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# Profitability vs. Growth

*A Study of Investor Preference*


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# Abstract

**Title:** Profitability vs. Growth – A study of investor preference

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**Keywords:** Profitability, Growth, P/B-ratio, Abnormal return, Value drivers

**Purpose:** The thesis purpose is to examine how investors values differences in sales growth and profitability, as well as reacts to reported changes in these variables. In addition, the authors evaluate whether it is possible to earn abnormal returns, using Jensen´s alpha, by investing in stocks after reported improvements in these variables.

**Methodology:** Due to the quantitative nature of the thesis, the authors have chosen a positivistic approach. The authors use an independent one way ANOVA (analysis of variance) test in order to compare price-to-book ratios amidst different categories of stocks, and see how investors values differences in growth and profitability. In addition, Jensen´s alpha is retrieved for all stocks before and after reported changes in these variables in order to observe when these changes are incorporated within stock prices.

**Conclusions:** In line with previous research, stocks are priced in accordance with what drives values in companies. In addition, profitability is preferred over growth as value driver. Investors can predict changes in the examined variables quite well and price effects of improvements or deteriorations of the variables are incorporated at least one year prior the changes. Earning abnormal returns, buying stocks ex post the move is possible but difficult. This is due to the inconsistency of the return in the portfolios that will earn abnormal return.

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# 1. Introduction

*The first chapter gives the reader an introduction to the concepts of what drives value in a company, how growth in revenue and profitability allegedly is perceived by investors, and the definition of growth and value stocks. The background leads to a problem discussion, which in turn will* lead *to the problem issue. In addition, this chapter explains the thesis purpose and defines the thesis target group as well as the remaining thesis disposition.*

## 1.1 Background

What drives stock prices, given that the financial markets are fairly efficient, is fundamentally the same thing that drives value in companies. Common finance textbooks usually discuss this issue and even though labels on the target variables differ, the conception is usually the same. According to Koller et al. (2005) value is mainly driven by three things: growth, profitability and optimizing the cost of capital. These three variables can of course be broken down further to derive a more comprehensive understanding of what drives value in companies (Rappaport 1998). However, individual value drivers for companies may differ and the three mentioned above are attributable to any company regardless of structure or industry.

There is no shortage of articles and research papers discussing the ins and outs of companies strategically choosing between profitability and growth (Davidsson et al. 2009; Ramezani et al. 2002; Jiang and Koller 2007; Chaudhuri et al. 2009, to name a few). Numerous papers address this topic, both with a quantitative as well as a qualitative approach, but the results are inconsistent. Papers, mostly entrepreneurial research and media often emphasize growth as being the largest success factor, read drive value (Davidsson et al. 2008). There is however little or weak empirical evidence that this assumption holds. Academicians and researchers alike state that profitability should drive growth and that profitability, to a larger extent than growth, maximizes shareholder value (Davidsson et al. 2009; Ramezani et al. 2002; Fama and French 1995)

Davidsson et al (2009), using a resource-based view, concluded that profitable small and mid-size enterprises, SME, in Sweden and Australia are initially more likely to have attained a competitive advantage than companies with high top-line growth. The authors separate between growth firms and profit firms. Firms can either just have one of the named attributes or be either strong or weak respectively, in both. From these characteristics the authors constructed a matrix with five categories: *profitable*, *growth*,

*middle*, *poor* and *star*, where *star* firms have both high growth and high profitability and *poor* firms have low growth and low profitability. The analysis suggests that profitable firms are in a good position to achieve high growth without any significant loss of profitability, while growth firm are not particularly likely to attain any profitability from increased growth.

Ramezani et al (2002) used a multivariate analysis to examine the relationship between top-line growth and corporate profitability and what maximizes shareholder value. The study was done on 2156 US based companies between the years 1990 through 2000. The results were that, on average, maximizing the corporate growth rate does not maximize the company´s profitability and shareholder value. On the contrary, companies with a moderate growth rate yielded the highest returns. Even though profitability generally rises with increases in top-line or bottom-line growth, there is an optimal point exist beyond which further increased growth destroys value.

Fama and French (1995) examined whether the behavior of stock prices, in relation to size and book-to-market equity-ratios, BE/ME, is reflected with regards to profitability and bottom-line growth. The portfolios were constructed by sampling companies with big, medium and small market equity values and high, medium or low BE/ME-ratios. They started measuring profitability and growth five years backward and forward from the portfolio construction date, time *t*, and saw that on average, high BE/ME-ratios, in line with rational pricing, reflect poor earnings and vice versa. They also presents how size and BE/ME are related to profitability. Companies with high BE/ME-ratios tend to have lower profitability and companies with low BE/ME-ratios are associated with a sustained strong profitability.

The brief review of the studies mentioned above supports the notion that profitability should be preferred over growth. Profitability has shown to not only drive growth (Davidsson et al. 2009), but also to maximize shareholder value (Fama and French 1995), measured as low BE/ME and (Ramezani et al. 2002) measured with returns. But how is this perceived by investors?

## 1.2 Problem Discussion

Given that the assumption of what drives value in companies and therefore also stock prices is true (Rappaport 1998), logically stocks within the different quintiles in Davidsson et al (2009) matrix should on average have similar price-to-book, P/B, ratios

at any given time. In addition, with regards to rational pricing (Fama and French 1995) and likelihood of moving towards a more profitable state (Davidsson et al 2009) and in accordance with what drives value (Rappaport 1998), stocks should be valued from high to low P/B-values, in the order: *star, profitable, growth* and *poor*. This is also indicated by Varaiya et al. (1987) findings where growth and profitability were used as variables in order to explain differences in P/B-ratios and where profitability, rather than growth, had a higher explanatory value with regards to firm value.

The concept of value stocks and growth stocks becomes important in this matter. Growth stocks are recognized by having a high P/B-value whereas value stocks by a low P/B-value. Numerous studies have shown that investing in a value stock portfolio, on average, yields higher returns than a growth stock portfolio (Carlsson et al. 2007; Capaul et al. 1993; Fama and French 1997; Piotroski 2000; Sharma and Preeti 2009) even though there is no significant difference in risk, measured by beta (β) (Fama and French 1992). The common notion is that value stocks are undervalued by the market and that the price mechanism eventually will correctly revalue them (La Porta et al. 1997).

When describing the characteristics with regards to profitability and revenue growth of growth stocks, Fama and French (1995) found that growth stocks are typically generating both a high revenue growth rate and a high profitability, i.e. a *star* firm according to Davidsson et al (2009). However, Jiang and Koller (2007) examined the characteristics of both growth and value stocks and found indications that the notion about profitability and growth could be incorrect. The difference in revenue growth between the two types of stock was indistinguishable. The main difference lies within their *Return on Invested Capital,* ROIC. Growth stocks had on average almost twice the ROIC compared to value stocks. However, the distribution of ROIC and growth within the group of growth stocks varied significantly. Growth stocks could have either a lower growth rate which was compensated with a higher ROIC or vice versa. In addition, Jiang and Koller (2007) found evidence that investor seem to reward companies who changes their strategy i.e. starts focusing on growth if profitable and vice versa.

If there is no distinguishable difference in growth rate between value stocks and growth stocks (Jiang and Koller 2007), growth stocks should be found in the quintiles *profitable* and *star* whereas value stocks should be found in the quintiles *poor* and

*growth* in Davidsson et al. (2009) matrix. Therefore, they should already be characterized by a high and low P/B-ratio, respectively. However, Ramezani et al (2002) found that companies with a mediate growth rate and stronger profitability i.e. a *profitable* firm according to Davidsson et al (2009), on average yielded the highest returns, even though it practically should be regarded as a growth stock and not a value stock (Davidsson et al 2009; Jiang and Koller 2007).

The conclusions are inconsistent, but what it all comes down to is how investors perceive revenue growth and profitability when choosing which stocks to invest in. With regards to the articles mentioned above it might be clear that investors would premier profitability rather than growth, but how to explain Ramezani et al (2002) findings that, what the authors assume to be growth stocks, on average beats value stocks in returns?

What is not yet clear and where there are still matters to investigate is how investors recognize the transition from one quintile to another. E.g. *profitable* towards *star* or *profitable* towards *poor*, and price the stocks that do move, even higher/lower than before. If investors recognize this move first when the stocks reach another status or during the transition, investors fail to predict which stocks that will move. Then, logically, there should be several stocks in, for example, the *profitable* quintile that are undervalued since they will move towards *star* status, which is in line with shareholder wealth maximization and also would support Ramezani et al (2002) findings. If investors are not able to predict this movement effectively, it might be possible to earn abnormal returns by investing in stocks moving towards a more favorable state.

## 1.3 Problem Issue

The thesis problem issue consists of three problem formulations, which are derived from the problem discussion above. The authors do not aim to test if Davidsson et al (2009) hypotheses also hold for another market but rather to investigate how efficiently the market price moves within the matrix. The thesis problem formulations are:

1. *How are stocks initially priced within different quintiles in Davidsson et al (2009) matrix with regards to P/B-ratio?*
2. *How are movements within Davidsson et al (2009) matrix perceived and valued by investors with regards to the stock prices of individual companies?*

3. *Will stocks which moves towards a more favorable state generate risk adjusted abnormal returns and which movers; poor, growth, profitable or star, will generate the highest risk adjusted abnormal return?*

## 1.4 Thesis Purpose

The thesis purpose is to use Davidsson et al. (2009) model for sorting publicly listed companies on the three stock exchanges NYSE, NYSE Amex and Nasdaq into the categories: *growth*, *profitability*, *poor* and *star*. The authors will then examine which companies that will move within the matrix within a defined period of time. By comparing the companies which has moved to another quintile with their respective share price, the authors will see how and when investors incorporates the move into the stock price and whether it is possible to earn risk adjusted abnormal returns, using Jensen´s alpha. By constructing a portfolio of moving stocks the authors also aims to conclude which movers will yield the highest returns and whether the return is significantly higher than non-movers.

## 1.5 Target Group

This report mainly focuses on bringing information to investors, managers and researchers with an academically and financial interest. Although the authors will explain theories and concepts further, it is suggested that readers should have previous knowledge about the financial market and terminology for a better understanding.

## 1.6 Thesis Restrictions

Since the study is extensive in several respects and the possibility to cover all aspects is limited, the authors feel the need to restrict the study to make it feasible. First, the authors restrict the sample data to the three American stock exchanges: NYSE, NYSE Amex and Nasdaq. A more comprehensive discussion on the sample data such as motivation for the choice of sample and how the sample will be treated will be found in *chapter 2*. Second, the authors acknowledge the fact that testing Davidsson et al (2009) hypotheses would enhance the depth of the thesis and generate a more comprehensive understanding of the issue. However, covering all aspects of Davidsson et al (2009) model, given the amount of data and time needed to conduct that study, is substantially larger and the authors feel that given the circumstances for this thesis, it would be impossible.

## 1.7 Thesis Outline

The remaining part of the thesis will have the following outline:

*Chapter 2* presents the choice of empirical method for the thesis purpose, as well as motivation for and description of the collected data sample.

*Chapter 3* covers the thesis practical approach, as well as motivations for the statistical methods used.

*Chapter 4* reviews literature covering the concepts of what drives value in companies and how this is related to stock prices. In addition, the chapter describes a more in depth review of previous studies used to build the thesis framework.

*Chapter 5* presents the empirical findings from the statistical methods used to answer the thesis problem formulations as well as an analysis of the empirical results.

*Chapter 6* summarizes the findings of this thesis and provides suggestions for future research.

*Chapter 7* provides the thesis reference list.

# 2. Methodology and Data

*Chapter two presents the choice of empirical method for the thesis purpose as well as motivation for and description of the chosen collected sample data.*

## 2.1 Research Approach

The thesis aims to evaluate whether investors can predict which stocks will move within Davidsson et al. (2009) matrix and if this is reflected in the stock prices. Therefore it is natural that the authors have taken a positivistic approach due to the quantitative nature of this thesis. Positivism is an epistemological perspective and philosophy of science, which states that true knowledge can only be based on what we perceive and positive verification. It also states that behavior or patterns in any environment can be generalized since there are theories or laws, which control the outcome of any event (Ryan et al. 2002).

Since the authors' ambition is not explicitly to develop a new theory about rational pricing or test a hypothesis regarding market efficiency, the thesis has neither taken exclusively an inductive or deductive research approach. It is rather a mix of both. The authors are deductive in the sense that they wish to extend Davidsson et al. (2009) study and examine how movements within the matrix are priced. The authors are inductive in the sense that they wish to develop a generalized assumption about how investors incorporate movements within Davidsson et al. (2009) matrix and whether it is possible to earn abnormal returns on these movements. (Lundahl and Skärvad 2009).

### 2.1.1 Reliability

High reliability in methodology is defined as the absence of random measurement errors. In short, it has to do with how replicable the study is. If someone else rather than the authors would construct the same study using the same methodology and data, it would yield the same results (Lundahl and Skärvad 2009). With the authors' positivistic research approach and the usage of data collected from the well revered *Datastream*[1], the authors consider this study to be highly reliable. The authors will not interpret any of the collected raw data directly and will therefore be unbiased in the analysis. However, it is possible that the statistical models chosen to examine the collected sample have been selected because the authors believe that it would yield a more

[1] Datastream is a financial statistical data base provided by Thomson Reuters. http://online.thomsonreuters.com/datastream/

favorable result. This is something the authors have perceived and therefore will take into account when conducting the analysis.

### 2.1.2 Validity

Validity in a research study can be defined as the absence of systematical measurement errors. Validity is divided into external and internal legitimacy. Internal validity means that the research method chosen actually measures what it is supposed to measure (Lundahl and Skärvad 2009). The authors believe the internal validity for this thesis to be high. The methods used to examine the problem formulations are considered accurate in the thesis context and the variables chosen to be examined are well defined. A more comprehensive discussion about the methods used and the expected results they will yield can be found in *chapter 3*.

External validity concerns to which extent the findings of a study can be generalized and applied to other cases, in this case other markets, (Lundhal and Skärvad 2009). The external validity is of great importance to this thesis. The authors aim to find generalized patterns in how stock prices moves in accordance to reported changes in revenue growth and profitability, and if investors can earn abnormal returns on these moves. If this only was possible on the markets the authors have chosen to examine, the validity would be quite low. There are few studies that can generate a 100 % external validity, since there might be differences in the population chosen to be investigated. However, the authors believe that the external validity for this thesis is high. The thesis problem discussion and hypotheses are based on common financial theories and hypotheses and connected to investors' rational pricing. The thesis' problem formulation and hypotheses would most likely be applicable on other markets and yield the same result.

## 2.2 Sample Data

The data is taken from three American stock exchanges: NYSE, NYSE Amex and Nasdaq. The main reason for this is that the US stock markets provides larger samples and better access to historical data than most other markets. The sample initially consists of 690 companies listed on the three exchanges. However, due to new listing, delisting, and exclusions of outliers and companies in certain industries, the number of companies varies from year to year. The sample throughout the time period is still sufficient to complete the study with significant results and the sample size each year is shown in table 1.

| Category / Year | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|---|---|---|---|
| *Poor* | 220 | 280 | 284 | 327 | 397 | 408 | 469 | 509 | 542 | 511 |
| *Growth* | 131 | 191 | 207 | 241 | 264 | 290 | 288 | 291 | 286 | 338 |
| *Profitable* | 118 | 161 | 200 | 226 | 227 | 250 | 224 | 237 | 236 | 293 |
| *Star* | 221 | 272 | 297 | 316 | 381 | 402 | 477 | 497 | 544 | 507 |
| **Total** | 690 | 904 | 988 | 1110 | 1269 | 1350 | 1458 | 1534 | 1608 | 1649 |

*Table 1. Data sample after exclusions (Appendix 1)*

To prevent the results from being perverted, the authors have chosen to exclude from the sample financial corporations, with regard to their leverage structure, and utilities, due to the special regulatory framework that surrounds many of these businesses. Also, whenever one of the variables needed to complete the study is missing, the stock is removed in that year. However, since the portfolios will be sorted and examined on a yearly basis, stocks that previously have been removed can still appear in later years. There is no clear-cut praxis or theory on how to deal with outliers in data samples. The authors have chosen to exclude stocks three standard deviations above and below the mean of the sample with regards to: *revenue growth*, *ROA* and *P/B-value.* This is done each year to avoid these extreme values to distort the analysis.

Yearly data has been collected for 14 years in total out of which 10 years are analyzed (1997-2006 for pricing variables and 1996-2005 for fundamental company variables). The additional four years is needed to ensure that all ten years that are analyzed will have data two years prior and two years after movements. In addition, 14 years will cover two business cycles and avoid any irregularities concerning boom and bust years. A longer period could have supported and enhanced the findings in this study but finding data becomes increasingly difficult back in time. Also, going beyond ten years makes the sample significantly larger and quite unmanageable. In addition, the authors have chosen to use yearly data instead of quarterly, since all companies do not disclose such data. Also, if using quarterly data, the authors would need to adjust some companies for seasonality changes, which would, with regards to the sample size, be impossible.

To avoid a look-ahead bias derived from using data in a trading strategy which was not published at the time, the authors use stock prices from June 30 each year and fundamentals from the yearend reports. Survivorship bias, a consequence of excluding

companies which have gone bankrupt or been delisted from the stock exchange, and focusing on those who survived, remains in the sample, which could distort the results to some degree (Jaffe et al. 1989). This is due to the difficulty in finding data of companies that have either gone out of business or been delisted for other reasons, such as acquisitions. Theory and evidence show that value stocks go bankrupt and hence become delisted more often than growth stocks related to financial troubles and lower profitability. If the authors assumptions regarding the relationship between the value-growth stocks dimension and Davisdsson et al (2009) categories are correct, the category of poor stocks will be more affected by bankruptcies than the star category and hence show a distorted higher return than is correct.

# 3. Practical Approach

*Chapter three covers a more comprehensive declaration of the thesis practical method used to answer the problem formulations.*

## 3.1 Introduction

The practical method will be divided into four steps. The steps will follow the same order as the thesis problem formulations and intend to give the reader further understanding on how this thesis is completed and further explain the methods used.

The practical approach consists of the following steps:

1. Sorting sample data into Davidsson et al (2009) matrix.
2. Comparison of P/B-values between different quintiles.
3. Portfolio formation.
4. Analysis and comparison of portfolios.

## 3.2 Practical Approach Break-down

### 3.2.1 Sorting Sample Data

The companies are divided into the five categories of *stars, profitability, middle, growth and poor*. The measurements used are growth in revenues as *growth*, and *Return on Assets*, ROA, as *profitability*. ROA is not optimal to use as a measure of profitability since it doesn't take leverage into account. In addition, the ROA retrieved from Datastream uses net income instead of after-tax EBIT as a measure of profit, which will pervert the measure slightly and make it less comparable to peers. However, the authors consider that this proxy is adequate in this context, since retrieving e.g. ROIC for all companies would be impractical as it requires the marginal tax rate for each company, as well as Invested Capital (Koller et al. 2005).

The specific formula used for *growth* is the change in revenue from year *t-1* to year *t* as a percentage of the revenues in year *t-1*.

$$g = \frac{\Delta Revenue_t}{Revenue_{t-1}}$$

The formula used for profitability is net income year *t* as a percentage of total assets year *t*.

$$ROA = \frac{Net\ Income_t}{Total\ Assets_{(t+t-1)/2}}$$

To reduce the impact of outliers, for companies that are significantly lower or higher in the targeted variable than others in the sample, both *growth* and *profitability* are divided with the median rather than the mean (Davidsson et al 2009). Companies are divided into the five categories with the following schema (figure 1) on annual data:

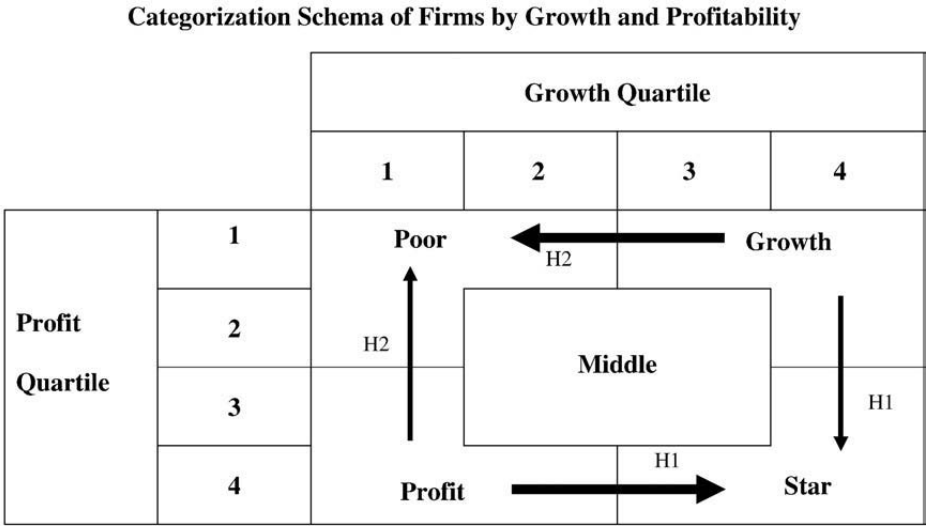



*Figure 1. Categorization Schema (Davidsson et al 2009)*

The quartiles have the following characteristics:

- *Poor:* Low performance on both dimensions (below median on both and lowest quartile on at least one).
- *Middle:* Mid-performance (2nd or 3rd quartile) on both dimensions.
- *Growth:* High growth performance, but low profit performance (above median on the former and below on the latter, but not qualifying as *Middle*).
- *Profit:* High profit performance, but low growth performance (above median on the former and below on the latter, but not qualifying as *Middle*).
- *Star:* High performance on both dimensions (above median on both and highest quartile on at least one).

The companies have been sorted each year in the thesis trial period, between 1995 and 2005 for fundamental company data and between 1996 and 2006 for price variables such as P/B and returns since they lag the fundamental half-year data. The first of these

eleven years was used solely for making the first movement, hence ten years of movements have been calculated. In order to identify each movement between categories the authors used conditional formulas in Excel, such as "IF" and "AND" together with "VLOOKUP".

### 3.2.2 P/B-values Comparison

After sorting the sample into Davidsson et al. (2009) matrix, each year's initial market price per share and book value per share will be collected to create the P/B-value for each stock. To compare the P/B- values between different quintiles, the authors applies a one-way ANOVA test.[2] This enables the authors to retrieve both the mean, standard deviation of the mean and the confidence interval of difference for all four categories simultaneously. By adding a post hoc test[3] the authors will also answer whether or not the mean difference amid the group is statistically significant. These tests are preferable over an independent sample t-test, when there are differences in the amount of observations between categories. However, since there are no theoretical values of P/B in Davidsson et al. (2009) matrix to test for, testing a hypothesis will not be necessary. Since the authors only wish to compare how stocks within different quintiles are initially priced, the test is considered adequate. The authors have chosen to exclude the quintile labeled *middle* from this step and beyond, since it contains stocks that are not as clear cut with regards to profitability and growth and is believed to distort the analysis.

### 3.2.3 Portfolio Formation

Each ending year in the defined time period, when it will be clear which stocks have moved and which have stayed, the stocks will be sorted into value weighted portfolios of movers and non-movers with regards to their prior position. Each year, the portfolio sample will therefore consist of total 12 moving and four non-moving portfolios with the following labels as in figure 2.

[2] Statistical test used to test if means between categories are equal.
[3] Statistical test which, given the results of the ANOVA-test, describes how the mean is significant different between categories.

| | |
|---|---|
| • *Poor to Star*<br>• *Poor to Growth*<br>• *Poor to Profitable*<br>• *Poor non-movers* | • *Growth to Star*<br>• *Growth to Profitable*<br>• *Growth to Poor*<br>• *Growth non-movers* |
| • *Profitable to Star*<br>• *Profitable to Growth*<br>• *Profitable to Poor*<br>• *Profitable non-movers* | • *Star to Profitable*<br>• *Star to Growth*<br>• *Star to Poor*<br>• *Star non-movers* |

*Figure 2. Portfolio Schema*

### 3.2.4 Changes in P/B values

In order to examine whether valuation changes in terms of P/B ratio when there is a movement between categories, the authors compared the mean and median values before and after the event takes place. Each year, the portfolio sample will therefore consist of the same twelve moving and four non-moving portfolios presented in the previous section Graphs are presented for P/B ratios two years before the event and two years after the event.

### 3.2.5 Analysis and Portfolio Comparison

The portfolios have been analyzed with regards to their respective return one year prior and two years after the portfolio formation date. This have enabled the authors to determine when and if the market reacts to changes in the two variables growth and profitability. Since the authors are not able to test when the reaction occurs with any statistical method, the time span of four years is believed to give sufficient data to draw conclusions about how moves are perceived by investors. If investors reacts to moves within the matrix, and if this move is observable, then the time span between movement and reaction can be compared between stocks and portfolios. Jensen's alpha is used to examine whether abnormal return could be obtained by investing in any of the portfolios above and also conclude which portfolio yields the highest abnormal return. CAPM have been constructed with the S&P 500 as the market return and the 10 year government bond as the risk-free rate.

# 4. Theoretical Framework

*This chapter reviews literature covering the concepts of what drives value in companies and how this is related to stock prices. In addition, the chapter provides a more in depth review of previous studies used to build this thesis' framework.*

## 4.1 Theoretical concepts

### 4.1.1 Value drivers

Although no standard definition for value drivers exists, they refer to what creates shareholder value. The creation of value is related to capabilities that gives a company a comparative advantage. Alfred Rappaport (1998) lists seven value drivers in his book *Creating Shareholder Value:*

- Sales growth rate
- Operating profit margin
- Incremental fixed capital investment
- Incremental working capital investment
- Cash income tax rate
- Residual value income tax rate
- Cost of capital

These can in turn be broken down to performance on the operating level or to calculate profitability to be used in formulas to calculate business value. However, to simplify, these value drivers are often compounded into three categories which are: sales growth rate (growth); operating profit margin, fixed and working capital investments (profitability); tax rates and cost of capital (*weighted average cost of capital* or WACC). These are attributable to any company regardless of structure or industry. These three together maximize firm value and therefore also shareholder value.

### 4.1.2 CAPM

To be consistent in the thesis of the CAPM's content and assumptions, the authors have decided to follow Berk and DeMarzo's (2007) framework. The Capital Asset Pricing Model explains the relationship between a security's expected return and risk based on its beta with the market portfolio:

$$r_e = r_f + \beta(r_m - r_f)$$

Where:

Re = Expected return of the asset

Rf = Risk free rate

B = The risk measure of the asset

Rm = Expected return on the market portfolio

There are three main and vital assumptions for the CAPM to hold:

- All investors can trade securities at competitive market prices, with no transaction costs or taxes.
- All investors will only choose efficient portfolios, which maximize the expected return at a given level of volatility.
- All investors analyze securities the same way. This means that they have the same homogeneous expectations concerning expected returns, volatilities and correlations.

### 4.1.3 Jensen's Alpha

In 1968, Michael Jensen published the article "The Performance of Mutual Funds in the Period 1945-1964". Jensen wanted to find a measure to evaluate the performance of portfolios of risky investments and find if one could outperform the market on the long term. By studying the CAPM, he added the variable *alpha* to the model:

$$\alpha = r_i - (r_f + \beta(r_m - r_f)$$

Where:

Ri = Expected total portfolio return

Rf = Risk free rate

B = The risk measure of the portfolio

Rm = Expected return of market under given period

The model illustrates the difference between the actual generated return and the theoretical expected return calculated by CAPM.

### 4.1.4 Efficient Market Hypothesis

The efficient market hypothesis was first introduced by Eugene F. Fama in 1970. The hypothesis states that all financial assets are correctly valued, given that all investors have access to all available information on the market about these assets. Therefore it is not possible for investors to single handedly foresee new information that could affect current asset price levels. According to the hypothesis, this will result in equilibrium prices on all markets and thus make it impossible for investors to earn abnormal returns. In addition, for this hypothesis to hold, Fama (1970) also presumes, besides access to all information, that all investors act rationally.

However, since there are possibilities to earn abnormal returns on financial assets, there are always stocks which will yield higher than market index and one could make abnormal returns by investing in such stocks, Fama (1970) concludes that there are three levels of efficiency. These are in turn depending on what kind of information is available and are categorized as: **strong-, semi-strong- and weak efficient.**

In **strong efficient markets,** the share prices reflect all available information. This includes historical as well as public and private information. Logically this will result in correctly valued stocks and no opportunity to earn any abnormal returns by investing in the stock market.

The **semi-strong efficient market** makes it impossible to make abnormal returns on publicly disclosed information. The reason is that immediately after the information becomes available on the market it is reflected in the share price along with historical data.

**Weak efficient market** means that prices follow the random walk model. It is not possible to withdraw abnormal excess returns just by looking at historical share prices, which means that technical analysis becomes useless.

## 4.2 Previous studies

### 4.2.1 Growing Profitable or growing from profits

In the article, Davidsson et al (2009) evaluated small and mid-size Swedish and Australian companies and hypothesized that profitable companies with a low growth are much more likely to move to a state with high profitability and high growth, rather than a fast growing company with low profitability. In other words, they assert that in order

to be successful, profitability should be prioritized over growth and that a growth company should strive for being profitable rather than perusing further growth. This is because profitability is believed to be a better indicator of companies having a comparative advantage.

After dividing the sample into the matrix disclosed in *chapter 3.2.1*, Davidsson et al. (2009) found in which direction companies moved over a predetermined period of time (1-year and 3-year periods in Australia and 1-year and 2-year periods in Sweden). The results were that 16 - 33 percent of the *profitable* companies moved to the *star* performance group, depending on time period, while only 10-12 percent of the *growth* companies moved the same way. The tests were statistically significant and therefore their hypotheses held. To increase the credibility of the results, sub-samples were made categorized by size, industry and company age. The results for these sub-samples were in line with the previous findings and most of them were statistically significant. In addition, besides profitable companies being more likely to reach *star* status, *growth* companies where 2-3 times as likely to end up in the *poor* category as *profitable* companies. These two results support the hypothesis that companies should strive to reach profitability and not growth first.

### 4.2.2 Size and Book-to-Market Factors in Earnings and Returns

Fama and French (1995) examined whether the behavior of stock prices, in relation to size and book-to-market equity-ratios, BE/ME, is reflected with regards to profitability and bottom-line growth. The study was a continuation of Fama and French (1992), where the authors found evidence of a value premium on American stocks, between 1963-1990, regarding growth stocks and value stocks.

The study focuses on six portfolios containing companies divided after high, medium or low BE/ME-ratios and big or small market capitalization, ME-values. 4878 companies from NYSE, AMEX and NASDAQ were sorted on a yearly basis between the years 1963-1992. The portfolios where then labeled in accordance with their characteristics (S/L, S/M, S/H, B/L, B/M and B/H), where stocks within big ME-sample which also belongs to the group with a high BE/ME are placed in the B/H portfolio and vice versa.

The results indicated that there is a link between profitability and size, since small stocks had a lower profitability than big stocks at the 5- percent significance level. The results also showed that, in line with rational pricing, stocks with a low BE/ME, on

average, are more profitable than stocks with a high BE/ME in the given time period. This in turn also showed the link between profitability and BE/ME- ratios.

### 4.2.3 Growth, Corporate Profitability and Value Creation

Ramezani et al (2002) examined the relationship between company top- and bottom line growth and performance, in order to evaluate whether it is possible to maximize profitability with an optimal growth rate. Ramezani et al (2002) also wanted to determine whether maximizing a performance metric would lead to shareholder wealth maximization. The final sample consisted of 2156 U.S. companies which was examined over an 11-year period between 1990 and 2000.

The study was conducted in two steps. First, the authors used two measures of growth designated to show the companies capacity to expand; Earnings growth and sales growth. Average annual sales and earnings growth rates were used to divide between companies, which lead to a yearly compilation with quartiles of earnings and sales growth rates where the first quartile represented companies with the slowest growth. Second, companies were evaluated and compiled by profitability using performance measures such as EVA (*Economic Value Added*), MVA (*Market Value Added*), ROE (*Return on Equity*) and ROI (*Return on Investment*). Financial attributes such as Size, MV/BV, P/E and total debt / total equity, were also added. Using a univariate analysis, Ramezani et al. (2002) could explain the relationship between growth and corporate performance.

The results showed that the performance measures on average increases in line with earnings and sales growth from quartile one to three, but decreases in quartile four. The results also showed that companies in the third quartile are the most likely to maximize shareholder wealth and improve performance further. In order to draw any further conclusions about the relationship between growth and performance, Ramezani et al. (2002) used the previous data in a multivariate analysis. A multivariate regression model measured only of EVA in terms of sales and earnings growth was added. The authors identified an inverted U-shaped relationship between EVA and sales growth/ earnings growth. The results were also proved to be statistically significant and give support to the univariate analysis. These results concluded that maximizing growth does not maximize shareholder value Instead, this is accomplished by a modest growth rate.

### 4.2.4 The Relationship between Growth, Profitability, and Firm Value

Varaiya, Kerin and Weeks (1987) examined how value-based planning performs as an evaluation of corporate strategies. They use the Finite Growth model and conclude that the expected spread, the difference between return on equity and the cost of capital, and the expected earnings growth are positively related to firm market value. The results also reveal that the former is more important than the latter for firm value which implies that growth have less importance in creating value than anticipated.

However, the study yielded some contradicting results. The change in market-to-book, ME/BE-value, was examined for companies, which went from having a negative to a positive spread as well as the opposite. The median ME/BE-value increased, as expected, in the former case but, unexpectedly, the ratio increased marginally, but significant, in the latter case as well. The findings also reveal that moving from negative spread to a positive one, in other word becoming profitable, and at the same time grow, is difficult for businesses to manage. Only 13 percent of the companies were able to achieve this and the reward was large with an 80 percent increase in ME/BE ratio. Varaiya et al. (1987) also found that profitability and growth were not independent. Instead, a trade-off exists between the two as companies with higher expected spread had lower expected growth. The implication would be to find the trade off that maximizes firm value.

# 5. Empirical Results and Analysis

*Chapter five presents the empirical findings from the statistical methods used to answer the thesis problem formulations as well as an analysis of the empirical results.*

## 5.1 P/B comparison

After retrieving the one-way ANOVA test results as well as the additional post hoc ANOVA test results, the data has been summarized in the tables below. Due to the large amount of data, the authors have chosen to only set forth results of importance to the thesis. The complete result tables will be found in the thesis appendix 1.

| Year | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *Mean* | *Std. Deviation* | *Mean* | *Std. Deviation* | *Mean* | *Std. Deviation* | *Mean* | *Std. Deviation* | *Mean* | *Std. Deviation* |
| **Poor** | 2,4414 | 2,28088 | 2,2345 | 2,14723 | 2,4613 | 2,55195 | 3,8887 | 32,10036 | 3,1703 | 5,276 |
| **Growth** | 3,5776 | 3,29238 | 3,0093 | 2,46344 | 3,3903 | 3,61033 | 3,4789 | 7,13102 | 4,1695 | 7,88369 |
| **Profitable** | 3,6004 | 2,95299 | 3,2801 | 2,65039 | 3,7675 | 2,8908 | 3,5309 | 5,27632 | 3,316 | 4,11115 |
| **Star** | 4,2883 | 2,88626 | 4,2452 | 2,83326 | 4,397 | 2,81355 | 4,3165 | 4,26783 | 4,9885 | 5,7253 |

*Table 2. Descriptive P/B Comparison (Appendix 1)*

| Year | 2002 | | 2003 | | 2004 | | 2005 | | 2006 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *Mean* | *Std. Deviation* | *Mean* | *Std. Deviation* | *Mean* | *Std. Deviation* | *Mean* | *Std. Deviation* | *Mean* | *Std. Deviation* |
| **Poor** | 0,3229 | 45,33035 | 2,1194 | 5,12012 | 2,4296 | 4,64928 | 2,9923 | 5,15625 | 2,7604 | 5,8357 |
| **Growth** | 3,6182 | 9,27629 | 2,5889 | 5,94146 | 2,6481 | 6,00166 | 3,6453 | 5,55808 | 3,2433 | 5,52546 |
| **Profitable** | 3,3138 | 6,61391 | 3,0991 | 3,747 | 3,0779 | 3,68965 | 3,6258 | 4,00037 | 3,5423 | 3,56979 |
| **Star** | 4,0086 | 5,51129 | 3,2099 | 3,28381 | 3,4215 | 3,45597 | 4,0415 | 3,73998 | 3,7823 | 3,90148 |

*Table 3. Descriptive P/B Comparison (Appendix 1)*

Tables 2 and 3 shows that, on average, there are differences in the mean P/B-value between categories. This would also be in line with rational pricing (Fama and French 1995) and what drives value in companies (Rappaport 1998), as well as Varaiya et al. (1987) findings. However, the differences are small between categories and standard deviation of the mean in some years are, relative other years, extremely large. This gives an indication that investors could have difficulties in valuing stocks with regards to growth and profitability, especially when separating between stocks in the *growth* and *profitable* quintiles. In six out of ten years, 1997, 1998, 1999, 2003, 2004 and 2006, stocks are valued in accordance with the authors' assumptions and ranked from high to low: *star*, *profitable*, *growth* and *poor*. There are some years, where the results are

highly irregular, such as year 2000 and 2001, when *poor* and *growth* have the second highest P/B-values respectively. This is most likely due to the dot com bubble, where many of the overvalued TMT-companies actually didn't have any profits nor growth in revenues but had generated great expectations about future earnings (Penman 2003).

| Year | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|---|---|---|---|
| Significance | 0,005 | 0,00 | 0,009 | 0,385 | 0,00 | 0,493 | 0,02 | 0,00 | 0,001 | 0,006 |

*Table 4. Test of Homogeneity of Variance (Appendix 1)*

The test of homogeneity of variance presented in table 4 shows that in eight out of ten years, variance between categories are not equal at the 0,05 significance level.

| Year | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|---|---|---|---|
| Significance | 0,00 | 0,00 | 0,00 | 0,943 | 0,00 | 0,167 | 0,002 | 0,003 | 0,003 | 0,008 |

*Table 5. One way ANOVA test (Appendix 1)*

The one-way ANOVA test in table 5 also shows that at the 0,05 significance level, means between categories are not equal in eight out of ten years. Only the years 2000 and 2002, as in the prior test results, have means that are similar among categories. This applies especially to the year 2000 where the significance level were 0,943, which is considered extremely high. Again this is most likely effects from the dot com bubble, where people overestimated or disregarded revenues and profitability for TMT-companies (Penman 2003).

When conducting the post hoc ANOVA test the results are different. As the tables 6 and 7 show, there are no years where all categories are significantly different in mean when compared between categories.

| | Year | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Category (I)* | *Category (J)* | *Mean difference* | *Significance* | *Mean difference* | *Significance* | *Mean difference* | *Significance* | *Mean difference* | *Significance* | *Mean difference* | *Significance* |
| **Poor** | **Growth** | -1,13619* | 0,004 | -,77482* | 0,003 | -,92900* | 0,010 | 0,40984 | 1,000 | -0,99924 | 0,359 |
| | **Profitable** | -1,15906* | 0,002 | -1,04562* | 0,000 | -1,30611* | 0,000 | 0,35779 | 1,000 | -0,14569 | 0,999 |
| | **Star** | -1,84696* | 0,000 | -2,01072* | 0,000 | -1,93563* | 0,000 | -0,42777 | 1,000 | -1,81823* | 0,000 |
| **Growth** | **Poor** | 1,13619* | 0,004 | ,77482* | 0,003 | ,92900* | 0,010 | -0,40984 | 1,000 | 0,99924 | 0,359 |
| | **Profitable** | -0,02287 | 1,000 | -0,2708 | 0,905 | -0,37711 | 0,814 | -0,05205 | 1,000 | 0,85355 | 0,554 |
| | **Star** | -0,71077 | 0,225 | -1,23590* | 0,000 | -1,00663* | 0,005 | -0,83761 | 0,493 | -0,81898 | 0,621 |
| **Profitable** | **Poor** | 1,15906* | 0,002 | 1,04562* | 0,000 | 1,30611* | 0,000 | -0,35779 | 1,000 | 0,14569 | 0,999 |
| | **Growth** | 0,02287 | 1,000 | 0,2708 | 0,905 | 0,37711 | 0,814 | 0,05205 | 1,000 | -0,85355 | 0,554 |
| | **Star** | -0,6879 | 0,220 | -,96510* | 0,002 | -0,62952 | 0,095 | -0,78556 | 0,334 | -1,67254* | 0,000 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Star** | **Poor** | 1,84696* | 0,000 | 2,01072* | 0,000 | 1,93563* | 0,000 | 0,42777 | 1,000 | 1,81823* | 0,000 |
| | **Growth** | 0,71077 | 0,225 | 1,23590* | 0,000 | 1,00663* | 0,005 | 0,83761 | 0,493 | 0,81898 | 0,621 |
| | **Profitable** | 0,6879 | 0,220 | ,96510* | 0,002 | 0,62952 | 0,095 | 0,78556 | 0,334 | 1,67254* | 0,000 |

*. The mean difference is significant at the 0.05 level.

*Table 6. Multiple P/B Comparisons (Appendix 1)*

| | **Year** | **2002** | | **2003** | | **2004** | | **2005** | | **2006** | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Category (I)* | *Category (J)* | *Mean difference* | *Significance* | *Mean difference* | *Significance* | *Mean difference* | *Significance* | *Mean difference* | *Significance* | *Mean difference* | *Significance* |
| **Poor** | **Growth** | -3,29529 | 0,634 | -0,4695 | 0,845 | -0,21851 | 0,995 | -0,65303 | 0,469 | -0,48293 | 0,780 |
| | **Profitable** | -2,99088 | 0,719 | -,97964* | 0,027 | -0,64832 | 0,221 | -0,63356 | 0,329 | -0,7819 | 0,107 |
| | **Star** | -3,68567 | 0,482 | -1,09049* | 0,001 | -,99194* | 0,001 | -1,04922* | 0,001 | -1,02196* | 0,006 |
| **Growth** | **Poor** | 3,29529 | 0,634 | 0,4695 | 0,845 | 0,21851 | 0,995 | 0,65303 | 0,469 | 0,48293 | 0,780 |
| | **Profitable** | 0,30441 | 0,998 | -0,51014 | 0,802 | -0,42981 | 0,895 | 0,01947 | 1,000 | -0,29897 | 0,960 |
| | **Star** | -0,39038 | 0,988 | -0,62099 | 0,482 | -0,77343 | 0,241 | -0,39619 | 0,860 | -0,53902 | 0,538 |
| **Profitable** | **Poor** | 2,99088 | 0,719 | ,97964* | 0,027 | 0,64832 | 0,221 | 0,63356 | 0,329 | 0,7819 | 0,107 |
| | **Growth** | -0,30441 | 0,998 | 0,51014 | 0,802 | 0,42981 | 0,895 | -0,01947 | 1,000 | 0,29897 | 0,960 |
| | **Star** | -0,69478 | 0,663 | -0,11085 | 0,999 | -0,34362 | 0,79 | -0,41566 | 0,684 | -0,24006 | 0,941 |
| **Star** | **Poor** | 3,68567 | 0,482 | 1,09049* | 0,001 | ,99194* | 0,001 | 1,04922* | 0,001 | 1,02196* | 0,006 |
| | **Growth** | 0,39038 | 0,988 | 0,62099 | 0,482 | 0,77343 | 0,241 | 0,39619 | 0,860 | 0,53902 | 0,538 |
| | **Profitable** | 0,69478 | 0,663 | 0,11085 | 0,999 | 0,34362 | 0,79 | 0,41566 | 0,684 | 0,24006 | 0,941 |

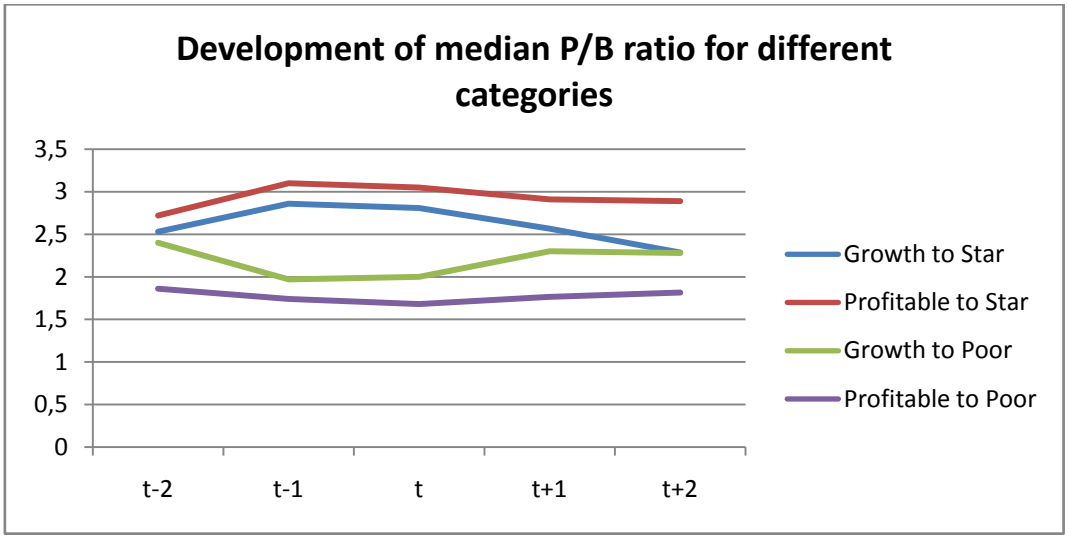
*. The mean difference is significant at the 0.05 level.

*Table 7. Multiple P/B Comparisons (Appendix 1)*

There are a few years where some means are statistically different such as 1997, 1998 and 1999. In accordance with the previous ANOVA test, the means in year 2000 and 2002 have no significant differences between categories. However, it is not enough to make any assumptions about how P/B-values should differ among categories with regards to profitability and revenue growth (Varaiya et al. 1987), rational pricing (Fama and French 1995) and what drives value in companies (Rappaport 1998). These tests actually speak against rational pricing and show that, on average, investors do not value the four categories differently at the 0,05 significance level.

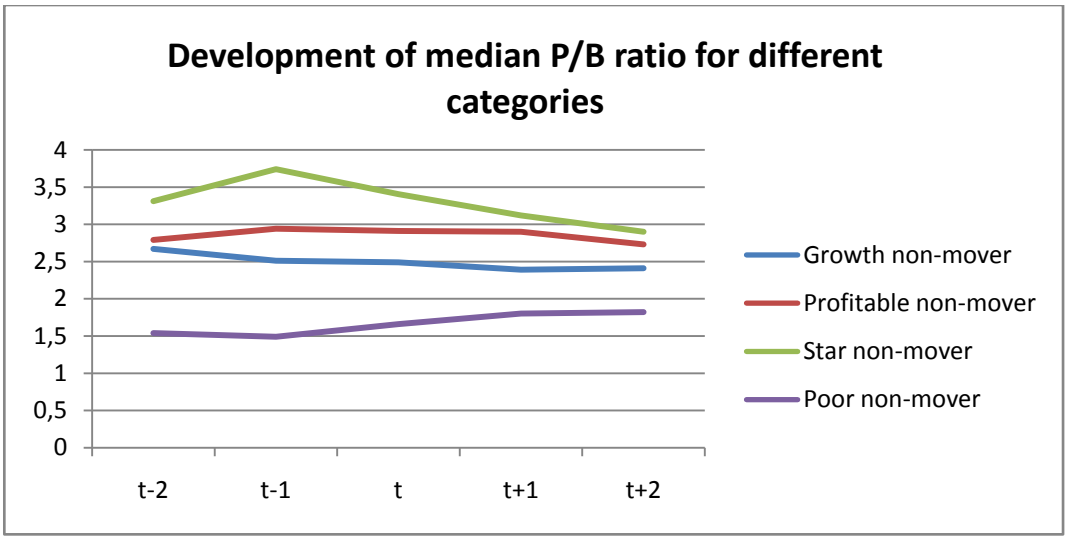
## 5.2 P/B change over time for different movements

As shown by graph 1 below, *star* movers are valued at a higher P/B ratio than *poor* movers, two years ahead of the event until two years after. This suggests that investors recognize the movement at least two years before they take place and. The graph also show that the difference increase a year before the movement. The ratio converge somewhat the year after the movement.



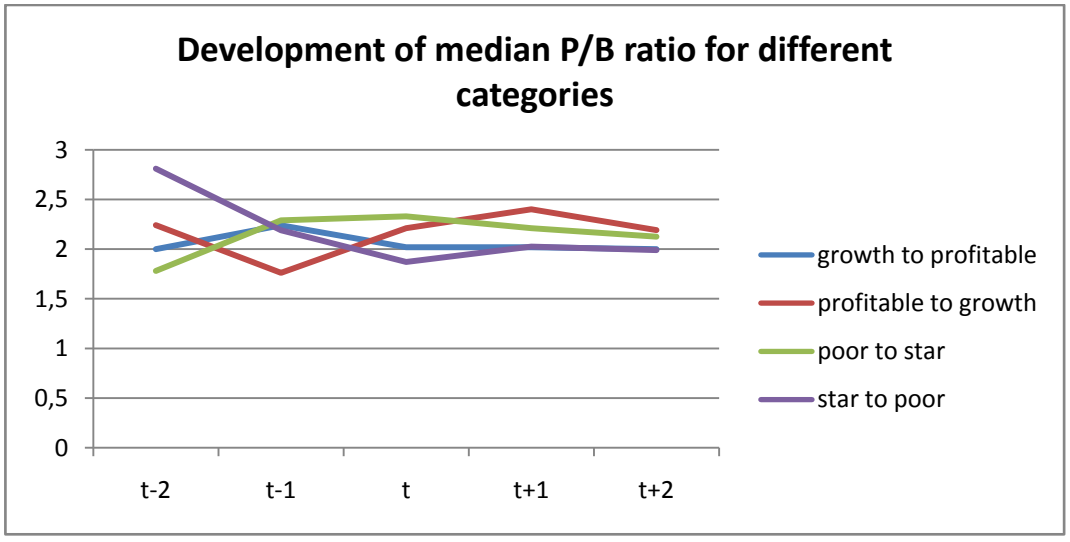

*Graph 1. Development of P/B ratio for different categories*

When examining non movers, graph 2 below shows that *star* and *profitable* non-movers are valued at a higher level than the *growth* and *poor* portfolios. As in the case of the previous graph, the differences between the former two, *star* and *profitable* and the later two are increased a year before the movement. Interestingly enough, *poor* non movers are valued at the same, or higher, P/B than *growth* non movers. Remaining in the *growth* category is thus not seen as something desirable by investors, which is in line with findings in previous studies (Ramezani et al. 2002). Staying in the *growth* category means risking continuing non profitable growth and hence destroying value. The P/B ratios converges slowly but remains separated two years after the moves which could indicate a highly likelihood that the companies will remain in the same category.



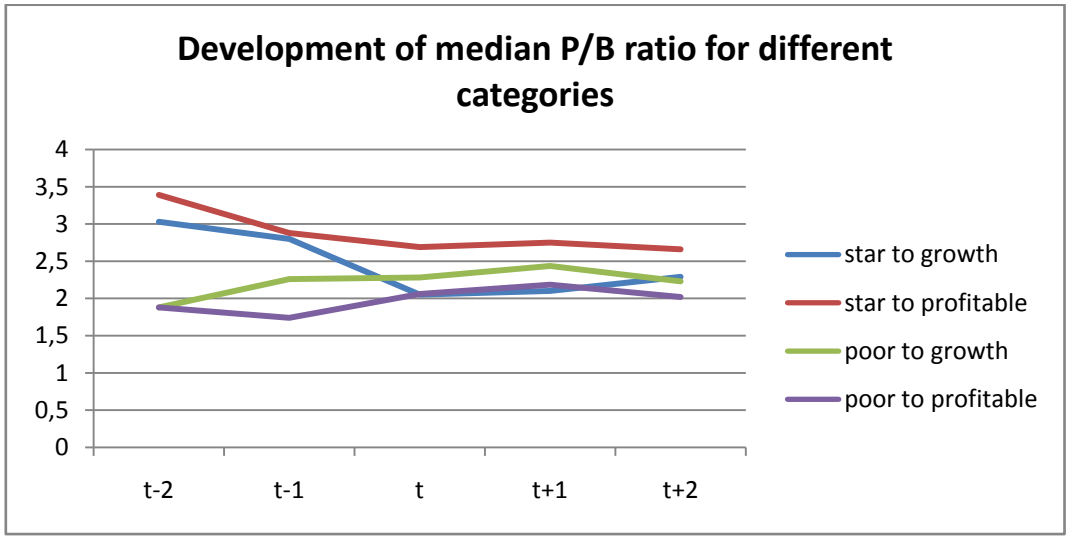

*Graph 2 Development of median P/B ratio for different categories*

Examining graph 3 below, a sharp fall of the P/B ratio in the *star* to *poor* category one year prior movement is observable. The fall continues somewhat in the year during the movement but recovers two years after the original fall. This indicates that investor seems to, quite successfully, forecast the event of companies with high growth and profitability failing to sustain that level. In a similar way the P/B ratio of the *poor* to *star* portfolio increase a year prior to the movement. Not surprisingly, going from *growth* to *profitability* is rewarded with a higher P/B the year prior the movement while the opposite is punished with a lower ratio. This supports the notion of investors preferring profitability over growth which might be value destroying. However, these changes in valuation are not sustained and at the time of movement,the changes are already erased.



*Graph 3. Development of median P/B ratio for different categories*

The convergence in P/B presented in graph 5 below reveals an interesting pattern. Companies moving from *star* to *growth* ends with a lower P/B ratio than companies moving from *poor* to *growth.* Losing profitability for a *star* company seems to be regarded as a large risk of further deterioration, while enhancing growth for a *poor* company is regarded as an opportunity. Moving from *star* to *profitable* isn't punished as hard, while, surprisingly, coming from *poor* and moving to *profitable* is hardly rewarded.




*Graph 4. Development of median P/B ratio for different categories*

As far as comparability is possible, the authors find these results to be in line with previous studies examining the relationship between growth, profitability, firm value and share holder wealth maximization (Fama and French 1995; Ramezani et al. 2002; Varayia 1987). Davidsson at al. (2009) study concluded that a *profitable* company is about two or three times more likely than a *growth* company to become a *star* company in a one-year transition time. Table 8 below shows that during the period examined by this thesis, there were about 80 percent more movements from *profitable* to *star* than *growth* to *star*. At the same time Davidsson et al (2009) results pointed to a higher likelihood for *growth* companies ending up as *poor* companies in the one-year transition period. For the Australian sample, the risk was almost three times as high, while the risk for the Swedish sample was almost 60 % as high. The results for a two and a three-year period revealed a similar but weaker pattern. In this study there were three times as many movements from *growth* to *poor* as from *profitable* to *poor.* The differences have not been verified as significant with state transition matrices as used in Davidsson et al.

(2009) study, but gives an indication of the difference. Varaiya et al (1987) found that going from unprofitable growth to a profitable one is difficult and unusual. Only 13 percent of the companies examined managed to do this over a five-year period. Both studies, (Davidsson et al. 2009; Varaiya et al. 1987), point at the difficulty of starting from high growth and turn it into profitable growth. This study indicates a similar relationship and confirms previous studie's results of companies struggling to make the transition from growth to profitability.

| Category | Number |
|---|---|
| Growth to Star | 304 |
| Profitable to Star | 541 |
| Growth to Poor | 725 |
| Profitable to Poor | 240 |

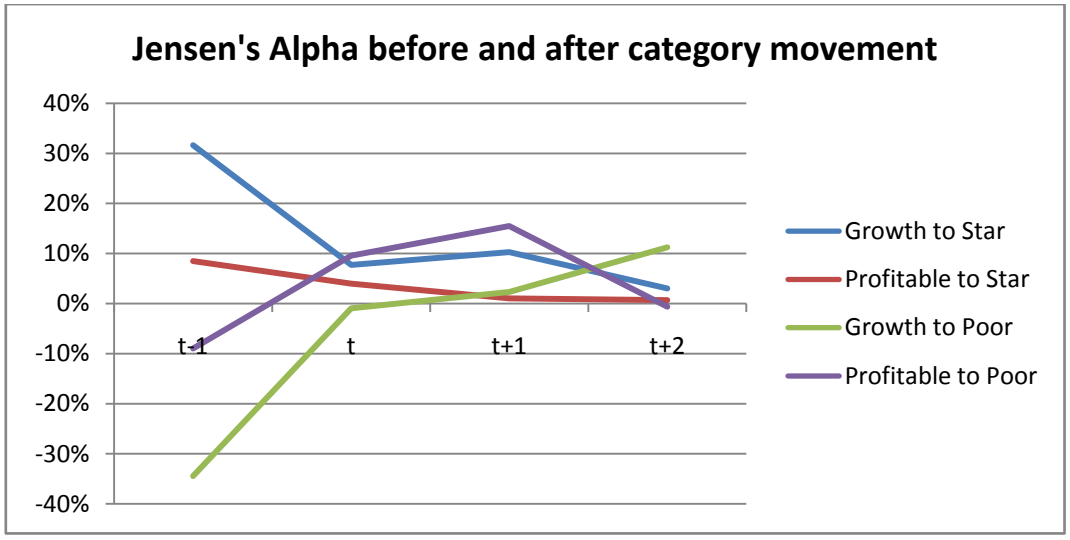
*Table 8. Number of movers*

## 5.2 Portfolio abnormal return

After sorting stocks into categories, portfolios of movers and non-movers were formed and Jensen´s alpha was retrieved one year prior and two year after the stocks moving date.

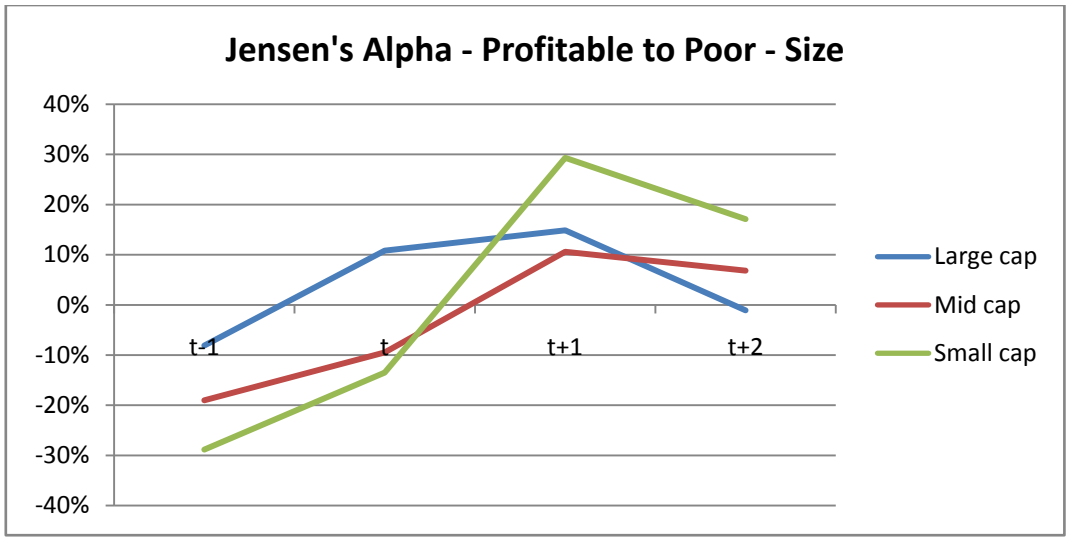
As graph 6 shows, *profitable* and *growth* companies, which moves to *star* status earn higher returns than those who moves to *poor* status at least a year prior to the actual movement. At time t-1, the weighted average abnormal return for *growth* to *star* movers is above 30 %, *profitable* to *star* movers about 9 %, *growth* to *poor* movers about -9 % and *profitable* to *poor* movers about -35 %. In line with Davidsson et al (2009) results about which category has the highest likelihood of moving towards *star* status, *growth* companies which have moved to *star* have a higher abnormal return than *profitable* companies since they are more unlikely to reach that status. The abnormal returns normalize around year t which shows that the possibility to earn abnormal return after its been clear that a company has moved becomes difficult. The market is fairly efficient in determining which companies will move and is able to foresee this at least a year prior to the transition, which is in line with rational pricing (Fama and French 1995) and the efficient market hypothesis (Fama 1970).

Two years after the transitions the difference in alpha among the groups has decreased further. There are, however, still some differences, such as *Growth* to *star* movers performing better than *profitable* to *star* movers. This is most likely because, as previous studies has shown (Davidsson et al. 2009; Ramezani et al. 2002; Fama and French 1995; Varaiya et al. 1987), profitability is preferred over growth and hence, as in the authors P/B ratios analysis, *profitable* companies are already valued higher than *growth* companies.

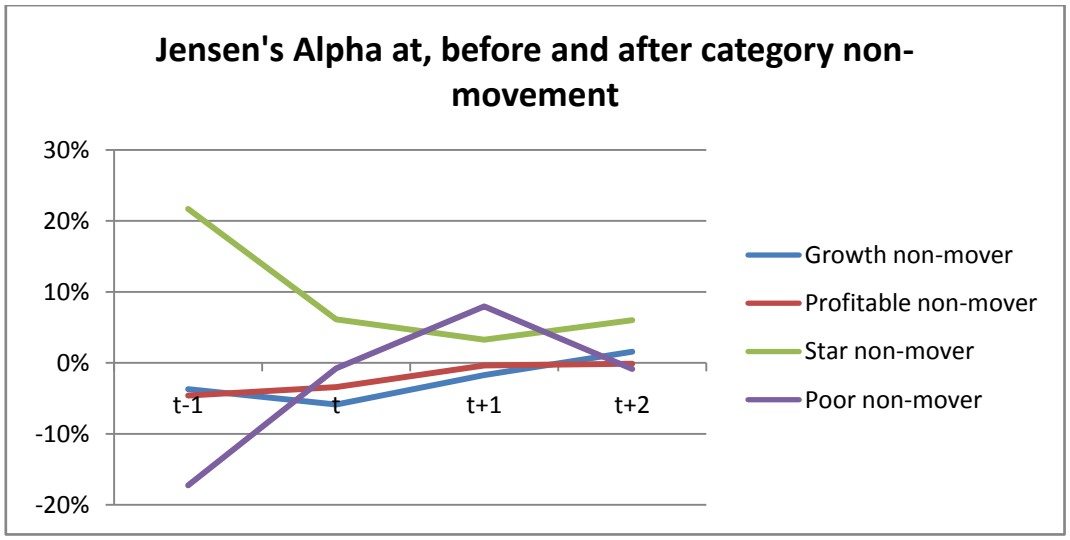



*Graph 5. Jensen's Alpha before and after category movement*

When transitions have taken place and reports have been published, it doesn't help to pick the companies, which have moved to *stars*. At the time of movement, *profitable* to *poor* movers perform a higher alpha than the group, which moves from *profitable* to *star*. When dividing these *profitable* to *poor* movers into three groups, with an equal amount of companies in each group (here called large cap, mid cap and small cap), depending on capitalization, the pattern becomes somewhat different. Graph 7 below shows that only the group with the largest companies generates abnormal return at the time of movement. Mid cap and small cap companies underperform significantly in years t-1 and t, but will outperform large cap in years t+1 and t+2. This suggests that there is a turnaround in this category and that the small cap and mid cap lag the large cap group.



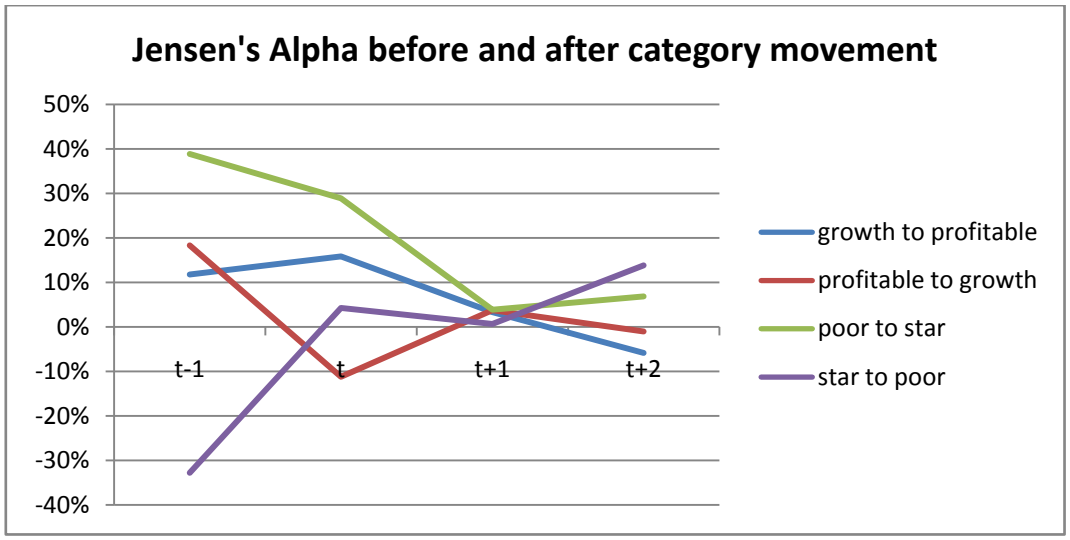

*Graph 6. Jensen's Alpha - Profitable to Poor - Size*




*Graph 7. Jensen's Alpha at, before and after category non-movement*

A similar pattern could be viewed for the non-movers as for the *star* and *poor* movers. In general, as seen in graph 8, the big impact in terms of Jensen's alpha takes place the year prior it is clear that the companies will stay in the same category as last year. Companies that are able to stay in the *star* category are rewarded with high abnormal return above 20 % the year before, while the opposite is true for companies which stay in the *poor* category: they are penalized with a 17 % negative Jensen's alpha. *Star* non-movers continue to earn abnormal return two years after the move which suggests that finding these companies will be rewarded. *Poor* non-movers earn abnormal return one year after the non-movement, which could be related to some mean reverse trend where some *poor* companies will improve. Remaining in the *growth* and *profitable* categories

will not be rewarded, a negative Jensen's alpha return in the year before and the year at the movement are followed by near zero abnormal returns.

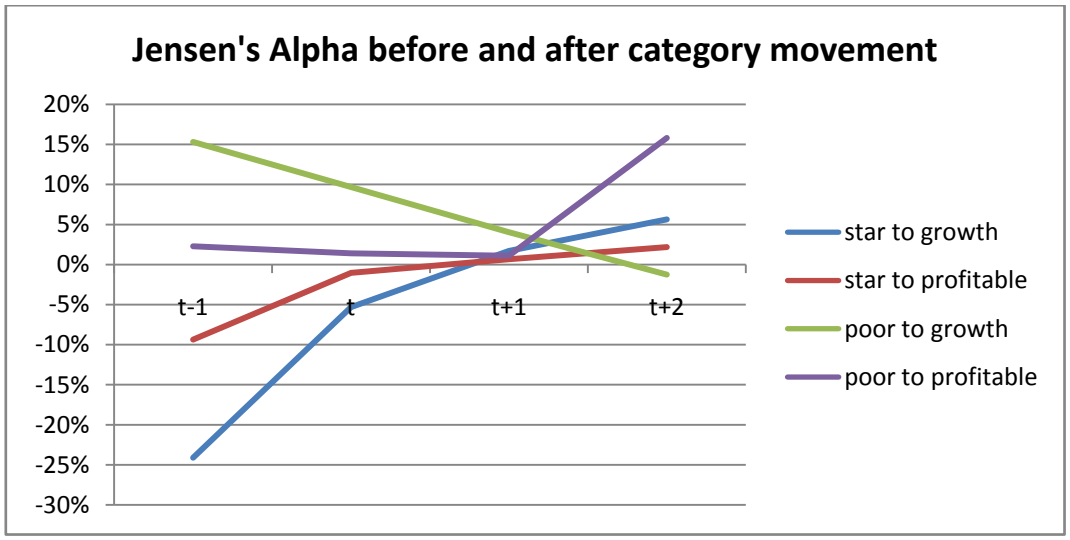



*Graph 8. Jensen's Alpha before and after category movement*

As in previous examined category movements, the largest abnormal returns take place before the category movement takes place, as seen in graph 9, which indicates that investors predict the moves for these categories as well. The portfolio with companies which moves from *poor* to *star* generates the highest Jensen's alpha one year before the move, almost 40 %, of all the different portfolios. The result is intuitive and in line with previous studies where large improvements in the value drivers should be rewarded (Rappaport 1998). The opposite is true for the portfolio of companies moving from *star* to *poor*, which have a Jensens's alpha of -32,8 % the year before movement. The portfolio performance suggest that the market can predict which star companies will run into problems in terms of growth and profitability and that they are punished by the market before the event happens. The *poor* to *star* portfolio continues to perform well at the time of the movement, but a year after the abnormal return is dramatically diminished.

The movement between the *profitable* and *growth* categories (in both directions) are rewarded prior to the movement with an abnormal return between 10 % and 20 %. This is in line with the findings of Jiang and Koller (2007), which concluded that the market rewards shifts between the two categories. The results are somewhat contradictive at the time of the movement, when the *profitable* to *star* portfolio have a negative Jensen's

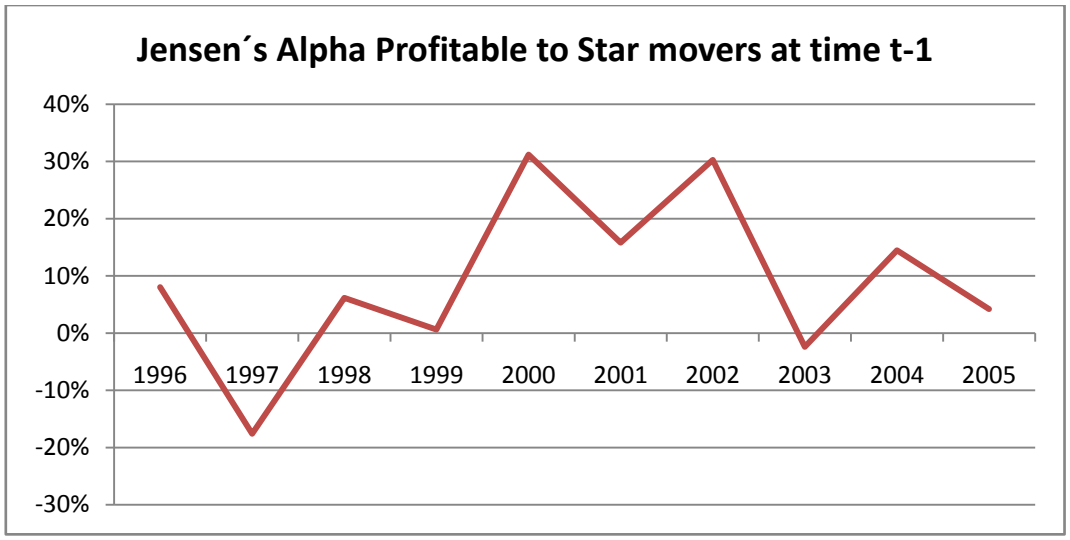
alpha of 11 %, while the opposite portfolio continues to generate abnormal return. In addition, Jiang and Koller (2007) showed that profitability is preferred over growth in sales. In this study however, the high abnormal return a year prior followed by a negative abnormal return indicates irrational investor behavior. As in the case of *poor* to *star* (and the opposite), the abnormal returns move near zero a year after the movement which suggests that making abnormal return on the information is difficult.



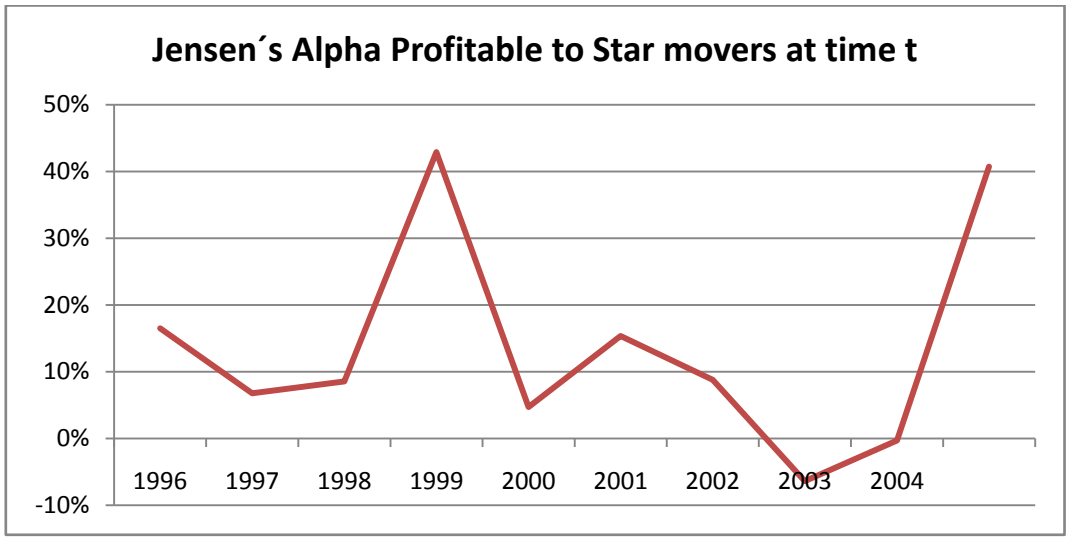

*Graph 9. Jensen´s Alpha before and after category movement*

Similar to the P/B study, graph 10 shows that moving from *star* to *growth* hit value more than moving to *profitable*. Another similarity is the higher reward of moving to growth from *poor* than moving to *profitability*.

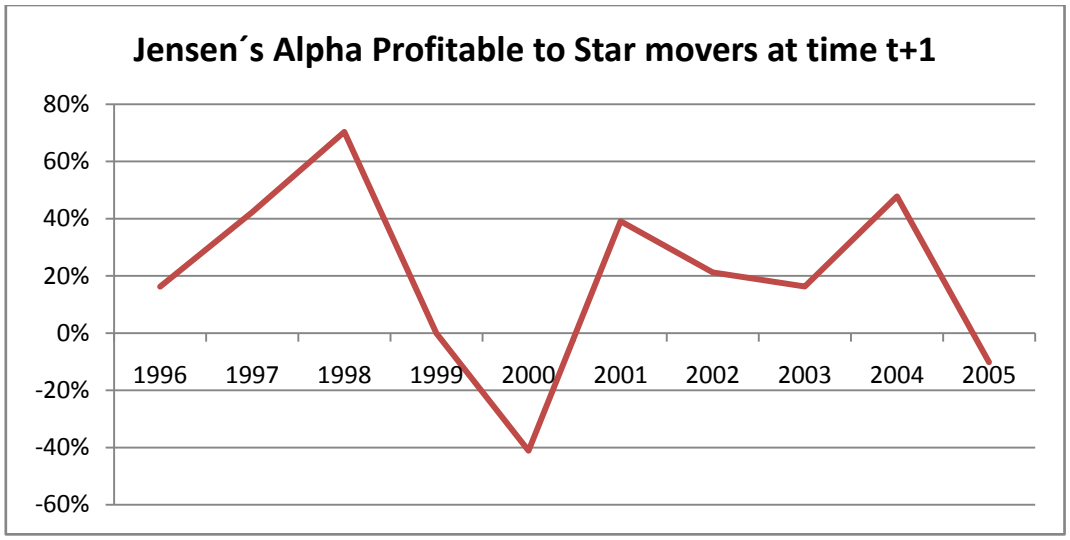
Even though results for the accumulated data over the years present a rather clear picture of the performance, it does not mean that the relationship is robust over the years. Quite the opposite, Jensen's alpha varies heavily from year to year, as seen in graphs 12-15. As an example, the authors have chosen to present charts for the *profitable* to *star* portfolio. The pattern of large differences is, however, valid for all portfolios.



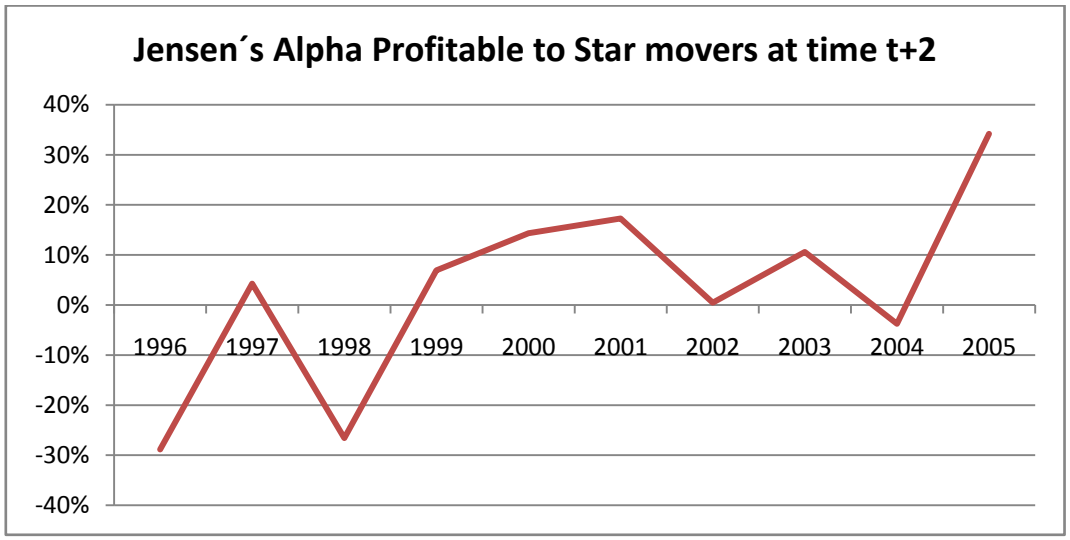

*Graph 10. Jensen´s alpha profitable to star movers at time t-1*




*Graph 11. Jensen´s alpha profitable to star movers at time t*




*Graph 12. Jensen´s alpha profitable to star movers at time t+1*




*Graph 13. Jensen´s alpha profitable to star movers at time t+2*

# 6. Conclusions

*The sixth and final chapter summarizes the findings of this thesis and provides suggestions for future research.*

## 6.1 Conclusions

The authors' conclusions will be presented in accordance with the order of the thesis' problem formulations in order to follow each conclusion made. The authors will end with a summarization of the conclusions and final remarks.

1. *How are stocks initially priced within different quintiles in Davidsson et al (2009) matrix with regards to P/B-ratio?*

Stocks within different categories of Davidsson et al. (2009) matrix are essentially priced, measured as P/B ratio, as expected with regards to growth and profitability. The authors results suggest that, as in previous studies, profitability is more important than growth for shareholders' wealth maximization. However, the differences amidst categories are small and, in most cases, not significant at the 0,05 significance level. This is something the authors believe to be due to the remaining extreme values. Excluding more outliers by winsorising one or five percent of the sample might have enhanced the difference between categories and give a statistically significant result.

2. *How are movements within Davidsson et al (2009) matrix perceived and valued by investors with regards to the stock prices of individual companies?*

P/B ratios are rather stable for most portfolios. However, the largest change takes place one year prior movement, which suggests that investors can forecast these moves efficiently. The investor reaction to moves within the matrix, measured by P/B, is in line with the authors assumptions, as well as previous studies. Moves to *star* is correlated with a higher P/B and a move to *poor* is correlated with a lower P/B value.

3. *Will stocks which moves towards a more favorable state generate risk adjusted abnormal returns and which movers; poor, growth, profitable or star, will generate the highest risk adjusted abnormal return?*

The authors have found clear indications that investors react to changes in growth and profitability and that the majority of the adjustment in share prices takes place a year before the movement. Generating abnormal returns will be difficult for investors, since stock pickers must find models to predict which companies will make the move.

However, since the categories are characterized by growth and profitability, making a multiple regression in order to find explaining variables towards movers becomes unnecessary, since these two variables already have known explaining variables, i.e. a company's value drivers. However, some portfolios show consistent abnormal return before and after the move takes place, such as the *growth* to *star* and *star non-mover* portfolios. Here, the authors have found indications that buying these portfolios ex post will generate abnormal return in the long run, although not on a yearly basis. Going from *growth* rather than from *profitable* to *star*, generates a higher abnormal return which seems to be linked to: 1) a lower initial valuation of the *growth* portfolio (though not significant) due to investor preferences towards profitability and 2) a lower likelihood of stocks in the *growth* portfolio becoming *stars*. Interestingly, *growth* to *poor* movers are punished harder than *profitable* to *poor* movers. Considering indications suggesting that the *growth* portfolio already have an initially lower valuation and that the authors have found that there are three times as many movers of the former than the latter it would be reasonable to expect a higher fall for the *profitable* to *poor* movers.

## 6.2 Summarization

In line with previous research, stocks are priced in accordance with what drives values in companies. In addition, profitability is preferred over growth as value driver. Investors can predict changes in the examined variables quite accurately and price effects of movers are incorporated at least one year prior the move. Earning abnormal returns or buying stocks ex post is possible, but difficult. This is due to the inconsistency of the return in the portfolios that will earn abnormal return.

## 6.3 Future Research

One approach to future research would be to concentrate on a smaller question than ours. This could be moving into daily data to see exactly when possible abnormal return takes place. If fewer companies where examined, the exact date for release of annual report could be used. An even deeper approach would be to use quarter reports and examine how short term change in growth and profitability affects valuation and if it is predicted.

Another approach would be trying to predict which companies will increase or sustain high growth and profitability. This could be done quantitative studies trying to identify important variables but there might also be qualitative approaches.

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# Appendix 1

## PB 1997

**Descriptives**

PB1997

| | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
|---|---|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound | | |
| Poor | 220 | 2,4414 | 2,28088 | ,15378 | 2,1383 | 2,7444 | -4,56 | 13,91 |
| Growth | 131 | 3,5776 | 3,29238 | ,28766 | 3,0085 | 4,1467 | -1,61 | 17,60 |
| Prof | 118 | 3,6004 | 2,95299 | ,27184 | 3,0620 | 4,1388 | ,76 | 19,75 |
| Star | 221 | 4,2883 | 2,88626 | ,19415 | 3,9057 | 4,6710 | 1,02 | 17,28 |
| Total | 690 | 3,4469 | 2,89772 | ,11031 | 3,2303 | 3,6634 | -4,56 | 19,75 |

**Test of Homogeneity of Variances**

PB1997

| Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|
| 4,258 | 3 | 686 | ,005 |

**ANOVA**

PB1997

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 383,928 | 3 | 127,976 | 16,253 | ,000 |
| Within Groups | 5401,471 | 686 | 7,874 | | |
| Total | 5785,399 | 689 | | | |

**Multiple Comparisons**

PB1997

Tamhane

| (I) Category | (J) Category | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| Poor | Growth | -1,13619* | ,32618 | ,004 | -2,0028 | -,2696 |
| | Prof | -1,15906* | ,31232 | ,002 | -1,9893 | -,3288 |
| | Star | -1,84696* | ,24767 | ,000 | -2,5017 | -1,1922 |
| Growth | Poor | 1,13619* | ,32618 | ,004 | ,2696 | 2,0028 |
| | Prof | -,02287 | ,39579 | 1,000 | -1,0726 | 1,0269 |
| | Star | -,71077 | ,34705 | ,225 | -1,6313 | ,2098 |
| Prof | Poor | 1,15906* | ,31232 | ,002 | ,3288 | 1,9893 |
| | Growth | ,02287 | ,39579 | 1,000 | -1,0269 | 1,0726 |
| | Star | -,68790 | ,33406 | ,220 | -1,5743 | ,1985 |
| Star | Poor | 1,84696* | ,24767 | ,000 | 1,1922 | 2,5017 |
| | Growth | ,71077 | ,34705 | ,225 | -,2098 | 1,6313 |
| | Prof | ,68790 | ,33406 | ,220 | -,1985 | 1,5743 |

*. The mean difference is significant at the 0.05 level.

## PB 1998

**Descriptives**

PB1998

| | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
|---|---|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound | | |
| Poor | 280 | 2,2345 | 2,14723 | ,12832 | 1,9819 | 2,4871 | -8,88 | 13,11 |
| Growth | 191 | 3,0093 | 2,46344 | ,17825 | 2,6577 | 3,3609 | -3,32 | 14,43 |
| Prof | 161 | 3,2801 | 2,65039 | ,20888 | 2,8676 | 3,6926 | -3,42 | 17,63 |
| Star | 272 | 4,2452 | 2,83326 | ,17179 | 3,9070 | 4,5834 | ,57 | 16,07 |
| Total | 904 | 3,1894 | 2,64235 | ,08788 | 3,0169 | 3,3619 | -8,88 | 17,63 |

**Test of Homogeneity of Variances**

PB1998

| Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|
| 7,834 | 3 | 900 | ,000 |

**ANOVA**

PB1998

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 566,047 | 3 | 188,682 | 29,591 | ,000 |
| Within Groups | 5738,724 | 900 | 6,376 | | |
| Total | 6304,770 | 903 | | | |

**Multiple Comparisons**

PB1998

Tamhane

| (I) Category1 | (J) Category1 | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| Poor | Growth | -,77482* | ,21963 | ,003 | -1,3558 | -,1938 |
| | Prof | -1,04562* | ,24515 | ,000 | -1,6952 | -,3960 |
| | Star | -2,01072* | ,21443 | ,000 | -2,5771 | -1,4443 |
| Growth | Poor | ,77482* | ,21963 | ,003 | ,1938 | 1,3558 |
| | Prof | -,27080 | ,27460 | ,905 | -,9976 | ,4560 |
| | Star | -1,23590* | ,24756 | ,000 | -1,8902 | -,5816 |
| Prof | Poor | 1,04562* | ,24515 | ,000 | ,3960 | 1,6952 |
| | Growth | ,27080 | ,27460 | ,905 | -,4560 | ,9976 |
| | Star | -,96510* | ,27045 | ,002 | -1,6807 | -,2495 |
| Star | Poor | 2,01072* | ,21443 | ,000 | 1,4443 | 2,5771 |
| | Growth | 1,23590* | ,24756 | ,000 | ,5816 | 1,8902 |
| | Prof | ,96510* | ,27045 | ,002 | ,2495 | 1,6807 |

*. The mean difference is significant at the 0.05 level.

**PB 1999**

**Descriptives**

PB1999

| | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
|---|---|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound | | |
| Poor | 284 | 2,4613 | 2,55195 | ,15143 | 2,1633 | 2,7594 | -9,31 | 18,76 |
| Growth | 207 | 3,3903 | 3,61033 | ,25094 | 2,8956 | 3,8851 | -10,30 | 19,52 |
| Prof | 200 | 3,7675 | 2,89080 | ,20441 | 3,3644 | 4,1705 | -5,28 | 20,43 |
| Star | 297 | 4,3970 | 2,81355 | ,16326 | 4,0757 | 4,7183 | ,90 | 20,92 |
| Total | 988 | 3,5022 | 3,03582 | ,09658 | 3,3127 | 3,6918 | -10,30 | 20,92 |

**Test of Homogeneity of Variances**

PB1999

| Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|
| 3,851 | 3 | 984 | ,009 |

**ANOVA**

PB1999

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 562,128 | 3 | 187,376 | 21,604 | ,000 |
| Within Groups | 8534,264 | 984 | 8,673 | | |
| Total | 9096,392 | 987 | | | |

**Multiple Comparisons**

PB1999

Tamhane

| (I) Category2 | (J) Category2 | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| Poor | Growth | -,92900* | ,29309 | ,010 | -1,7045 | -,1535 |
| | Prof | -1,30611* | ,25439 | ,000 | -1,9788 | -,6334 |
| | Star | -1,93563* | ,22268 | ,000 | -2,5235 | -1,3477 |
| Growth | Poor | ,92900* | ,29309 | ,010 | ,1535 | 1,7045 |
| | Prof | -,37711 | ,32365 | ,814 | -1,2330 | ,4788 |
| | Star | -1,00663* | ,29937 | ,005 | -1,7985 | -,2148 |
| Prof | Poor | 1,30611* | ,25439 | ,000 | ,6334 | 1,9788 |
| | Growth | ,37711 | ,32365 | ,814 | -,4788 | 1,2330 |
| | Star | -,62952 | ,26160 | ,095 | -1,3211 | ,0620 |
| Star | Poor | 1,93563* | ,22268 | ,000 | 1,3477 | 2,5235 |
| | Growth | 1,00663* | ,29937 | ,005 | ,2148 | 1,7985 |
| | Prof | ,62952 | ,26160 | ,095 | -,0620 | 1,3211 |

*. The mean difference is significant at the 0.05 level.

## PB 2000

**Descriptives**

PB2000

| | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
|---|---|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound | | |
| Poor | 327 | 3,8887 | 32,10036 | 1,77515 | ,3965 | 7,3809 | -43,93 | 575,22 |
| Growth | 241 | 3,4789 | 7,13102 | ,45935 | 2,5740 | 4,3838 | -30,31 | 51,93 |
| Prof | 226 | 3,5309 | 5,27632 | ,35098 | 2,8393 | 4,2225 | -39,71 | 16,45 |
| Star | 316 | 4,3165 | 4,26783 | ,24008 | 3,8441 | 4,7889 | -12,82 | 35,49 |
| Total | 1110 | 3,8487 | 18,02344 | ,54097 | 2,7872 | 4,9101 | -43,93 | 575,22 |

**Test of Homogeneity of Variances**

PB2000

| Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|
| 1,015 | 3 | 1106 | ,385 |

**ANOVA**

PB2000

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 125,454 | 3 | 41,818 | ,128 | ,943 |
| Within Groups | 360126,963 | 1106 | 325,612 | | |
| Total | 360252,418 | 1109 | | | |

**Multiple Comparisons**

PB2000

Tamhane

| (I) Category3 | (J) Category3 | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| Poor | Growth | ,40984 | 1,83362 | 1,000 | -4,4405 | 5,2602 |
| | Prof | ,35779 | 1,80952 | 1,000 | -4,4301 | 5,1457 |
| | Star | -,42777 | 1,79132 | 1,000 | -5,1686 | 4,3130 |
| Growth | Poor | -,40984 | 1,83362 | 1,000 | -5,2602 | 4,4405 |
| | Prof | -,05205 | ,57809 | 1,000 | -1,5799 | 1,4758 |
| | Star | -,83761 | ,51831 | ,493 | -2,2087 | ,5335 |
| Prof | Poor | -,35779 | 1,80952 | 1,000 | -5,1457 | 4,4301 |
| | Growth | ,05205 | ,57809 | 1,000 | -1,4758 | 1,5799 |
| | Star | -,78556 | ,42523 | ,334 | -1,9097 | ,3386 |
| Star | Poor | ,42777 | 1,79132 | 1,000 | -4,3130 | 5,1686 |
| | Growth | ,83761 | ,51831 | ,493 | -,5335 | 2,2087 |
| | Prof | ,78556 | ,42523 | ,334 | -,3386 | 1,9097 |

**PB 2001**

**Descriptives**

PB2001

| | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
|---|---|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound | | |
| Poor | 397 | 3,1703 | 5,27600 | ,26479 | 2,6497 | 3,6909 | -15,29 | 41,67 |
| Growth | 264 | 4,1695 | 7,88369 | ,48521 | 3,2142 | 5,1249 | -24,56 | 61,36 |
| Prof | 227 | 3,3160 | 4,11115 | ,27287 | 2,7783 | 3,8537 | -12,90 | 26,14 |
| Star | 381 | 4,9885 | 5,72530 | ,29332 | 4,4118 | 5,5653 | -6,11 | 45,38 |
| Total | 1269 | 3,9501 | 5,91750 | ,16611 | 3,6243 | 4,2760 | -24,56 | 61,36 |

**Test of Homogeneity of Variances**

PB2001

| Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|
| 8,986 | 3 | 1265 | ,000 |

**ANOVA**

PB2001

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 756,245 | 3 | 252,082 | 7,306 | ,000 |
| Within Groups | 43645,093 | 1265 | 34,502 | | |
| Total | 44401,337 | 1268 | | | |

**Multiple Comparisons**

PB2001

Tamhane

| (I) Category4 | (J) Category4 | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| Poor | Growth | -,99924 | ,55276 | ,359 | -2,4605 | ,4620 |
| | Prof | -,14569 | ,38023 | ,999 | -1,1496 | ,8582 |
| | Star | -1,81823* | ,39516 | ,000 | -2,8606 | -,7758 |
| Growth | Poor | ,99924 | ,55276 | ,359 | -,4620 | 2,4605 |
| | Prof | ,85355 | ,55667 | ,554 | -,6182 | 2,3253 |
| | Star | -,81898 | ,56698 | ,621 | -2,3173 | ,6794 |
| Prof | Poor | ,14569 | ,38023 | ,999 | -,8582 | 1,1496 |
| | Growth | -,85355 | ,55667 | ,554 | -2,3253 | ,6182 |
| | Star | -1,67254* | ,40061 | ,000 | -2,7301 | -,6149 |
| Star | Poor | 1,81823* | ,39516 | ,000 | ,7758 | 2,8606 |
| | Growth | ,81898 | ,56698 | ,621 | -,6794 | 2,3173 |
| | Prof | 1,67254* | ,40061 | ,000 | ,6149 | 2,7301 |

*. The mean difference is significant at the 0.05 level.

## PB 2002

**Descriptives**

PB2002

| | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
|---|---|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound | | |
| Poor | 408 | ,3229 | 45,33035 | 2,24419 | -4,0887 | 4,7346 | -904,82 | 57,42 |
| Growth | 290 | 3,6182 | 9,27629 | ,54472 | 2,5461 | 4,6903 | -45,29 | 63,24 |
| Prof | 250 | 3,3138 | 6,61391 | ,41830 | 2,4899 | 4,1377 | -42,64 | 61,63 |
| Star | 402 | 4,0086 | 5,51129 | ,27488 | 3,4682 | 4,5490 | -64,11 | 26,28 |
| Total | 1350 | 2,6822 | 25,65080 | ,69813 | 1,3126 | 4,0517 | -904,82 | 63,24 |

**Test of Homogeneity of Variances**

PB2002

| Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|

**ANOVA**

PB2002

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 3332,052 | 3 | 1110,684 | 1,691 | ,167 |
| Within Groups | 884260,578 | 1346 | 656,954 | | |
| Total | 887592,631 | 1349 | | | |

| | | | |
|---|---|---|---|
| ,801 | 3 | 1346 | ,493 |

**Multiple Comparisons**

PB2002

Tamhane

| (I) Category5 | (J) Category5 | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| Poor | Growth | -3,29529 | 2,30935 | ,634 | -9,3979 | 2,8073 |
| | Prof | -2,99088 | 2,28284 | ,719 | -9,0246 | 3,0428 |
| | Star | -3,68567 | 2,26096 | ,482 | -9,6626 | 2,2912 |
| Growth | Poor | 3,29529 | 2,30935 | ,634 | -2,8073 | 9,3979 |
| | Prof | ,30441 | ,68680 | ,998 | -1,5095 | 2,1183 |
| | Star | -,39038 | ,61015 | ,988 | -2,0030 | 1,2223 |
| Prof | Poor | 2,99088 | 2,28284 | ,719 | -3,0428 | 9,0246 |
| | Growth | -,30441 | ,68680 | ,998 | -2,1183 | 1,5095 |
| | Star | -,69478 | ,50053 | ,663 | -2,0174 | ,6279 |
| Star | Poor | 3,68567 | 2,26096 | ,482 | -2,2912 | 9,6626 |
| | Growth | ,39038 | ,61015 | ,988 | -1,2223 | 2,0030 |
| | Prof | ,69478 | ,50053 | ,663 | -,6279 | 2,0174 |

**PB 2003**

**Descriptives**

PB2003

| | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
|---|---|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound | | |
| Poor | 469 | 2,1194 | 5,12012 | ,23643 | 1,6548 | 2,5840 | -46,67 | 37,02 |
| Growth | 288 | 2,5889 | 5,94146 | ,35010 | 1,8998 | 3,2780 | -28,41 | 46,18 |
| Prof | 224 | 3,0991 | 3,74700 | ,25036 | 2,6057 | 3,5924 | -10,97 | 37,15 |
| Star | 477 | 3,2099 | 3,28381 | ,15036 | 2,9145 | 3,5054 | -22,98 | 23,40 |
| Total | 1458 | 2,7194 | 4,61153 | ,12077 | 2,4825 | 2,9563 | -46,67 | 46,18 |

**Test of Homogeneity of Variances**

PB2003

| Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|
| 3,285 | 3 | 1454 | ,020 |

**ANOVA**

PB2003

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 320,787 | 3 | 106,929 | 5,070 | ,002 |
| Within Groups | 30664,105 | 1454 | 21,089 | | |
| Total | 30984,892 | 1457 | | | |

**Multiple Comparisons**

PB2003

Tamhane

| (I) Category6 | (J) Category6 | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| Poor | Growth | -,46950 | ,42246 | ,845 | -1,5851 | ,6461 |
| | Prof | -,97964* | ,34435 | ,027 | -1,8887 | -,0705 |
| | Star | -1,09049* | ,28018 | ,001 | -1,8295 | -,3515 |
| Growth | Poor | ,46950 | ,42246 | ,845 | -,6461 | 1,5851 |
| | Prof | -,51014 | ,43041 | ,802 | -1,6471 | ,6269 |
| | Star | -,62099 | ,38102 | ,482 | -1,6285 | ,3866 |
| Prof | Poor | ,97964* | ,34435 | ,027 | ,0705 | 1,8887 |
| | Growth | ,51014 | ,43041 | ,802 | -,6269 | 1,6471 |
| | Star | -,11085 | ,29204 | ,999 | -,8831 | ,6614 |
| Star | Poor | 1,09049* | ,28018 | ,001 | ,3515 | 1,8295 |
| | Growth | ,62099 | ,38102 | ,482 | -,3866 | 1,6285 |
| | Prof | ,11085 | ,29204 | ,999 | -,6614 | ,8831 |

*. The mean difference is significant at the 0.05 level.

## PB 2004

**Descriptives**

PB2004

| | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
|---|---|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound | | |
| Poor | 509 | 2,4296 | 4,64928 | ,20608 | 2,0247 | 2,8344 | -23,73 | 49,32 |
| Growth | 291 | 2,6481 | 6,00166 | ,35182 | 1,9556 | 3,3405 | -32,68 | 32,42 |
| Prof | 237 | 3,0779 | 3,68965 | ,23967 | 2,6057 | 3,5501 | -8,03 | 34,86 |
| Star | 497 | 3,4215 | 3,45597 | ,15502 | 3,1169 | 3,7261 | ,55 | 39,42 |
| Total | 1534 | 2,8926 | 4,48504 | ,11451 | 2,6679 | 3,1172 | -32,68 | 49,32 |

**Test of Homogeneity of Variances**

PB2004

| Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|
| 6,510 | 3 | 1530 | ,000 |

**ANOVA**

PB2004

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 273,698 | 3 | 91,233 | 4,567 | ,003 |
| Within Groups | 30563,507 | 1530 | 19,976 | | |
| Total | 30837,206 | 1533 | | | |

**Multiple Comparisons**

PB2004

Tamhane

| (I) Category7 | (J) Category7 | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| Poor | Growth | -,21851 | ,40773 | ,995 | -1,2956 | ,8586 |
| | Prof | -,64832 | ,31608 | ,221 | -1,4829 | ,1862 |
| | Star | -,99194* | ,25787 | ,001 | -1,6719 | -,3120 |
| Growth | Poor | ,21851 | ,40773 | ,995 | -,8586 | 1,2956 |
| | Prof | -,42981 | ,42570 | ,895 | -1,5544 | ,6947 |
| | Star | -,77343 | ,38446 | ,241 | -1,7899 | ,2431 |
| Prof | Poor | ,64832 | ,31608 | ,221 | -,1862 | 1,4829 |
| | Growth | ,42981 | ,42570 | ,895 | -,6947 | 1,5544 |
| | Star | -,34362 | ,28543 | ,790 | -1,0980 | ,4108 |
| Star | Poor | ,99194* | ,25787 | ,001 | ,3120 | 1,6719 |
| | Growth | ,77343 | ,38446 | ,241 | -,2431 | 1,7899 |
| | Prof | ,34362 | ,28543 | ,790 | -,4108 | 1,0980 |

*. The mean difference is significant at the 0.05 level.

## PB 2005

**Descriptives**

PB2005

| | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
|---|---|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound | | |
| Poor | 542 | 2,9923 | 5,15625 | ,22148 | 2,5572 | 3,4274 | -21,98 | 32,82 |
| Growth | 286 | 3,6453 | 5,55808 | ,32866 | 2,9984 | 4,2922 | -23,26 | 38,08 |
| Prof | 236 | 3,6258 | 4,00037 | ,26040 | 3,1128 | 4,1389 | -12,25 | 37,21 |
| Star | 544 | 4,0415 | 3,73998 | ,16035 | 3,7265 | 4,3565 | -12,92 | 31,19 |
| Total | 1608 | 3,5564 | 4,65670 | ,11613 | 3,3286 | 3,7842 | -23,26 | 38,08 |

**Test of Homogeneity of Variances**

PB2005

| Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|
| 5,249 | 3 | 1604 | ,001 |

**ANOVA**

PB2005

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 303,895 | 3 | 101,298 | 4,704 | ,003 |
| Within Groups | 34543,728 | 1604 | 21,536 | | |
| Total | 34847,623 | 1607 | | | |

**Multiple Comparisons**

PB2005

Tamhane

| (I) Category8 | (J) Category8 | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| Poor | Growth | -,65303 | ,39632 | ,469 | -1,6996 | ,3935 |
| | Prof | -,63356 | ,34185 | ,329 | -1,5361 | ,2690 |
| | Star | -1,04922* | ,27343 | ,001 | -1,7701 | -,3284 |
| Growth | Poor | ,65303 | ,39632 | ,469 | -,3935 | 1,6996 |
| | Prof | ,01947 | ,41931 | 1,000 | -1,0881 | 1,1270 |
| | Star | -,39619 | ,36569 | ,860 | -1,3628 | ,5705 |
| Prof | Poor | ,63356 | ,34185 | ,329 | -,2690 | 1,5361 |
| | Growth | -,01947 | ,41931 | 1,000 | -1,1270 | 1,0881 |
| | Star | -,41566 | ,30581 | ,684 | -1,2241 | ,3927 |
| Star | Poor | 1,04922* | ,27343 | ,001 | ,3284 | 1,7701 |
| | Growth | ,39619 | ,36569 | ,860 | -,5705 | 1,3628 |
| | Prof | ,41566 | ,30581 | ,684 | -,3927 | 1,2241 |

*. The mean difference is significant at the 0.05 level.

## PB 2006

**Descriptives**

PB2006

| | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
|---|---|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound | | |
| Poor | 511 | 2,7604 | 5,83570 | ,25816 | 2,2532 | 3,2675 | -30,81 | 41,95 |
| Growth | 338 | 3,2433 | 5,52546 | ,30055 | 2,6521 | 3,8345 | -21,30 | 42,75 |
| Prof | 293 | 3,5423 | 3,56979 | ,20855 | 3,1318 | 3,9527 | -15,28 | 24,07 |
| Star | 507 | 3,7823 | 3,90148 | ,17327 | 3,4419 | 4,1227 | -25,11 | 42,18 |
| Total | 1649 | 3,3125 | 4,88739 | ,12036 | 3,0764 | 3,5485 | -30,81 | 42,75 |

**Test of Homogeneity of Variances**

PB2006

| Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|
| 4,200 | 3 | 1645 | ,006 |

**ANOVA**

PB2006

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 284,777 | 3 | 94,926 | 3,996 | ,008 |
| Within Groups | 39080,273 | 1645 | 23,757 | | |
| Total | 39365,050 | 1648 | | | |

**Multiple Comparisons**

PB2006

Tamhane

| (I) Category9 | (J) Category9 | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| Poor | Growth | -,48293 | ,39620 | ,780 | -1,5281 | ,5622 |
| | Prof | -,78190 | ,33187 | ,107 | -1,6572 | ,0934 |
| | Star | -1,02196* | ,31091 | ,006 | -1,8418 | -,2021 |
| Growth | Poor | ,48293 | ,39620 | ,780 | -,5622 | 1,5281 |
| | Prof | -,29897 | ,36581 | ,960 | -1,2647 | ,6668 |
| | Star | -,53902 | ,34692 | ,538 | -1,4550 | ,3770 |
| Prof | Poor | ,78190 | ,33187 | ,107 | -,0934 | 1,6572 |
| | Growth | ,29897 | ,36581 | ,960 | -,6668 | 1,2647 |
| | Star | -,24006 | ,27114 | ,941 | -,9556 | ,4755 |
| Star | Poor | 1,02196* | ,31091 | ,006 | ,2021 | 1,8418 |
| | Growth | ,53902 | ,34692 | ,538 | -,3770 | 1,4550 |
| | Prof | ,24006 | ,27114 | ,941 | -,4755 | ,9556 |

*. The mean difference is significant at the 0.05 level.