therefore it should yield the same result. The reason for the differences in the results could be a sign of diversity between markets, for example the market's sensitivity to the changes of the American interest rate.

5.2 Suggestion to further studies

Our suggestions to further studies are basically to continue the studies in this area and try to strengthen the arguments and significance. It would also be interesting to extend the study and ad more explanatory variables, for example as mentioned above to gather information about research and development cost. It would also be of interest to extend the event window for the study, there could be explanations in our time frame, which perhaps slipped through our fingers. It is off course still interesting to apply this approach on other markets for which it haven't been done, and by this be able to compare and display differences and similarities.

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7 Appendix

Chart 1

The P/E correlation to interest rate (30 day T-bill).

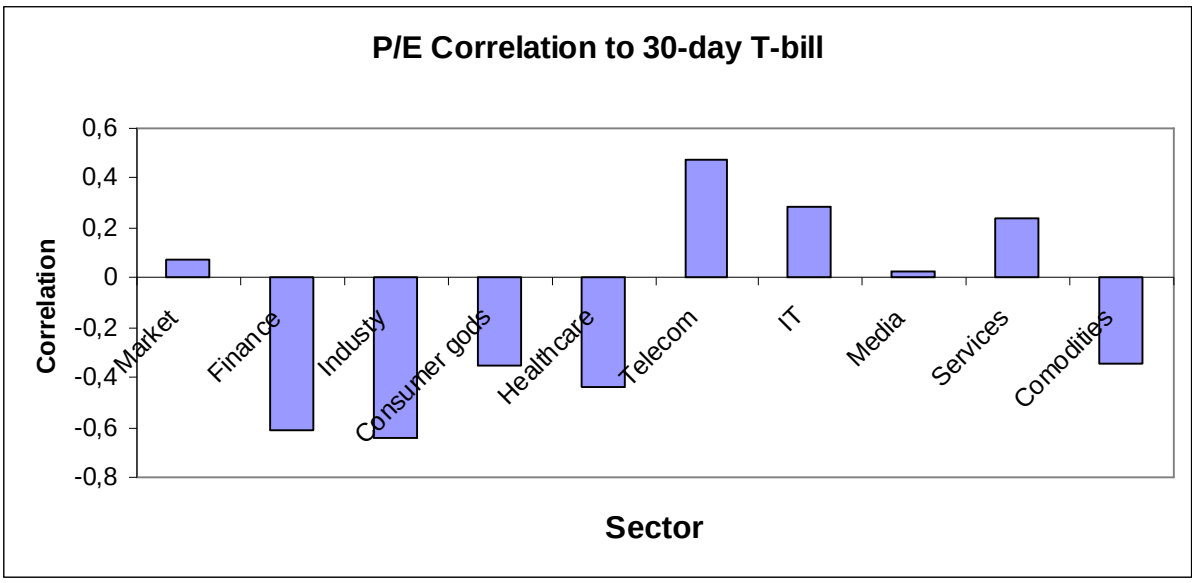

Chart 2

The P/E correlation to risk, divided into two time periods.

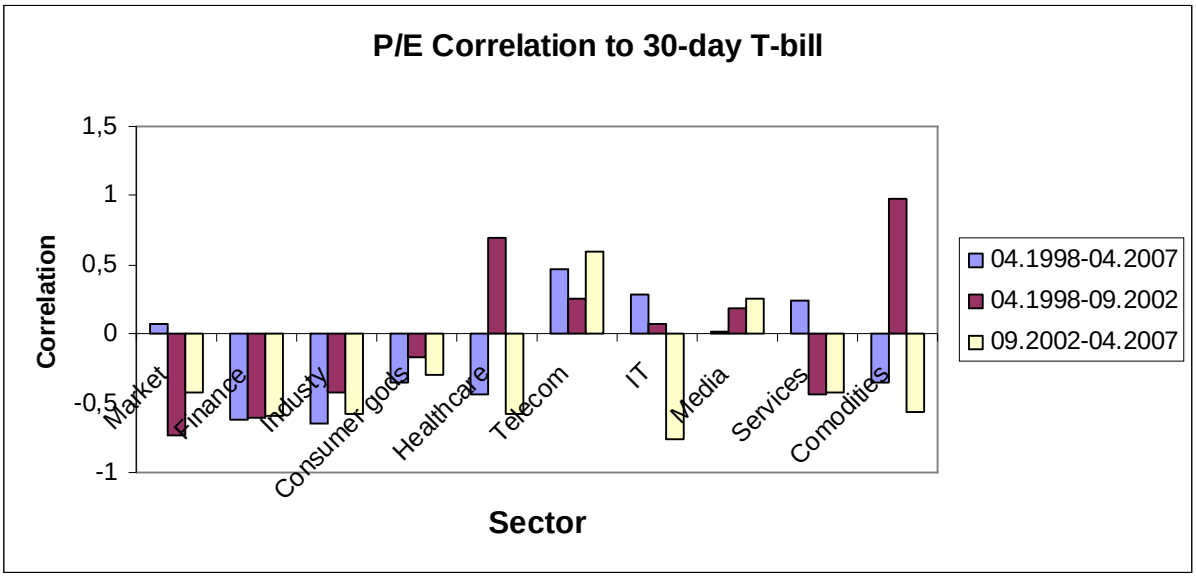

Chart 3

The P/E correlation to dividend yield.

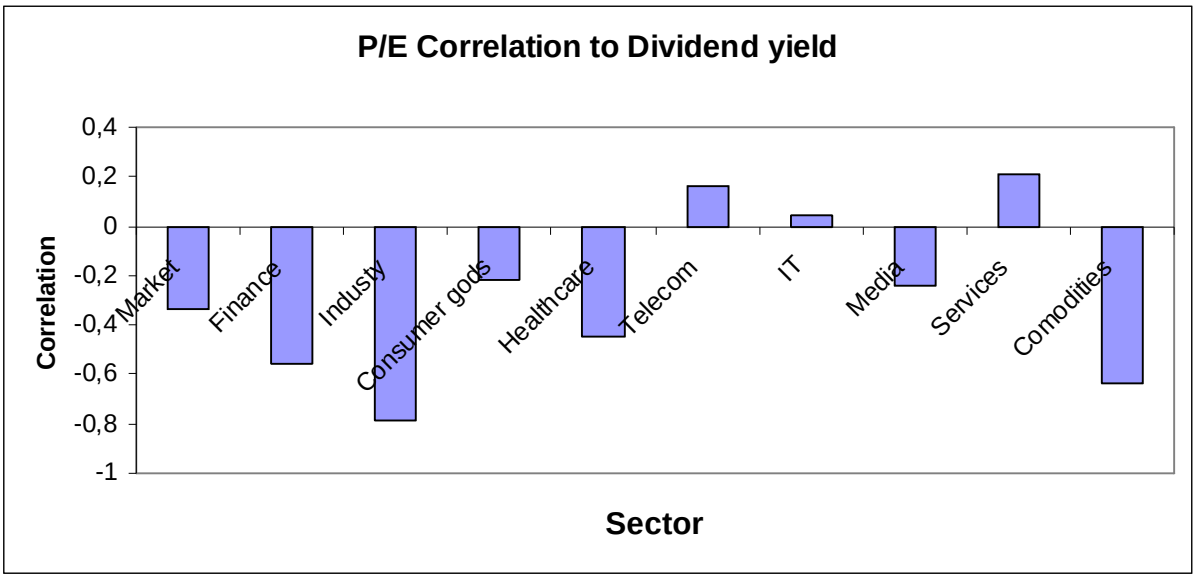

Chart 4

The P/E correlation to dividend yield, dividend into two time periods.

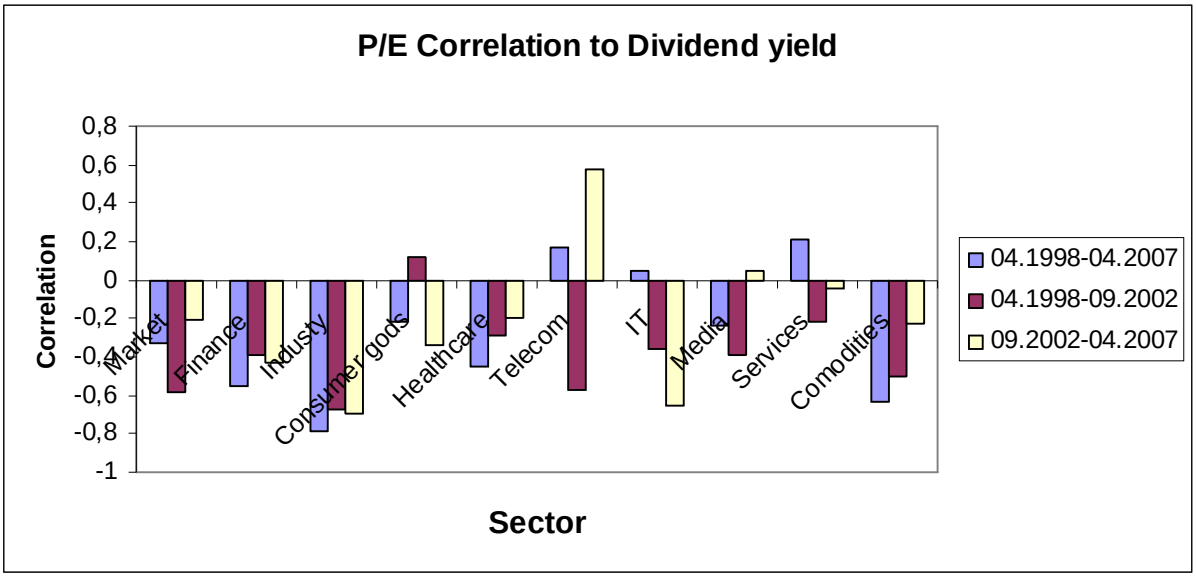

Chart 5

The P/E correlation to risk.

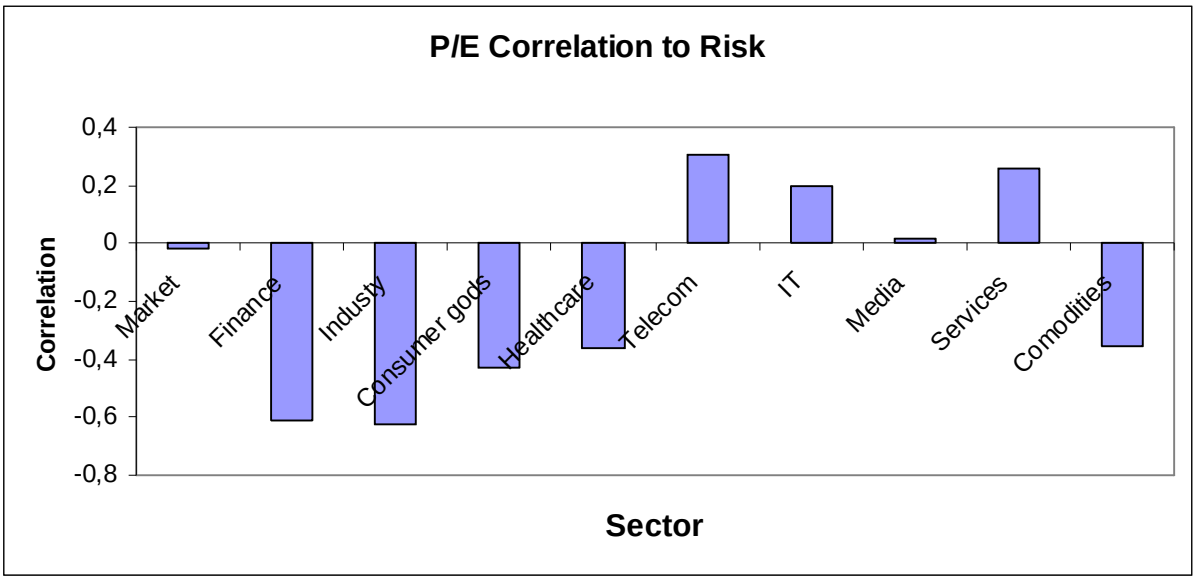

Chart 6

The P/E correlation to risk, divided into two time periods.

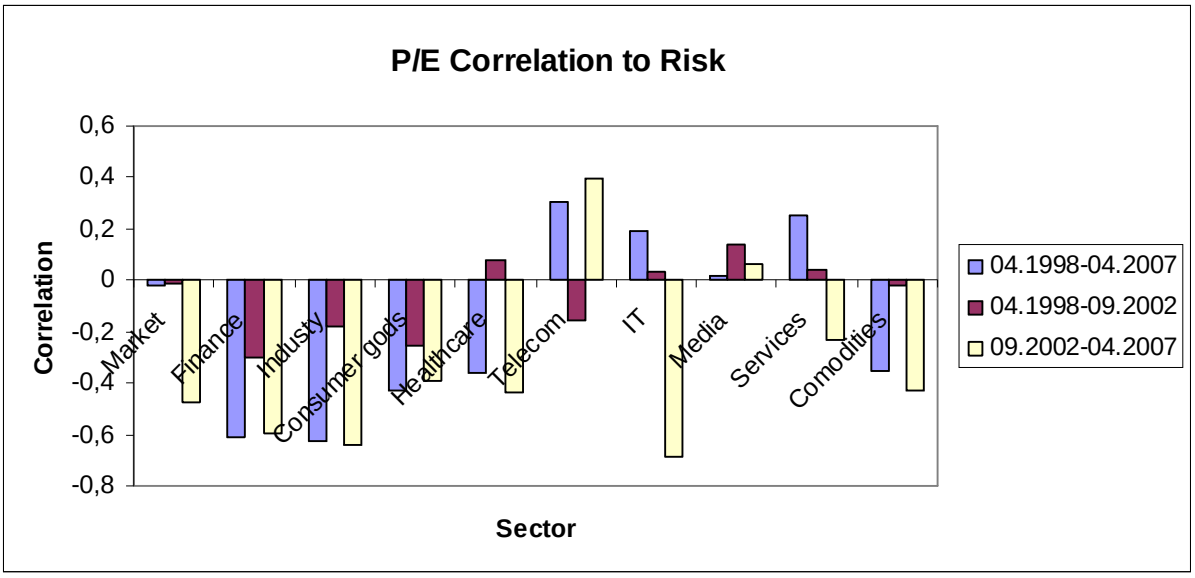

Chart 7

The P/E correlation to growth.

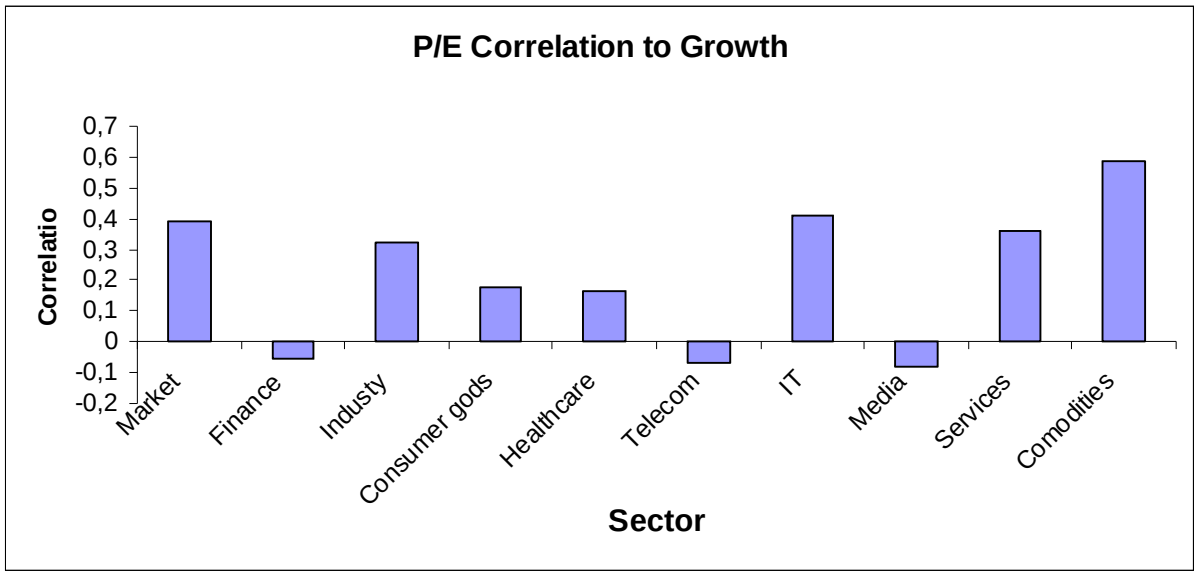

Chart 8

The P/E correlation to growth, divided into two time periods.

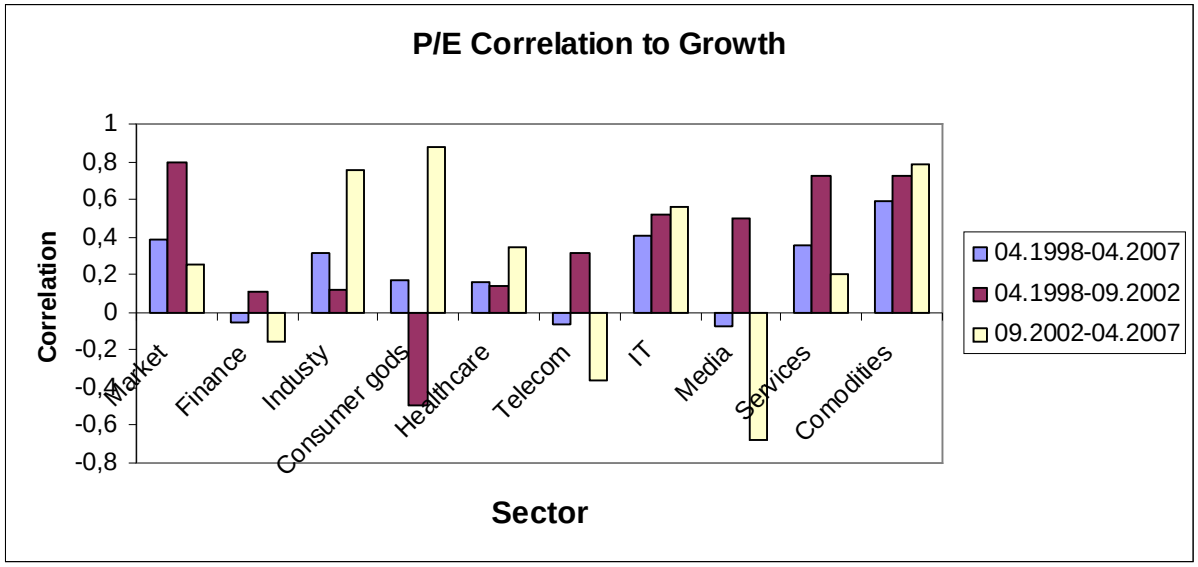

Chart 9

The P/E correlation to the debt to equity ratio.

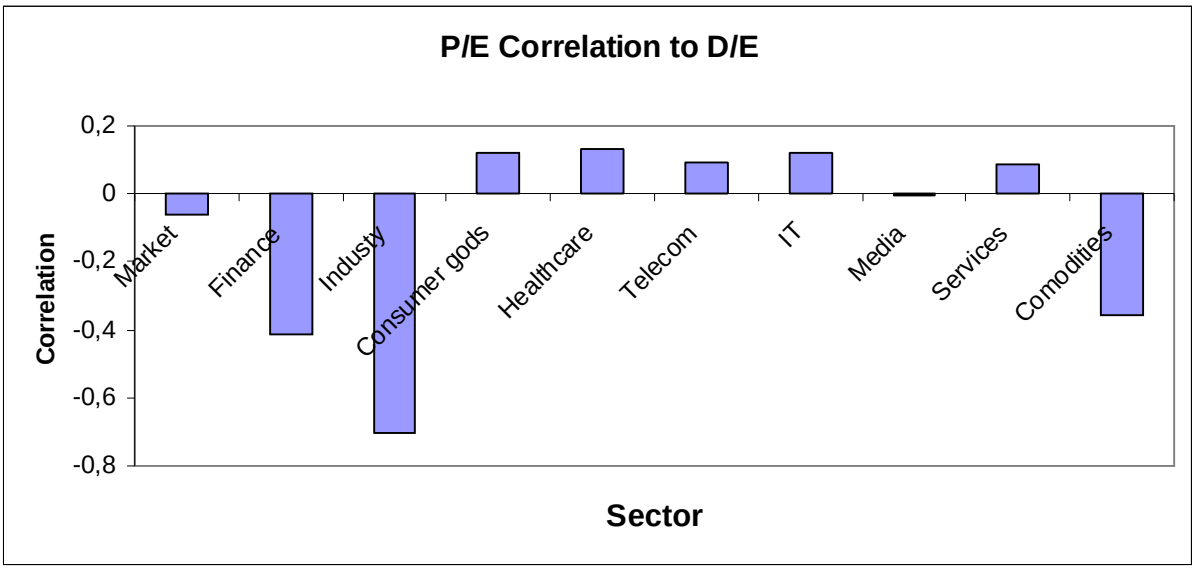

Chart 10

The P/E correlation to the debt to equity ratio, divided into two time periods.

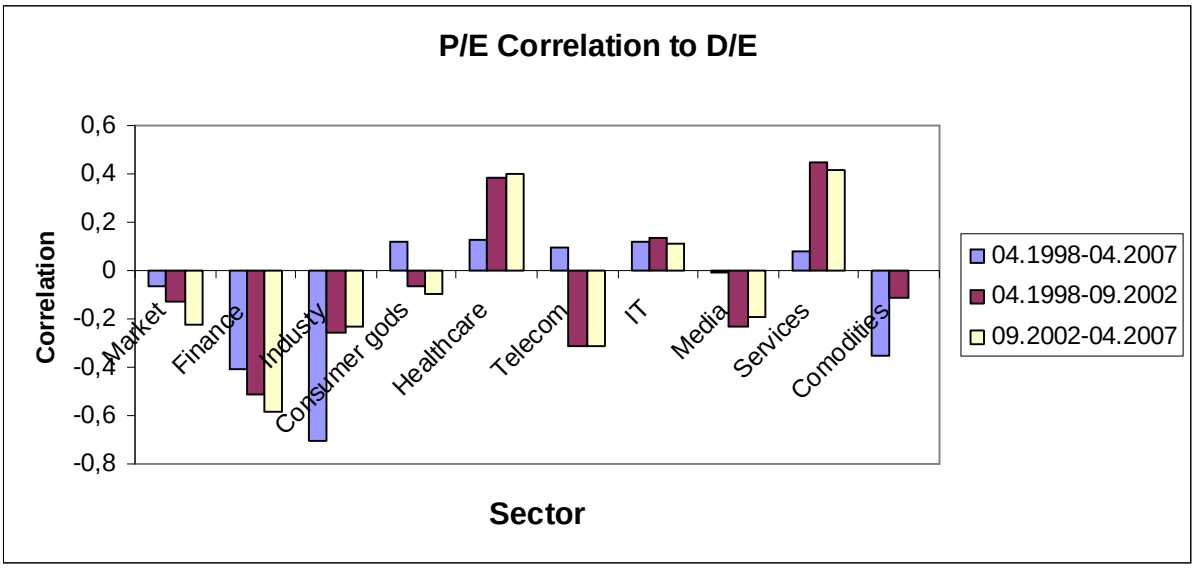

Chart 11

The P/E correlation to size (market value).

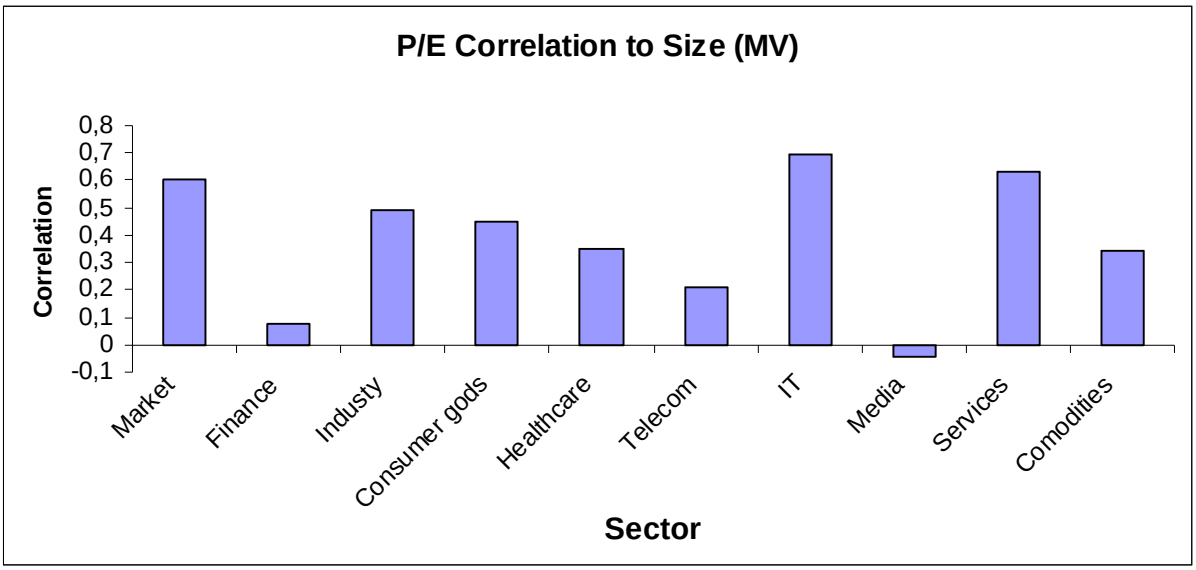

Chart 12

The P/E correlation to size (market value), divided into two time series.

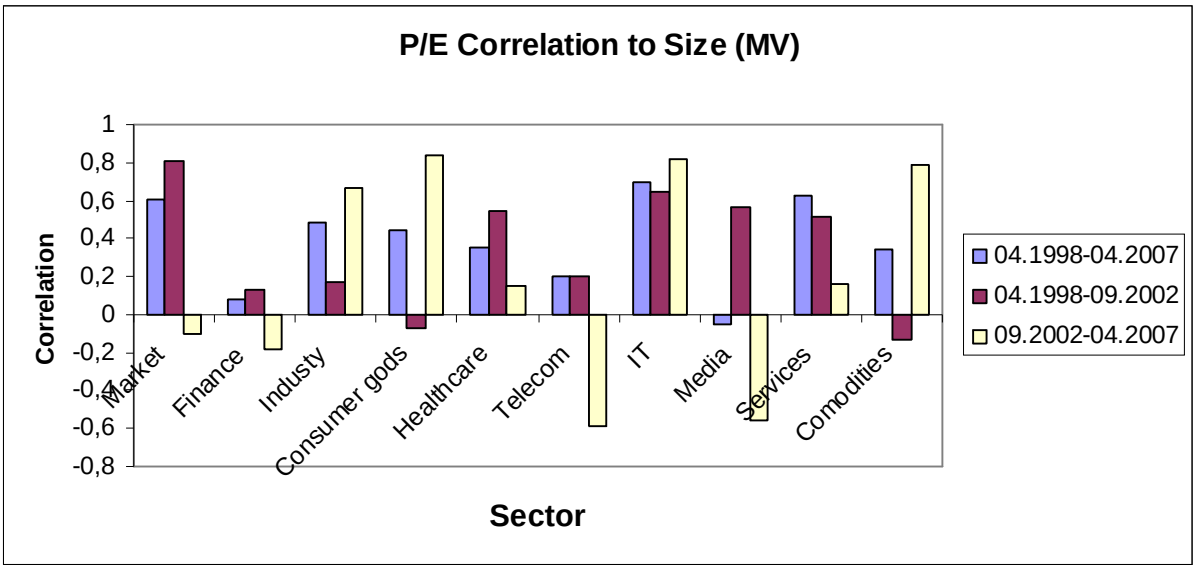

Chart 13

The P/E correlation to market to book ratio.

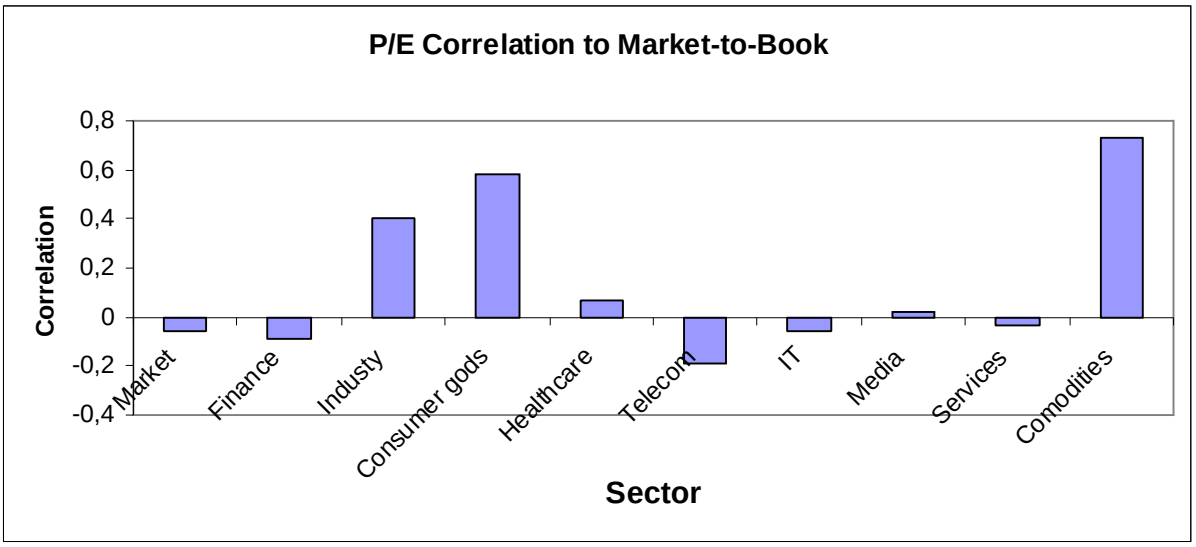

Chart 14

The P/E correlation to market to book ratio, divided into two time periods.

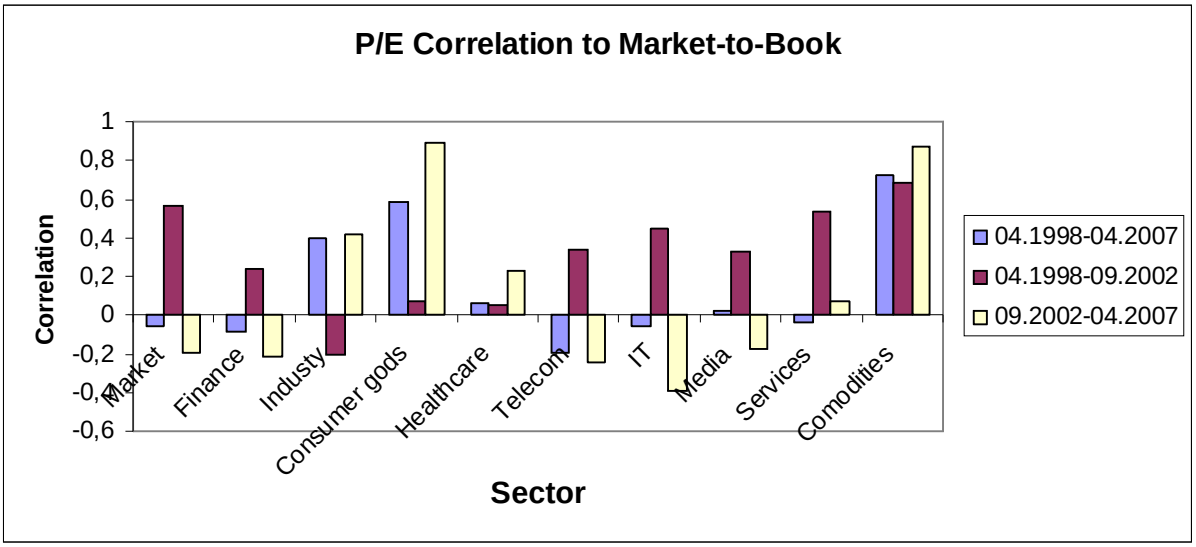

Chart 15

$$P/E = \alpha_0 + \alpha_1 (Dividend\ yield) + \alpha_2 (Growth) + \alpha_3 (Interest) + \alpha_4 (Risk)$$

(April. 1998 to April 2007)

Industry	Constant	Dividend yield	Growth	Interest	Risk	Adj R^2	# of obs	DW statistic
AFGX Market index	2,28 (0,00)*	-0,48 (0,00)*	0,19 (0,04)*	0,17 (0,04)*	-0,01 (0,75)	0,69	108	2,35
IT	-2,24 (0,18)	-0,33 (0,27)	0,98 (0,00)*	0,33 (0,16)	0,03 (0,55)	0,80	108	2,04
Telecom	3,21 (0,00)*	-0,57 (0,08)**	-0,01 (0,95)	0,54 (0,00)*	0,01 (0,93)	0,44	108	2,53
Media	7,38 (0,00)*	-1,36 (0,03)*	-0,61 (0,12)	0,30 (0,39)	-0,01 (0,91)	0,59	108	2,17
Services	0,43 (0,79)	0,10 (0,81)	0,52 (0,05)**	0,11 (0,63)	0,05 (0,45)	0,67	108	2,27
Finance	3,44 (0,00)*	-0,43 (0,00)*	-0,08 (0,46)	-0,18 (0,06)**	-0,05 (0,04)*	0,84	108	2,16
Healthcare	2,53 (0,09)**	-0,25 (0,46)	0,22 (0,37)	0,28 (0,17)	-0,03 (0,63)	0,69	108	2,23
Commodities	-0,30 (0,85)	-0,40 (0,09)**	0,52 (0,04)*	0,25 (0,06)**	0,00 (0,91)	0,89	108	1,92
Industry	1,94 (0,00)*	-0,37 (0,00)*	0,23 (0,02)*	-0,02 (0,78)	-0,02 (0,29)	0,89	109	2,18
Consumer gods	2,57 (0,00)*	-0,27 (0,03)*	0,11 (0,38)	0,00 (0,98)	-0,02 (0,23)	0,88	109	1,92

* The coefficient is statistically significant t the 5 % level

** The coefficient is statistically significant t the 10 % level

Chart 16

$P/E = \alpha_0 + \alpha_1 (Dividend\ yield) + \alpha_2 (Growth) + \alpha_3 (Interest) + \alpha_4 (Risk) + \alpha_5 (M\text{-}to\text{-}B) + \alpha_6 (MV) + \alpha_7 (R\&D) + \alpha_8 (Debt)$

(April. 1998 to April 2007)

Industry	Constant	Dividend yield	Growth	Interest	Risk	Market-to-Book	MV	Debt	Adj R2	# of obs	DW statistic
*AFGX Market index****	3,32 (0,00)*	-0,25 (0,05)*	0,09 (0,12)	0,11 (0,06)**	-0,02 (0,65)	0,16 (0,00)*	-0,04 (0,01)*	-0,16 (0,00)*	0,23	919	-
IT	-2,11 (0.18)	-0,01 (0,98)	0,50 (0,13)	0,31 (0,13)	0,01 (0,88)	0,05 (0,20)	0,35 (0,00)*	-0,04 (0,54)	0,82	104	2,02
Telecom	2,77 (0,04)*	-0,39 (0,33)	0,04 (0,84)	0,59 (0,00)*	0,01 (0,89)	0,03 (0,59)	0,00 (0,99)	-0,05 (0,58)	0,47	101	2,49
Media	9,48 (0,00)*	-1,66 (0,06)*	-0,25 (0,70)	0,27 (0,51)	0,00 (0,98)	0,09 (0,26)	-0,48 (0,26)	-0,07 (0,65)	0,58	104	2,18
Services	-2,92 (0,28)	0,48 (0,22)	0,78 (0,16)	-0,11 (0,41)	0,07 (0,31)	-0,05 (0,62)	0,37 (0,01)*	-0,38 (0,07)	0,67	104	2,17
Finance	3,76 (0,02)*	-0,42 (0,00)*	-0,13 (0,46)	-0,19 (0,04)*	-0,04 (0,05)*	0,05 (0,46)	0,00 (0,96)	0,00 (0,94)	0,84	104	2,19
Healthcare	4,58 (0,01)*	-0,47 (0,28)	-0,53 (0,13)	-0,22 (0,18)	-0,05 (0,30)	0,28 (0,22)	0,13 (0,02)*	0,13 (0,44)	0,71	104	2,13
Commoditi	-1,43 (0,47)	-0,36 (0,21)	0,42 (0,31)	0,26 (0,10)**	0,01 (0,71)	0,01 (0,87)	0,18 (0,13)	0,00 (0,95)	0,87	104	1,90
Industry	2,76 (0,00)	-0,50 (0,00)	-0,06 (0,71)	-0,04 (0,54)	-0,02 (0,18)	0,00 (0,87)	0,15 (0,09)	-0,12 (0,24)	0,90	104	2,17
Consumer gods	0,52 (0,77)	-0,05 (0,75)	-0,19 (0,39)	0,03 (0,71)	-0,03 (0,01)*	0,24 (0,08)**	0,34 (0,04)*	0,00 (0,94)	0,89	91	1,83

* The coefficient is statistically significant t the 5 % level

** The coefficient is statistically significant t the 10 % level

*** Calculated with Panel data