

**P/E and
EV/EBITDA
Investment
Strategies
vs.
the Market**

- A Study of Market Efficiency

**EVA PERSSON
CAROLINE STÅHLBERG**

MASTER'S THESIS (D-LEVEL)
FALL, 2006

LINKÖPING UNIVERSITY
SCHOOL OF MANAGEMENT
INTERNATIONAL BUSINESS PROGRAM

ABSTRACT

Background:

The efficient market hypothesis states that it is not possible to consistently outperform the overall stock market by stock picking and market timing. This is because, in an efficient market, all stock prices are at their correct level, and there are no over- or undervalued stocks. Nevertheless, deviations from true price can occur according to the hypothesis, but when they do they are always random. Thus, the only way an investor can perform better than the overall stock market is by being lucky. However, the efficient market hypothesis is very controversial. It is often discussed within the area of modern financial theory and there are strong arguments both for and against it.

Purpose:

The purpose of this study was to investigate whether it is possible to outperform the overall stock market by investing in stocks that are undervalued according to the enterprise multiple (EV/EBITDA), and the price-earnings ratio.

Realization of the Study:

Portfolios were constructed based on information from five years, 2001 to 2005. Each year two portfolios were put together, one of them consisting of the six stocks with the lowest price-earnings ratio, and the other consisting of the six stocks with the lowest EV/EBITDA. Each portfolio was kept for one year and the unadjusted returns as well as the risk adjusted returns of the portfolios were compared to the returns on the two indexes OMXS30 and AFGX. The sample consisted of the 30 most traded stocks on the Nordic Stock Exchange in Stockholm 2006.

Conclusion:

The study shows that it is possible to outperform the overall stock market by investing in undervalued stocks according the price-earnings ratio and the EV/EBITDA. This indicates that the market is not efficient, even in its weak form.

Key words:

Efficient Market Hypothesis, Enterprise Multiple, P/E ratio, Relative Valuation, Anomaly, Stock Valuation

TABLE OF CONTENTS

1. INTRODUCTION.....	1
1.1 Background	1
1.2 Problem Discussion.....	2
1.3 Purpose	3
1.4 Delimitations	3
1.5 Disposition of the Thesis	4
2. THE EFFICIENT MARKET HYPOTHESIS	6
2.1 The Different Levels of Market Efficiency	7
2.2 Studies of Market Efficiency	9
2.3 Common Misconceptions.....	11
2.4 Implications for this study	12
3. RELATIVE VALUATION	13
3.1 The Use of Multiples	14
3.2 The Price-Earnings Ratio	16
3.2.1 P/E Ratio Definitions.....	16
3.2.2 Understanding the P/E Ratio.....	18
3.2.3 P/E Ratio Interpretations.....	19
3.3 The Enterprise Multiple.....	21
4. METHODOLOGY	24
4.1 Research Approach	24
4.2 Collection of Data	25
4.3 Portfolio Composition and Evaluation	26
4.3.1 Portfolio Composition	26
4.3.2 Adjusting for Risk	28
4.3.3 The Risk Free Rate and the Risk Premium	29
4.4 Reliability and Validity.....	29

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

5. EMPIRICAL RESULTS	31
5.1 Portfolio Composition and Returns	31
5.1.1 The P/E Strategy	31
5.1.2 The EV/EBITDA Strategy	39
5.2 Summary of the P/E and EV/EBITDA Portfolios.....	46
6. ANALYSIS.....	48
6.1 Analysis of the P/E Strategy.....	48
6.1.1 Analysis of the Individual P/E Portfolios	49
6.1.2 Risk Adjusted Returns on the P/E Portfolios	55
6.1.3 Summary of the P/E strategy	55
6.2 Analysis of the EV/EBITDA Strategy	56
6.2.1 Analysis of the Individual EV/EBITDA Portfolios.....	57
6.2.2 Risk Adjusted Returns on the EV/EBITDA Portfolios	62
6.2.3 Summary of the EV/EBITDA Strategy	63
6.4 Additional Costs	67
6.4.1 Transaction costs and taxes.....	67
6.4.2 Information and processing costs	67
6.5 Is the market efficient?	68
7. CONCLUSIONS	71
8. REFERENCES	72
8.1 Written Sources.....	72
8.1.1 Annual Reports.....	75
8.2 Electronic Sources.....	76
9. APPENDIX.....	78

LIST OF FIGURE AND TABLES

Figure 2.1 Subsets of Available Information for a Given Stock.....	9
Table 3.1 Determinants of the P/E Ratio	19
Table 3.2 Determinants of the Enterprise Multiple	23
Table 5.1 P/E Portfolio 2001	32
Figure 5.1 Unadjusted Return on the P/E Portfolio 2001.....	32
Table 5.2 P/E Portfolio 2002	33
Figure 5.2 Unadjusted Return on the P/E Portfolio 2002.....	34
Table 5.3 P/E Portfolio 2003	35
Figure 5.3 Unadjusted Return on the P/E Portfolio 2003.....	35
Table 5.4 P/E Portfolio 2004	36
Figure 5.4 Unadjusted Return on the P/E Portfolio 2004.....	37
Table 5.5 P/E Portfolio 2005	38
Figure 5.5 Unadjusted Return on the P/E Portfolio 2005.....	38
Table 5.6 EV/EBITDA Portfolio 2001	39
Figure 5.6 Unadjusted Return on the EV/EBITDA Portfolio 2001	40
Table 5.7 EV/EBITDA Portfolio 2002	41
Figure 5.7 Unadjusted Return on the EV/EBITDA Portfolio 2002	41
Table 5.8 EV/EBITDA Portfolio 2003	42
Figure 5.8 Unadjusted Return on the EV/EBITDA Portfolio 2003	43
Table 5.9 EV/EBITDA Portfolio 2004	44
Figure 5.9 Unadjusted Return on the EV/EBITDA Portfolio 2004	44
Table 5.10 EV/EBITDA Portfolio 2005	45
Figure 5.10 Unadjusted Return on the EV/EBITDA Portfolio 2005	46
Table 5.11 Summary Unadjusted Portfolio Return.....	47
Table 5.12 Summary Risk Adjusted Portfolio Return.....	47
Table 6.1 Unadjusted Portfolio Return on the P/E Portfolios	48

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

Figure 6.1 Unadjusted Return on Each Stock in the P/E Portfolio 2001	50
Figure 6.2 Unadjusted Return on Each Stock in the P/E Portfolio 2002	51
Figure 6.3 Unadjusted Return on Each Stock in the P/E Portfolio 2003	52
Figure 6.4 Unadjusted Return on Each Stock in the P/E Portfolio 2004	53
Figure 6.5 Unadjusted Return on Each Stock in the P/E Portfolio 2005	54
Figure 6.6 Risk Adjusted Return on the P/E Portfolios 2001-2005	55
Table 6.2 Unadjusted Portfolio Return on the EV/EBITDA Portfolios	56
Figure 6.7 Unadjusted Return on Each Stock in the EV/EBITDA Portfolio 2001.....	57
Figure 6.8 Unadjusted Return on Each Stock in the EV/EBITDA Portfolio 2002.....	58
Figure 6.9 Unadjusted Return on Each Stock in the EV/EBITDA Portfolio 2003.....	59
Figure 6.10 Unadjusted Return on Each Stock in the EV/EBITDA Portfolio 2004....	60
Figure 6.11 Unadjusted Return on Each Stock in the EV/EBITDA Portfolio 2005....	61
Figure 6.12 Risk Adjusted Return on the EV/EBITDA Portfolios 2001-2005	62
Table 6.3 Comparison of the Growth of the P/E and EV/EBITDA Portfolios	64
(Unadjusted return).....	64
Table 6.4 Comparison of the Growth of the P/E and EV/EBITDA Portfolios	65
Figure 6.13 Comparison of the P/E and the EV/EBITDA Strategies (unadjusted return)	65
Figure 6.14 Comparison of the P/E and the EV/EBITDA Strategies (risk adjusted return)	66
Table 9.1 Average P/E ratios of the Studied Companies 2001-2005.....	78
Table 9.2 Enterprise Multiples of the Studied Companies 2001-2005.....	79
Table 9.3 Beta of the Studied Companies 2001-2005	80
Table 9.4 Expected Return According to CAPM	81

ABBREVIATIONS

- AFGX: Affärsvärldens Generalindex, a broad index that measures the market average on the Stockholm Stock Exchange
- DCF: Discounted Cash Flow
- EBITDA: Earnings Before Interest, Taxes, Depreciation and Amortization
- EV: Enterprise Value
- EMH: Efficient Market Hypothesis
- OMXS30: Index consisting of the 30 most traded stocks on the Nordic Exchange in Stockholm
- P/E ratio: Price-Earnings Ratio

1. INTRODUCTION

The aim of this chapter is to present the reader with the background of the thesis. This is followed by the problem discussion and the purpose. Delimitations and the disposition of the thesis are presented thereafter.

1.1 Background

There is an old joke about an economist strolling down the street with a companion when they come upon a \$100 bill lying on the ground. As the companion reaches down to pick it up, the economist says “Don’t bother – if it were a real \$100 bill, someone would have already picked it up.” (Lo 2000) This is clearly an example of economic logic taken too far, but it serves as a suitable introduction to this thesis.

Let us translate (and slightly modify) this to the stock market: If there existed an investment strategy that consistently resulted in higher returns for the investor, would people already have taken advantage of it and thereby driven the prices of all stocks to fully reflect all available information? If stock prices were driven to fully reflect all available information about all companies, industries and the macroeconomic situation, such an investment strategy would become useless, since there would be no mispricings in the market to take advantage of.

If the stock market was strongly efficient, and stocks were always valued correctly, professional investors would find themselves unemployed, since no single investor could have an advantage over another. If one investor earned superior returns one year, it would simply be a strike of luck, not because he or she was more accurate in his or her analysis than other market participants. Some people and some research

claim that this is the case, whereas others believe that the market is inefficient in several aspects and that it is possible to outperform the overall stock market by taking advantage of such inefficiencies.

1.2 Problem Discussion

According to the efficient market hypothesis it is impossible for investors to consistently outperform the overall stock market. In an efficient market, current share prices reflect all available information and the collective analysis and knowledge of all investors. This means that each stock sells at a price that is appropriate, given its risk, based on the best available approximation of the probability distribution of the firm's future cash flows. Since, in such a market, all stocks trade at a fair value, there are no over- or undervalued stocks, and an investor cannot buy undervalued stocks and sell stocks at inflated prices. Expert stock picking and market timing can therefore not lead to higher returns. In an efficient market, riskier investments are the only way to obtain higher returns. (Fama 1991)

Nevertheless, the efficient market hypothesis is controversial and there are several arguments both for and against it. The fact that some professional investors do seem to consistently perform better than the overall market is one of the arguments used by opponents of the efficient market hypothesis. (Heakal 2002)

If a stock is undervalued, it is trading below its true value. One method for deciding whether a stock is undervalued is to use relative valuation. This means that the value of an asset is derived through comparing it to similar assets by examining certain common variables such as book value, cash flow, earnings or sales. (Damodaran 2002)

The price-earnings ratio is one multiple that can be used in relative valuation. It is calculated as a company's share price divided by earnings per share. This multiple is an equity measure, since it is based on market values.

The enterprise multiple is another multiple that can be used in relative valuation. It is calculated as the total market value of the firm, net of cash, divided by the earnings before interest, taxes, depreciation and amortization. While the price-earnings ratio is based on market values, the enterprise multiple is based on book values. The price-earnings ratio is the most widely used of all multiples, whereas the enterprise multiple is a newer measure. (Damodaran 2002)

1.3 Purpose

The purpose of this study is to investigate whether it is possible to outperform the overall stock market by investing in stocks that are undervalued according to the enterprise multiple and the price-earnings ratio.

1.4 Delimitations

This thesis will focus on studying the stocks that comprise the OMXS30 index in December 2006. This index consists of the thirty most traded stocks on the Nordic Exchange in Stockholm. The stocks will be studied during five years, between 2002 and 2006, and the undervalued stocks will be picked based on information from the previous year, thus information from 2001 to 2005. Further, we will not take into account any transaction costs or taxes. If we had chosen to include such costs, we would have to base our calculations on assumptions of the size of them. Since these assumptions would not be exact we choose to ignore these costs entirely.

1.5 Disposition of the Thesis

The thesis is divided into nine chapters. A brief introduction to each chapter follows:

Chapter 2 – The Efficient Market Hypothesis

The aim of the second chapter is to provide the reader with a more comprehensive understanding of the efficient market hypothesis, its origins and the three different levels of market efficiency. Further, past research about market efficiency is presented.

Chapter 3 – Relative Valuation

In order to decide which of the stocks on the OMXS30 that are undervalued we use relative valuation. The third chapter presents the reader with the basics of relative valuation. Further the multiples we use in the relative valuation of the stocks on the OMXS30 are presented.

Chapter 4 – Methodology

Chapter four explains the practical procedure of our study as well as our methodological approach.

Chapter 5 - Empirical Results

In this chapter the empirical results of the study are presented, beginning with the results of the price-earnings (P/E) strategy. Thereafter the results of the

EV/EBITDA strategy are presented. The chapter ends with a summary of our empirical findings.

Chapter 6 - Analysis

In chapter six, the empirical results of the study are analyzed. The P/E strategy and the EV/EBITDA strategy are first analyzed separately and then they are compared. The chapter ends with a discussion about additional factors that are important to consider in this kind of study and what our results indicate about whether the market is efficient or not.

Chapter 7 - Conclusion

Chapter seven contains the conclusions reached in the study.

In chapter eight the references are presented and chapter nine contains the appendix.

2. THE EFFICIENT MARKET HYPOTHESIS

The aim of this chapter is to provide the reader with an understanding of the efficient market hypothesis, its origins and the different levels of market efficiency. Further, arguments for and against the hypothesis are discussed.

The Efficient Market Hypothesis, EMH, is an investment theory that states that it is impossible for investors to consistently outperform the overall stock market due to market efficiency. According to the EMH, current share prices perfectly reflect all available information and the collective analysis and knowledge of all investors. The EMH was formulated in 1970 by University of Chicago professor Eugene Fama. (Heakal 2002)

The EMH has its roots in research by Maurice Kendall and a paper he published in 1953 where he presented his studies of stock and commodity prices. He found that instead of moving in regular cycles, prices seemed to follow a random walk, or as he put it: "The series looks like a wandering one, almost as if once a week, the Demon of Chance drew a random number from a symmetrical population of fixed dispersion and added it to the current price to determine the next week's price" (Kendall 1953 p.13) This phenomenon had been suggested earlier by the Stanford professor Holbrook Working in 1934, but he lacked sufficient empirical results to support his theory. (Fama 1970)

The four main characteristics of the EMH are the following:

- 1) Share prices respond correctly and immediately to new information that is relevant to valuation.

- 2) Changes in expected security returns from one period to another are driven by changes in the level of risk-free interest rate and changes in the level of the risk premium of the specific security. Changes in stock prices that are associated with other factors are random and cannot be predicted. Within the theory of EMH this non-predictability is called the “random walk” of prices. (Heakal 2002)

- 3) Trading rules or specific investment strategies do not produce superior returns since it is not possible to discriminate between profitable and unprofitable investments based on already available information.

- 4) Professional investors do not produce superior returns than other investors. Differences in performance between different groups of investors are due to chance.

In an efficient market, the market price on an investment does not have to be equal to the true value at each point in time. Though, all deviations from the true value of an asset are random. (Haugen 2001)

2.1 The Different Levels of Market Efficiency

Fama (1970) argues that there are three levels of market efficiency; weak efficiency, semi-strong efficiency, and strong efficiency.

The first degree, weak efficiency, implies that the current share prices reflect all historical information of past share prices. Due to the weak efficiency of the market it is impossible for investors to predict and outperform the market by using historical data, so called technical analysis.

Semi-strong market efficiency means that all public information is included in the current share price and an investor cannot outperform the market by either the application of technical nor fundamental analysis of public information. (Fama 1970)

Under the third level of market efficiency, strong efficiency, all information, both private and public, is included in the stock price. This implies that not even insiders can have superior information and thereby profit from it. This extreme level of efficiency is not meant to be a description of reality. Instead it is formulated to serve as a benchmark that can be used to estimate the importance of deviations from the efficient market. (Fama 1970) In figure 2.1 on the next page, the relationship between the three different information sets is presented. If current stock prices reflect only information in past stock prices, the market is weak-form efficient. If current stock prices reflect not only historical information but also all public information about the company, such as its accounting reports, the reports of competing firms and all other publicly available information that could be of interest when valuating the firm, the market is semi strong-form efficient. If current stock prices reflect all available information, including private and inside information, the market is strong-form efficient. (Haugen 2001)

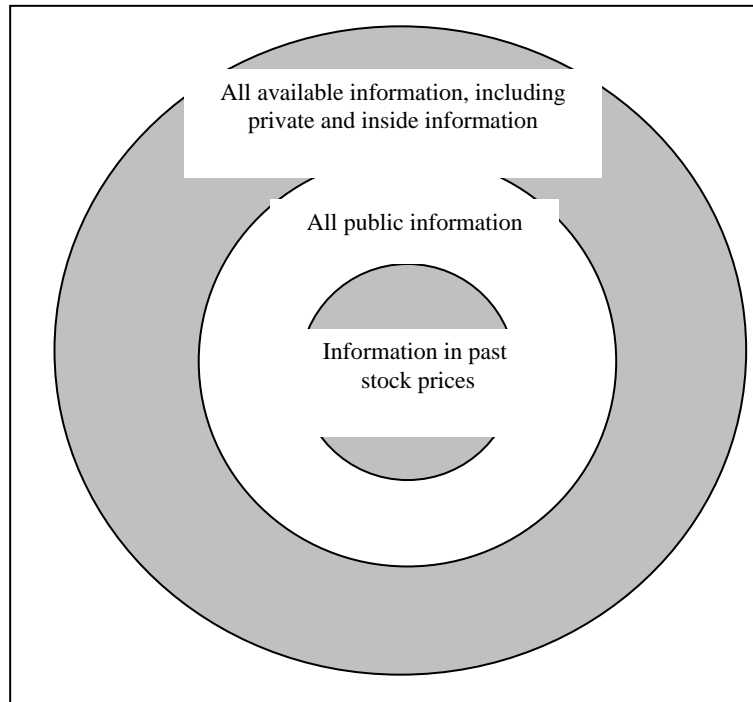


Figure 2.1 Subsets of Available Information for a Given Stock
(Haugen 2001)

2.2 Studies of Market Efficiency

Despite being one of the most studied propositions in all the social sciences, economists have not reached a consensus about whether markets are efficient or not. (Lo 2000)

In the remains of this chapter, research on the four main characteristics of the EMH will be presented. As mentioned earlier, the characteristics are the following:

- 1) Share prices respond correctly and immediately to new information

- 2) Changes in expected security returns are driven by changes in the level of risk-free interest rate and changes in the level of the risk premium of the specific security
- 3) Trading rules or specific investment strategies do not produce superior returns
- 4) Professional investors do not produce superior returns

When it comes to testing whether the market reacts correctly and immediately to new information, some studies have shown that so is the case, whereas others have shown that the market tends to lag in its response to new information and that the magnitude of the reaction is not always correct. (Haugen 2001)

In an efficient market all changes in expected security returns that are not driven by changes in the level of risk-free interest rate or the risk premium of the specific security, are random. Several studies have shown that this characteristic of an efficient market is not in line with reality. Systems or patterns of inefficiency in the market that investors can use when trying to gain superior profits than the overall market, called anomalies, have been discovered. Anomalies in the stock market are phenomena that the opponents of the EMH use in their criticism of the EMH. (Heakal 2002) The so called Monday Effect is one stock market anomaly that has been observed; returns on the stock market on Mondays tend to follow the trend from the previous Friday. (Wang et al 1997) The P/E effect is another stock market anomaly that has been discovered. It suggests that portfolios consisting of low P/E stocks show higher average risk-adjusted returns than portfolios with high P/E stocks. (www.investopedia.com)

According to the EMH, specific investment strategies or trading rules do not produce superior returns. Several studies have tested the efficiency of such rules, and most of them have failed. Nevertheless, there is one strategy that has produced superior returns in simulations. This strategy is called value investing and is built upon the assumption that the market overreacts to good or bad news, and thereby, stock prices do not always correspond with their true values. This implies that an investor can profit from buying undervalued stocks. Value investing has proven to produce superior returns in several simulations based on historical data, even after adjusting for factors like transaction costs, differential taxes and risk adjustment. (Haugen 2001)

The fourth characteristic of an efficient market is that differences in performance between different groups of investors are due to chance, and professional investors do not produce superior returns than other investors. As with the other characteristics of an efficient market, there is no undisputed evidence when it comes to this aspect. A study of mutual fund performance during the years 1945-64 shows that different groups of investors do not differ in their average investment performance. (Jensen 1968) Nonetheless, a recent and more comprehensive study of mutual fund performance shows that professional investors can succeed in outperforming the market continuously. (Carhart 1997)

2.3 Common Misconceptions

In order to understand the concept of efficient markets, it is useful to discuss a few common misconceptions about efficient markets. The first misconception is that, in an efficient market, stock prices cannot differ from their true value. This is not the case. Though, the condition is that the deviations from true value are random.

A second misconception is that no investor can beat the market in a certain period of time. This is not the case; in fact, according to the EMH half of all investors should beat the market in a certain period of time, due to the fact that deviations from true value are random. (Damodaran 2002)

Another misconception about an efficient market has to do with the fact that no group of investors can outperform the market consistently. This point may need some clarification. What the EMH says is that no investor can consistently outperform the market due to superior analysis of information that is available to all investors. However, due to chance, investors can outperform the market repeatedly. Since the number of investors in financial market is large, the laws of probability suggest that a number of investors due to luck will outperform the market consistently. (Damodaran 2002)

2.4 Implications for this study

In this study market efficiency is tested through investigating whether it is possible to outperform the overall stock market by using two different investment strategies; investing in stocks that are undervalued according to the P/E ratio and investing in stocks that are undervalued according to the enterprise multiple (EV/EBITDA).

As explained earlier in this chapter, if the market is efficient, it is not possible to outperform the market by using such investment strategies. If the results of the study show that these investment strategies are successful, this is an indication that the market is not efficient in the weak form, since we base our study on historical data. This is true as long as the results are not due to errors in the study.

3. RELATIVE VALUATION

In this thesis we investigate whether it is possible to outperform the overall stock market by investing in undervalued stocks. In order to decide which stocks are undervalued we use relative valuation. This chapter provides the reader with the basics of relative valuation. This is followed by a discussion about advantages and disadvantages of using multiples in valuating stocks. Thereafter, the price-earnings ratio and the enterprise multiple, that are used to value stocks in this thesis, are presented.

According to Damodaran (2002) there are three general approaches to valuation: the discounted cash flow valuation that relates the value of an asset to the expected future cash flows on that asset, the contingent claim valuation that is based on option pricing models, and the relative valuation that derives the value of an asset by comparing it to similar assets by examining certain common variables such as book value, cash flow, earnings or sales. (Damodaran 2002)

Relative valuation is less complicated, less time-consuming and demands fewer assumptions than the discounted cash flow valuation method. The fact that relative valuation is fairly easy to use has made it a well-established method. Another advantage with using this method is that key data in form of different financial multiples are available. (McClure 2003) Yet another advantage of relative valuation is that it is more likely than other valuation methods to capture the current mood of the market. Whereas this can be desirable in some cases it can also constitute a problem, for example if relative valuation is being used in valuating an Initial Public Offering (IPO) there is the risk that the entire industry in which the IPO company

operates is undervalued, and therefore, valuing the IPO in relation to other companies in that industry would lead to an undervaluation of the IPO stock. (Damodaran 2002)

Another weakness of relative valuation is that it can seem too simple and straightforward and that multiples are calculated with inconsistent estimates of values and without considering important underlying factors such as risk, growth and cash flow potential. Lack of transparency when it comes to the underlying assumptions in relative valuation can be a problem since this leaves room for manipulation of the information. (Damodaran 2002)

In relative valuation it is assumed that the market is correct in its pricing of stocks on average, but that it is not always correct when it comes to pricing individual stocks. By comparing certain multiples, an investor can discover such mispricings and eventually they will be corrected. The multiples of a company can be compared to those of other companies or to the historical multiples of the same company. The former method is the most widely used. The latter requires a long company history in order to function satisfactory. (Damodaran 2002)

3.1 The Use of Multiples

Some of the advantages with using multiples are that they are easy to understand and that the variables used in the multiples are usually accessible. (Damodaran 2002) When using relative valuation it is important to make sure that the multiples used are defined and formulated in the same way for all the companies compared. Many multiples, although they are widely used within the financial field, are differently defined and used by different analysts. Examples of multiples

used in valuation are the price-earnings ratio (P/E), the price-to-book ratio, and the enterprise multiple. (McClure 2003)

The fact that companies belong to the same industry does not make them comparable. Companies within the same industry can differ significantly and this will affect the accuracy of the comparison and the multiples used. Therefore, it is very important that the firms have similar underlying fundamentals. (McClure 2003). Differences in growth, risk, and cash flow between companies must be considered when deciding whether the companies are comparable. All these variables can affect the multiples of the firm. These differences can be handled in three different ways. The first approach is to make subjective adjustments of the multiple of a specific company based on the average multiple of the studied firms. If the multiple of a specific company differs significantly and if the difference cannot be explained by the company's fundamentals such as growth, risk or cash flows, then the company is considered as over- or undervalued. The second approach is to adjust the multiple by taking into account the so called companion variable, which is the most important variable in determining the multiple. Then the adjusted ratios are compared across firms and it is assumed that the companies are comparable when it comes to all other aspects. The third approach can be used when firms are considered to be different when it comes to more than one variable and it includes running regressions of the multiples against the variables that are considered to differ. (Damodaran 2002)

When using multiples it is important to ensure that the numerator and the denominator are consistently defined. If the numerator is an equity measure, such as market price or value of equity, the denominator should be an equity measure as well. The same is true if a firm measure, such as EBITDA or book value of capital, is used. For the price-earnings ratio both the numerator and the denominator are

equity measures. In the case of the enterprise multiple, both the numerator (enterprise value) and the denominator (EBITDA) are firm measures. (Damodaran 2002)

It is crucial to consider the distributional characteristics of the multiples used. In the case of the P/E ratio, since it is often assumed that it cannot be lower than zero and since it has no upper limits, the multiple is skewed towards positive values. Therefore, the median value is usually more relevant to use than the average value of the multiple when it comes to identifying the typical firm in the group of firms being examined. Another problem with using average P/E ratios when comparing companies is that if some of the companies have negative P/E ratios, the average will be biased since these are left out of the sample. (Damodaran 2002)

3.2 The Price-Earnings Ratio

The price-earnings ratio, P/E, is the most frequently used of all earnings multiples. It is calculated as price per share divided by earnings per share and it expresses how much investors are willing to pay for the company earnings. (Damodaran 2002)

3.2.1 P/E Ratio Definitions

The P/E ratio can be calculated using current earnings per share, resulting in the *current P/E ratio*. Alternatively, expected earnings per share can be used as denominator, which results in the *forward P/E ratio*. A third type of P/E ratio is the *trailing P/E ratio*, where trailing four quarters of earnings per share is used as denominator. (Damodaran 2002)

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

Earnings per share (EPS) is calculated as follows:

$$\text{Earnings per share (EPS)} = \frac{\text{Net income} - \text{dividends on preferred stock}}{\text{Average outstanding shares}}$$

The current P/E ratio is calculated as follows:

$$\text{Current P/E ratio} = \frac{\text{Market price per share}}{\text{Earnings per share from the most recent financial year}}$$

The trailing P/E ratio is calculated as follows:

$$\text{Trailing P/E ratio} = \frac{\text{Market price per share}}{\text{Trailing four quarters of earnings per share}}$$

The Forward P/E ratio is calculated as follows:

$$\text{Forward P/E ratio} = \frac{\text{Market price per share}}{\text{Expected earnings per share in the next year}}$$

Since earnings in this case are just estimates, there is greater uncertainty involved in this calculation. (Damodaran 2002) Forward P/E can be used when comparing current earnings to future earnings, and when a more forward-looking focus is desirable when comparing companies. (www.investopedia.com)

When looking at the P/E ratio of a company one should take into account that the quality of the P/E ratio depends on the quality of the denominator, earnings per share, since this is an accounting measure that can be manipulated. (www.investopedia.com)

3.2.2 Understanding the P/E Ratio

In order to understand the P/E ratio it is important to understand its underlying factors. The P/E ratio can be derived from a simple discounted cash flow model where the value of equity is defined as:

$$\text{Value of Equity} = P_0 = \frac{DPS_1}{k_e - g_n}$$

where:

DPS_1 = Expected dividend in the next year

k_e = cost of equity

g_n = expected stable growth rate

By dividing both sides of the equation by the earnings, the P/E ratio is obtained:

$$\frac{P_0}{EPS_0} = P/E \text{ ratio} = \frac{\text{Payout ratio} \times (1 - g_n)}{k_e - g_n}$$

where:

EPS₀ = Earnings per share

Payout ratio = yearly dividend per share divided by earnings per share

(Damodaran 2002)

The P/E ratio is determined by payout ratio, risk and expected growth rate in earnings. All else equal, the following characteristics of a company have the following impacts on the P/E ratio.

Table 3.1 Determinants of the P/E Ratio

Characteristics	Influence on the P/E Ratio
Increasing payout ratio	Higher
Higher risk (through the discount rate)	Lower
Higher growth rate in earnings (given that return on equity > cost of equity)	Higher

(Damodaran 2002)

3.2.3 P/E Ratio Interpretations

The P/E ratio can be used to analyze and value firms. The average P/E ratio on the Swedish stock market has historically been slightly lower than 15 (www.finansportalen.se) Nonetheless, one has to keep in mind that P/E ratios vary

depending on the market, the industry the company operates in and it also varies over time. (www.investopedia.com)

A high P/E ratio compared to that of other companies in the industry can be an indicator of one or more of the following:

- 1) The company shows a high growth rate in earnings. The higher the growth rate, the higher the net present value of future earnings. If a company's earnings grow by 15 percent a year, the company doubles its earnings every five years.

- 2) The company's growth rate is expected to remain for a longer period. The longer the growth rate is expected to keep on, the higher the net present value of future earnings. A company whose earnings is expected to grow during the next ten years will have a higher P/E ratio than a company whose earnings is expected to grow during the next five years, all else equal.

- 3) The company has a higher payout ratio (yearly dividend per share divided by earnings per share). This is due to the fact that the risk can be considered to decrease as part of the company earnings are paid to the shareholders in form of dividends. The higher the proportion of the earnings that the owners (shareholders) have access to, the lower the risk the owners face. A lower risk justifies a lower return on equity, which results in a higher net present value of future earnings and a higher P/E ratio.

- 4) The company has a lower risk. The lower the risk, the lower the uncertainty and the lower yield the investors require and thereby the higher the net present value of future earnings and the higher the P/E ratio.

5) The market interest rate (that is used to calculate net present value) is low. The lower the interest rate, the higher the net present value and the higher the P/E ratio. (Bernhardsson 2003)

If a company is not profitable, that is the company has a negative earnings per share (EPS), the company can be said to have a negative P/E. Some refer to companies with negative EPS as to having P/E ratios of zero. Others are of the opinion that the P/E ratio does not exist if it is negative. (www.investopedia.com)

3.3 The Enterprise Multiple

The enterprise value to EBITDA multiple, also called the enterprise multiple has become widely used in estimating company value during the past two decades. (www.investopedia.com) It is calculated as the total market value of the firm net of cash, divided by the earnings before interest, taxes, depreciation and amortization. The reason why cash is subtracted from the market value of equity is that the interest income from the cash is not included in EBITDA; hence not subtracting the cash would lead to a multiple that is overvalued. (Damodaran 2002)

EBITDA is a measure of a company's profits. It can be used to compare the profitability of different companies and industries. The measure first came into use in the 1980s as a tool for leveraged buyout investors to investigate whether a company could service its debt in the short run, by dividing EBITDA by the interest charges of the company. The EBITDA measure is now used in several businesses. (McClure 2006)

One of the advantages of EBITDA is that it is not affected by financing and accounting decisions. (Wayman 2002)

$$\text{EnterpriseMultiple} = \frac{\text{EV}}{\text{EBITDA}} = \frac{\text{Market value of equity} + \text{Market value of debt} - \text{Cash}}{\text{EBITDA}}$$

The enterprise multiple looks at a company in the same way as a potential acquirer would, and therefore, the debt is included. A company with a low P/E ratio compared to similar companies in the same industry may look cheap, but the company may have a large debt burden that is not reflected in the P/E ratio. Instead this is reflected in a high enterprise multiple. For most companies, the enterprise multiple is lower than the P/E ratio. (Fitch 2002)

The enterprise multiples are different for different industries. Therefore, the enterprise multiple of a certain company should be compared to the enterprise multiples of companies in the same industry and not to those of companies in other industries. Higher enterprise multiples will be found in industries with high growth and low depreciation charges, and lower enterprise multiples will be found in industries with low growth and or big needs for maintenance-level capital expenditure. (Fitch 2002)

The enterprise multiple is determined by tax rate, depreciation and amortization, reinvestment requirements, cost of capital, expected growth.

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

All else equal, the following characteristics of a company have the following impacts on the enterprise multiple:

Table 3.2 Determinants of the Enterprise Multiple

Characteristics	Influence on the enterprise multiple
Lower tax rate	Higher
Higher depreciation and amortization	Lower
Larger reinvestment requirements	Lower
Lower cost of capital	Higher
Higher expected growth	Higher

(Damodaran 2002)

4. METHODOLOGY

In this chapter, the reader will be presented with the methodology of the thesis, beginning with a description of our research approach and the data collection process. In order to investigate whether it is possible to outperform the overall stock market by investing in stocks that are undervalued according to the enterprise multiple and the price-earnings ratio, portfolios consisting of undervalued shares are created each year. The portfolio composition is described in section 4.3. This is followed by a discussion of the validity and the reliability of the thesis.

4.1 Research Approach

According to Ghauri and Grønhaug (2005), one can choose between a quantitative and a qualitative research approach depending on the nature of the research. The methods differ, not in quality, but in procedure. The purpose of qualitative research is to gain insights and understanding. Quantitative research on the other hand is focused on testing and verification.

While conducting this study we have used a quantitative approach. This approach is result-oriented with a logical and critical approach, whereas the qualitative approach is more process-oriented. (Ghauri and Grønhaug 2005)

In this thesis we relate theory and reality through deduction. This means that conclusions are drawn through logical reasoning. (Ghauri and Grønhaug 2005)

4.2 Collection of Data

According to Lekvall and Wahlbin (2001) there are two types of data, primary and secondary. Data that has been collected for a special purpose is classified as primary data, whereas secondary data is already existing data. In this thesis we have used secondary data.

One of the advantages with using secondary data is that it saves time and money, since collecting primary data is often both time-consuming and expensive. Using secondary data shortens the process of data collection and leaves more time for the analysis. (Bryman & Bell 2005) We have exclusively used secondary data, since all the data we required to fulfill our purpose was already published. Our main sources of data were the official annual reports of the firms we studied, Reuters 300Xtra and Six Trust.

We regard the data collected from these sources as being of high quality since these systems are recognized as leading and are extensively used by professionals within the financial area. The annual reports are composed by the companies themselves and moreover, are thoroughly controlled by external auditors.

Nevertheless, secondary data has a few limitations. One of them can be that the researcher is not familiar with the material and therefore, it can take time for the researcher to understand the data. (Bryman & Bell 2005) However, we believe that this has not been a problem in our case, since we are familiar with both the Reuters system, Six Trust and with interpreting annual reports.

Another possible disadvantage with using secondary data is that some key information may not be available. (Bryman & Bell 2005) During our data collection

process we had some difficulties with this due to minor inconsistencies and incompleteness of the data presented in Reuters. Further, the data presented in the studied companies' annual reports differed between the companies, and this made the data collection slightly more complicated than it would have been if the companies were more consistent in their reporting.

4.3 Portfolio Composition and Evaluation

As described in the delimitations section of this thesis, we have chosen to limit our study to the thirty most traded stocks on the Nordic Exchange in Stockholm in December 2006. Hence, all the stocks included in the study have not been part of the OMXS30 index during the entire studied period.

4.3.1 Portfolio Composition

Based on the average P/E ratio of each company during year 0, we build a portfolio consisting of the six companies (20 % of the total sample) with the lowest P/E ratios. During the following year (year 1) we invest in that portfolio, and compare the return on the portfolio with the return on the OMXS30 index and with the return on Affärsvärldens Generalindex, AFGX, which is a broad index that measures the market average on the Stockholm Stock Exchange. The return we have used is solely based upon the share price development; hence, possible dividends have not been taken into account. Due to the fact that the market regulates the share price as a company pays dividend, and because both the returns of the portfolios and the indexes exclude dividends, we do not believe this has affected the results of this study.

We invest in each portfolio on April 1 (or the next trading day, if April 1 is not a trading day) and keep the portfolio until March 31 the following year. The reason being that we base our portfolios on information from the company reports for the previous year and that this information is not available until the fourth quarter reports are published a couple of months into the next year.

Based on the enterprise multiple, EV/EBITDA, portfolios are composed and evaluated in the same way as the P/E portfolios. Hence, each year we have two different portfolios; one that consists of the six companies with the lowest P/E ratios, and another one that consists of the six companies with the lowest enterprise multiples.

The first portfolio investment is made on April 1, 2002, based on information from the annual reports for year 2001. Each of the following four years, two new portfolios (one based on the P/E ratios and one based on the enterprise multiple) are built on April 1 and kept for one year. However, the portfolio that is constructed on April 1, 2006 is only kept during the following eight months, until end of November, 2006.

As described in the previous chapter, the multiple of a certain company is usually compared to the multiples of other companies in the same industry, in order to decide whether the multiple is at a reasonable level. However, in this study we do not decide what stocks to invest in based upon whether each stock is undervalued compared to similar companies. We do not discriminate at all between the thirty companies in the sample; instead we have solely chosen the six stocks with the lowest multiples each year. The P/E ratios used in this thesis were obtained from Six Trust, and are calculated as the average daily P/E ratio during one year.

4.3.2 Adjusting for Risk

In this study we compare the absolute returns and the risk adjusted returns on different portfolios with the returns on the two indexes, OMXS30 and AFGX. The risk adjusted returns were calculated by using the capital asset pricing model, CAPM. (Sharpe 1964) First we calculated the expected returns on all the stocks in the sample (the stocks that comprised the OMXS30 in December, 2006) and then the expected return on each stock was subtracted from the actual return. The expected return was calculated as follows: (Haugen 2001)

$$\text{Expected return} = \text{Risk-free rate} + \text{Beta of the asset} \times (\text{Expected market return} - \text{Risk-free rate})$$

Example:

If the risk free rate is 3 %, the expected market return is 4.5 %, and the Beta of the stock is 1.5, then the expected return of that stock would be 5.25 %:

$$3 + 1.5 * (4.5 - 3) = 5.25\%$$

If the actual return was 8.75 %, the risk adjusted return of the same stock would be 3.5 %:

$$8.75 - 5.25 = 3.5$$

4.3.3 The Risk Free Rate and the Risk Premium

When risk adjusting our ten portfolios we used a different risk free rate for all five years. The risk free rates were all obtained from the homepage of the Swedish central bank and were calculated as the average daily rate of a three month T-bill (in Swedish: statsskuldväxel) between the periods in which we invested in the portfolios (between April 1 one year and March 31 the following year). By using this method we obtained a risk free rate of 3.99 % for the 2001 portfolios, 2.72 % for year 2002, 2.01 % for year 2003, 2.00 % for year 2004, and 2.49 % for the 2005 portfolios.

The risk premium we used in the CAPM was obtained from Öhrlings PricewaterhouseCoopers yearly reports on the expected risk premium on the Swedish market. The risk premium for the 2001 and 2002 portfolios was 4.5%, for year 2003 and 2004 it was 4.3%, and for the 2005 portfolios it was 4.5 %.

4.4 Reliability and Validity

The reliability of a study has to do with whether the results of the study would be the same if it was to be performed again. This measure is relevant in a quantitative study, since the researcher is interested in whether a measure is stable or not. (Bryman & Bell 2005) All the data used in this thesis is historical data that is uncomplicated to access and will not change over time. This indicates a high degree of reliability. However, if one were to repeat this study in a different period of time, identical or even similar results cannot be guaranteed, this due to the fact that market conditions change.

Validity refers to the capacity of an instrument to measure what it is supposed to measure. (Wiedersheim-Paul & Eriksson 1999) The instruments used in this study are the P/E ratio and the EV/EBITDA multiple. Since they are well-established straightforward quantitative instruments, we believe that the validity is high

5. EMPIRICAL RESULTS

In this chapter, the empirical results are presented, beginning with the portfolio composition and the returns on the portfolios. Thereafter, a summary of the results is presented.

5.1 Portfolio Composition and Returns

As described in the methodology chapter, two portfolios are created each year based on information from the company reports for the previous year. One of the portfolios consists of the six stocks (20 percent of the sample) that have the lowest P/E ratio, and the other portfolio consists of the six stocks with the lowest enterprise multiple. The same proportion (1/5) is invested in each stock.

The ten different portfolios are named after which of the multiples, and from what year, they are based upon.

5.1.1 The P/E Strategy

In this section the composition and the performance of the portfolios composed with the P/E strategy are presented.

P/E Portfolio 2001

The companies in the study with the lowest P/E ratios 2001 are presented in table 5.1 on the next page.

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

Table 5.1 P/E Portfolio 2001

Company	Average P/E Ratio 2001	Share Price April 2, 2002	Share Price March 31, 2003	Unadjusted Return	Risk Adjusted Return
VOSTOK NAFTA SDB	4,2	55	40,5	-26,36%	-34,22%
ATLAS COPCO B	4,7	22,8	15	-34,21%	-41,35%
HOLMEN B	8,5	257,5	197,5	-23,30%	-30,71%
SKF B	8,9	54,1	49,8	-7,95%	-15,31%
SCA B	10	325,5	267,5	-17,82%	-23,92%
INVESTOR B	11,1	116,5	48,8	-58,11%	-65,02%

Since one sixth is invested in each share, the unadjusted return on the portfolio between April 2, 2002 and March 31, 2003 is -27.96 percent. During this period the return on the OMXS30 was -40.47 percent, and the return on AFGX was -39.84 percent. Thus, the unadjusted portfolio return was 12.51 percentage points higher than the OMXS30, and 11.88 percentage points higher than AFGX. The figure below displays the unadjusted return on this portfolio compared to the return on the OMXS30 and the AFGX.

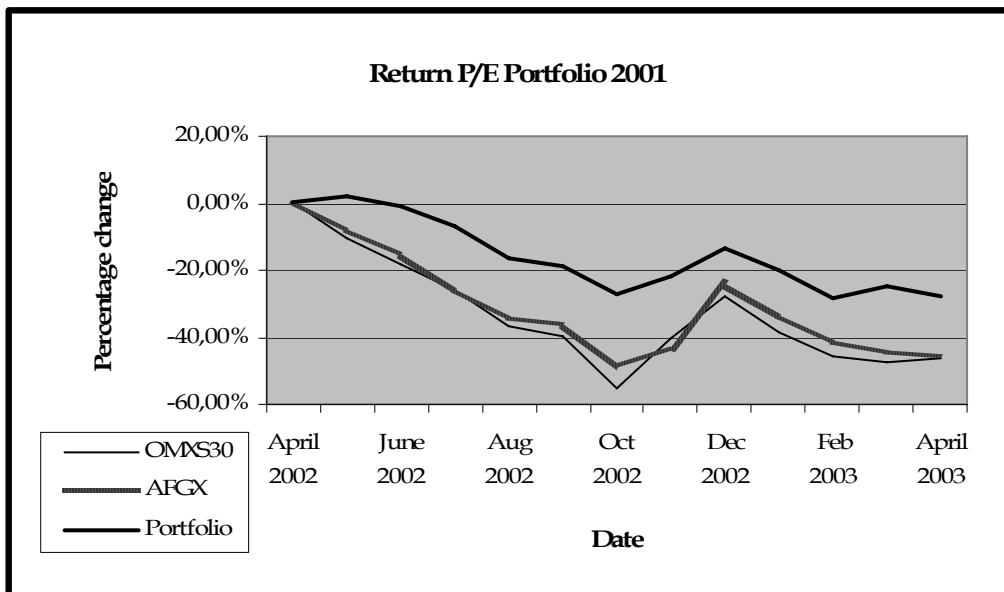


Figure 5.1 Unadjusted Return on the P/E Portfolio 2001

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

The risk adjusted return on each stock is also presented in table 5.1 on the previous page. The risk adjusted return on the entire portfolio was -35.09 percent. This means that the risk adjusted portfolio return was 7.13 percentage points lower than the unadjusted return on the portfolio. Further, the risk adjusted return on this portfolio was 5.38 percentage points higher than the return on the OMXS30 and 4.75 percentage points higher than the return on the AFGX.

P/E Portfolio 2002

In the table below, the companies in the study with the lowest P/E ratios during 2002 are presented:

Table 5.2 P/E Portfolio 2002

Company	Average P/E Ratio 2002	Share Price April 1, 2003	Share Price March 31, 2004	Unadjusted Return	Risk Adjusted Return
VOSTOK NAFTA SDB	3	40,5	115,5	185,19%	179,99%
HOLMEN B	9,3	198	212	7,07%	1,83%
ELECTROLUX B	10,5	37,9	43,6	15,04%	8,99%
SKF B	10,5	49,4	62,8	27,13%	21,30%
SEB A	11,7	75	110,5	47,33%	40,70%
SCA B	12,6	269,5	301,5	11,87%	7,80%

Between April 1, 2003 and March 31, 2004, the return on the OMXS30 was 50.31 percent, whereas the return on the AFGX was 56.18 percent. The unadjusted return on a portfolio consisting of equally large proportions of shares in the companies in the table above was 48.94 percent during this period. Consequently, the unadjusted

portfolio return was 1.37 percentage points lower than the return on the OMXS30 and 7.24 percentage points lower than the return on the AFGX. The return on the portfolio is compared to the return on the OMXS30 and the return on the AFGX in figure 5.2.

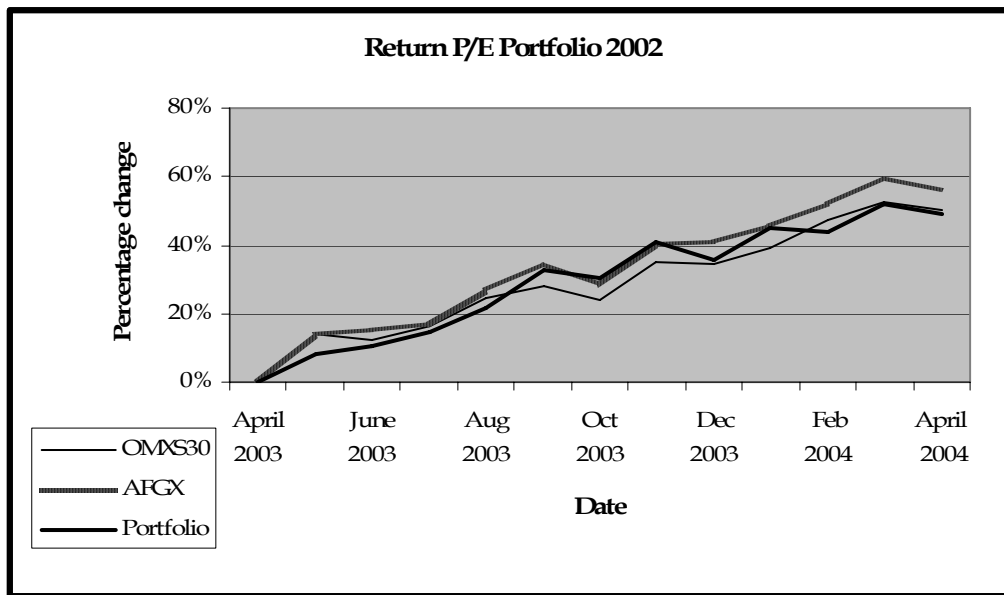


Figure 5.2 Unadjusted Return on the P/E Portfolio 2002

The risk adjusted return on this portfolio was 43.44 percent. Hence, it was 5.5 percentage points lower than the unadjusted portfolio return, 7.77 percentage points higher than the return on the OMXS30 and 7.14 percentage points higher than the AFGX.

P/E Portfolio 2003

The companies in the study with the lowest P/E ratios during 2003 are presented in table 5.3 on the following page.

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

Table 5.3 P/E Portfolio 2003

Company	Average P/E Ratio 2003	Share Price April 1, 2004	Share Price March 31, 2005	Unadjusted Return	Risk Adjusted Return
VOSTOK NAFTA SDB	3,2	112,5	130	15,56%	10,45%
BOLIDEN AB	3,8	33,4	32,5	-2,69%	-8,91%
SKANSKA B	7,8	63	85,5	35,71%	30,31%
NORDEA BANK	9,5	49,6	71,5	44,15%	39,87%
ATLAS COPCO B	9,8	78,5	96,5	22,93%	16,84%
SWEDBANK	9,8	140,5	167	18,86%	14,96%

A portfolio consisting of equal proportions of all these stocks would have an unadjusted return of 22.42 percent between April 1, 2004 and March 31, 2005. The return on the OMXS30 was 11.48 percent during the same period, whereas the return on the AFGX was 14.94 percent. Hence, the unadjusted return on the portfolio was 10.94 percentage points higher than the return on the OMXS30 and 7.45 percentage points higher than on the AFGX. Figure 5.3 shows the unadjusted return on the portfolio compared to the return on the OMXS30 and AFGX.

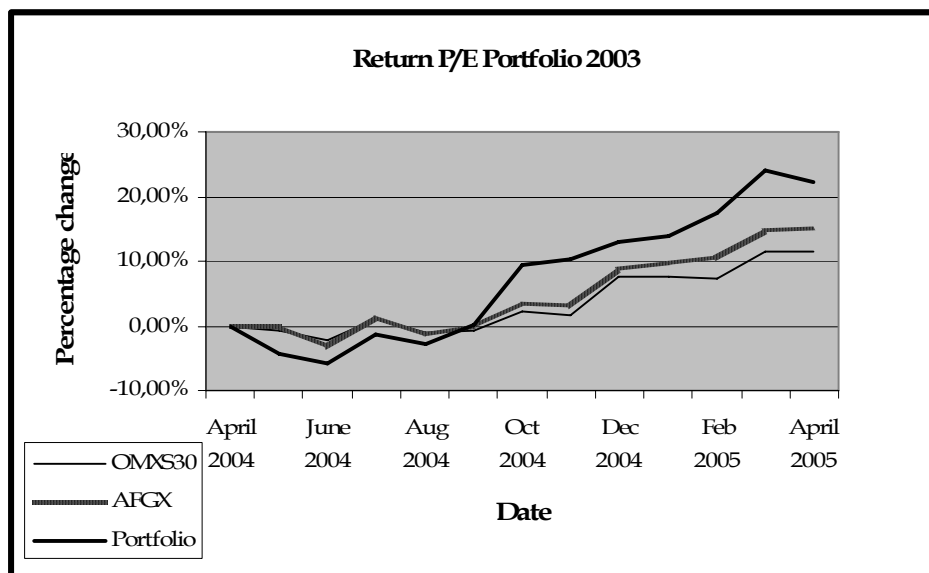


Figure 5.3 Unadjusted Return on the P/E Portfolio 2003

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

The risk adjusted return on this portfolio was 17.25 percent. Thus it was 5.17 percentage points lower than the unadjusted portfolio return, 5.17 percentage points higher than the return on the OMXS30 and 2.29 percentage points higher than the return on the AFGX.

P/E Portfolio 2004

The following were the companies in the study that had the lowest average P/E ratio during 2004:

Table 5.4 P/E Portfolio 2004

Company	Average P/E Ratio 2004	Share Price April 1, 2005	Share Price March 31, 2006	Unadjusted Return	Risk Adjusted Return
VOSTOK NAFTA SDB	2,6	131,5	458,5	248,67%	243,27%
INVESTOR B	8,1	96,8	141,5	46,18%	39,75%
BOLIDEN AB	8,2	33,7	119,5	254,60%	246,49%
SWEDBANK	9,3	169	219,5	29,88%	24,83%
NORDEA BANK	9,6	73	96,25	31,85%	26,41%
ATLAS COPCO B	10,7	97	203,5	109,79%	102,59%

A portfolio consisting of equal proportions of all these stocks would have an unadjusted return of 120.16 percent between April 1, 2005 and March 31, 2006. During the same period the return on the OMXS30 was 38.81 percent and the return on the AFGX was 43.48 percent. Thus, the unadjusted portfolio return was 81.35 percentage points higher than the return on the OMXS30 and 76.68 percentage points higher than the return on the AFGX. Figure 5.4 displays the unadjusted return on this portfolio compared to the return on the OMXS30 and the AFGX.

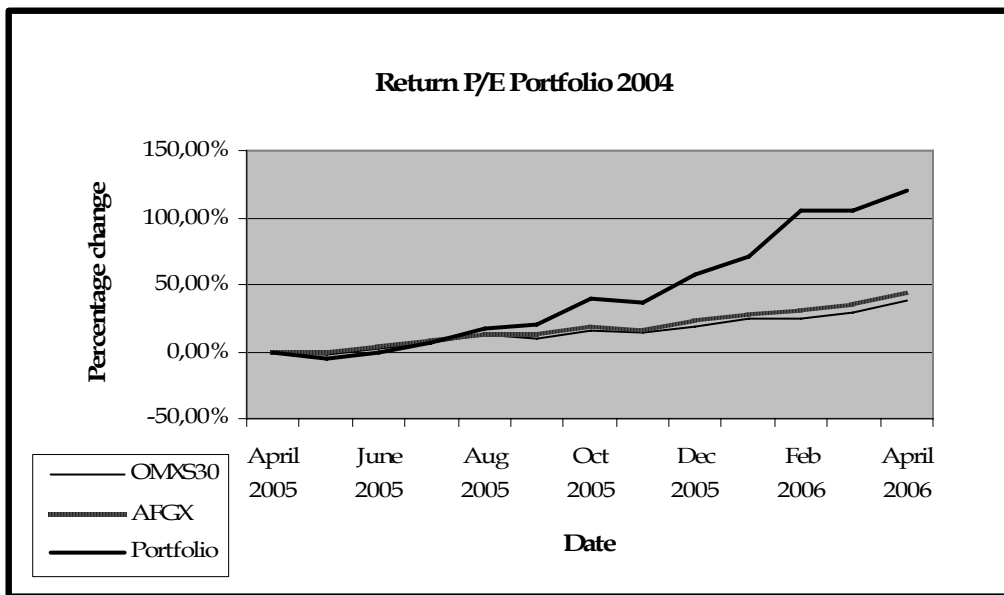


Figure 5.4 Unadjusted Return on the P/E Portfolio 2004

The risk adjusted return on this portfolio was 113.89 percent. Hence, it was 6.27 percentage points lower than the unadjusted portfolio return, 75.08 percentage points higher than the return on the OMS30 and 70.41 percentage points higher than the return on the AFGX.

P/E Portfolio 2005

The companies in the study with the lowest P/E ratios during 2005 are presented in table 5.5 on the following page.

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

Table 5.5 P/E Portfolio 2005

Company	Average P/E Ratio 2005	Share Price April 3, 2006	Share Price Nov 30, 2006	Unadjusted Return	Risk Adjusted Return
INVESTOR B	2	146,5	151,5	3,41%	-4,79%
VOSTOK NAFTA SDB	2	462	455,5	-1,41%	-8,13%
BOLIDEN AB	6,5	124	165	33,06%	24,41%
SWEDBANK	8,5	223,5	240	7,38%	1,70%
NORDEA BANK	9,4	98,5	96,6	-1,93%	-8,42%
VOLVO B	10,4	376	445	18,35%	11,36%

A portfolio consisting of equal proportions of the shares in the table would have an unadjusted return of 9.81 percent between April 3 and November 30, 2006. The OMXS30 return was 2.38 percent and the AFGX return was 3.75 percent during this period. Consequently, the portfolio return was 7.43 percentage points higher than the return on the OMXS30 and 6.93 percentage points higher than the return on the AFGX. Figure 5.5 displays the unadjusted return on this portfolio compared to the return on the OMXS30 and the AFGX.

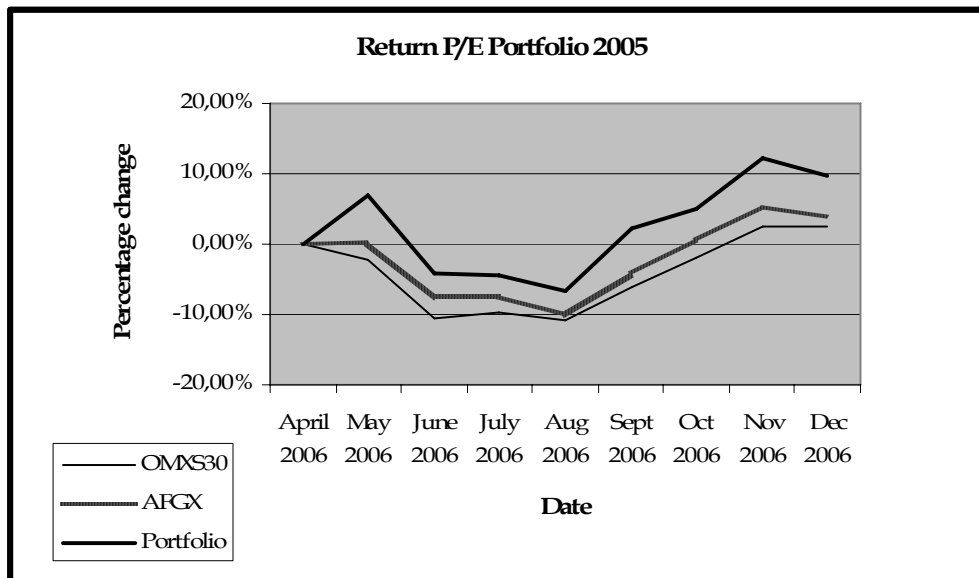


Figure 5.5 Unadjusted Return on the P/E Portfolio 2005

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

The risk adjusted return on this portfolio was 2.69 percent. Hence, it was 7.12 percentage points lower than the unadjusted return, 0.31 percentage points higher than the return on the OMXS30 and 1.06 percentage points lower than the return on the AFGX.

5.1.2 The EV/EBITDA Strategy

In this section the composition and the performance of the portfolios composed with the EV/EBITDA strategy are presented.

EV/EBITDA Portfolio 2001

In table 5.6 the companies in the study with the lowest enterprise multiples, EV/EBITDA, during 2001 are presented:

Table 5.6 EV/EBITDA Portfolio 2001

Company	EV/EBITDA 2001	Share Price April 2, 2002	Share Price March 31, 2003	Unadjusted Return	Risk Adjusted Return
SKF B	1,27	54,1	49,8	-7,95%	-15,31%
H&M B	1,89	210	178	-15,24%	-22,87%
ELECTROLUX B	2,44	52,1	38,1	-26,87%	-33,20%
BOLIDEN AB	3,2	36,4	12,3	-66,21%	-70,19%
SCA B	4,69	325,5	267,5	-17,82%	-23,92%
HOLMEN B	4,71	257,5	197,5	-23,30%	-30,71%

The unadjusted return on a portfolio consisting of equally large amounts of shares in these companies between April 2, 2002 and March 31, 2003, was -26.23 percent. The return on the OMXS30 during this period was -40.47 percent, and the return on AFGX was -39.84 percent. Thus, the unadjusted portfolio return was 14.24 percentage points higher than the return on the OMXS30, and 13.61 percentage

points higher than the return on the AFGX. In the figure below, the portfolio return is compared to the return on the OMXS30 and the AFGX.

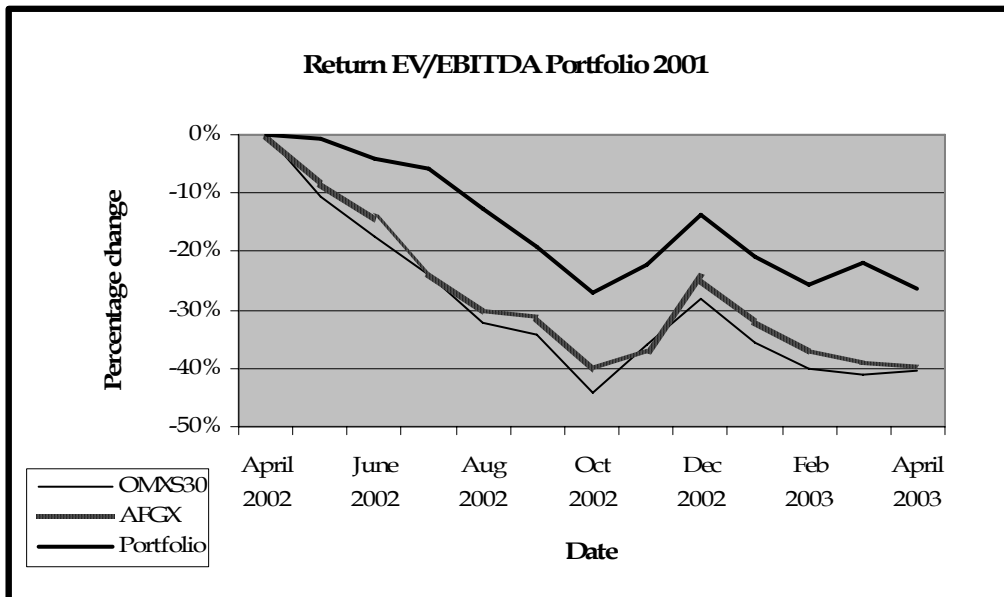


Figure 5.6 Unadjusted Return on the EV/EBITDA Portfolio 2001

The risk adjusted return on this portfolio was -32.70 percent. This means that it was 6.47 percentage points lower than the unadjusted portfolio return, 7.77 percentage points higher than the return on the OMXS30 and 7.14 percentage points higher than the return on the AFGX.

EV/EBITDA Portfolio 2002

The companies in the study with the lowest EV/EBITDA 2002 are presented in table 5.7 on the following page.

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

Table 5.7 EV/EBITDA Portfolio 2002

Company	EV/EBITDA 2002	Share Price April 1, 2003	Share Price March 31, 2004	Unadjusted Return	Risk Adjusted Return
SKF B	1,13	49,4	62,8	27,13%	21,30%
H&M B	1,42	171,5	203	18,37%	11,82%
ALFA LAVAL	2,27	71	99,5	40,14%	37,42%
ELECTROLUX B	2,98	37,9	43,6	15,04%	8,99%
TELE2 B	3,14	79,6	109,5	37,56%	27,69%
ATLAS COPCO B	4,75	16,4	84	412,20%	406,69%

Between April 1, 2003 and March 31, 2004, the unadjusted portfolio return was 91.74 percent. This can be compared to the 50.31 percent return on the OMXS30 and the 56.18 percent return on the AFGX. Thus, the unadjusted portfolio return was 41.43 percentage points higher than the return on the OMXS30 and 35.56 percentage points higher than the return on the AFGX. The returns are compared in figure 5.7.

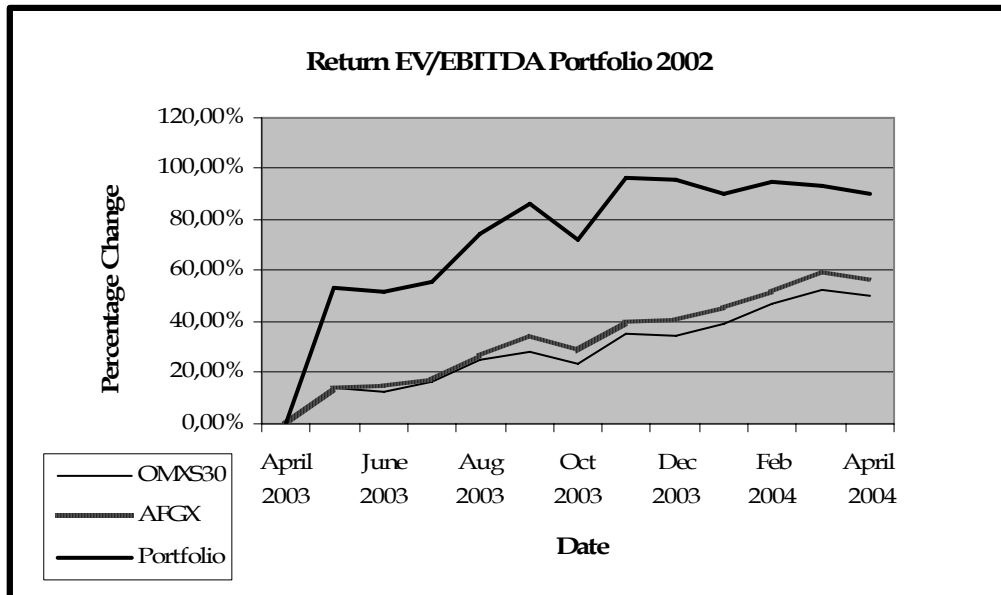


Figure 5.7 Unadjusted Return on the EV/EBITDA Portfolio 2002

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

The risk adjusted portfolio return on this portfolio was 85.65 percent. This is 6.09 percentage points lower than the unadjusted portfolio return, 35.34 percentage points higher than the return on the OMXS30 and 29.48 percentage points higher than the return on the AFGX.

EV/EBITDA Portfolio 2003

In the following table, the companies in the study with the lowest EV/EBITDA during 2003 are presented:

Table 5.8 EV/EBITDA Portfolio 2003

Company	EV/EBITDA 2003	Share Price April 1, 2004	Share Price March 31, 2005	Unadjusted Return	Risk Adjusted Return
SKF	1,15	63,5	76	19,69%	15,01%
H&M B	1,37	205	243	18,54%	13,26%
SKANSKA B	4,2	63	85,5	35,71%	30,31%
ELECTROLUX B	5,08	44,3	98,3	121,90%	116,58%
SCA B	5,76	308	266,5	-13,47%	-16,77%
TELIASONERA	5,98	32,9	41,2	25,23%	23,22%

A portfolio consisting of equal proportions of these stocks would have an unadjusted return of 34.60 percent between April 1, 2004 and March 31, 2005. The return on the OMXS30 was 11.48 percent and the return on the AFGX was 14.94 percent during the same period. Hence, the return on the portfolio was 23.12 percentage points higher than the return on the OMXS30 and 19.63 percentage points higher than the return on the AFGX. The unadjusted return on this portfolio is compared to the OMXS30 and the AFGX in figure 5.8.

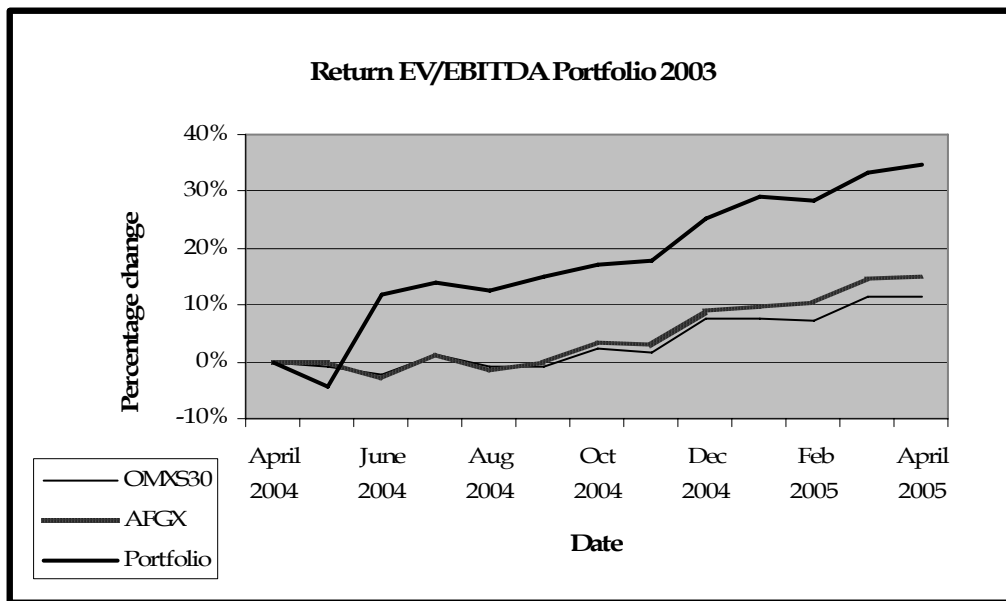


Figure 5.8 Unadjusted Return on the EV/EBITDA Portfolio 2003

The risk adjusted return on this portfolio was 30.27 percent. This means that it was 4.33 percentage points lower than the unadjusted portfolio return, 18.79 percentage points higher than the return on the OMXS30 and 15.30 percentage points higher than the return on the AFGX.

EV/EBITDA Portfolio 2004

In table 5.9 the companies in the study with the lowest EV/EBITDA during 2004 are presented.

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

Table 5.9 EV/EBITDA Portfolio 2004

Company	EV/EBITDA 2004	Share Price April 1, 2005	Share Price March 31, 2006	Unadjusted Return	Risk Adjusted Return
SKF	0,92	76,5	127	66,01%	60,66%
H&M B	1,66	246,5	284	15,21%	9,86%
ELECTROLUX B	4,43	98,8	133,8	35,43%	29,77%
VOLVO B	4,51	315,5	364,5	15,53%	9,40%
BOLIDEN AB	4,85	33,7	119,5	254,60%	246,49%
TELE2 B	4,86	74,8	92	22,99%	15,02%

A portfolio consisting of equal proportions invested in each of these shares would have an unadjusted return of 68.30 percent between April 1, 2005 and March 31, 2006. Since the return on the OMXS30 was 38.81 percent and the return on the AFGX was 43.48 percent, the unadjusted return on the portfolio was 29.49 percentage points higher than the return on the OMXS30 and 24.81 percentage points higher than the return on the AFGX. Figure 5.9 displays the unadjusted return on this portfolio compared to the return on the OMXS30 and the AFGX.

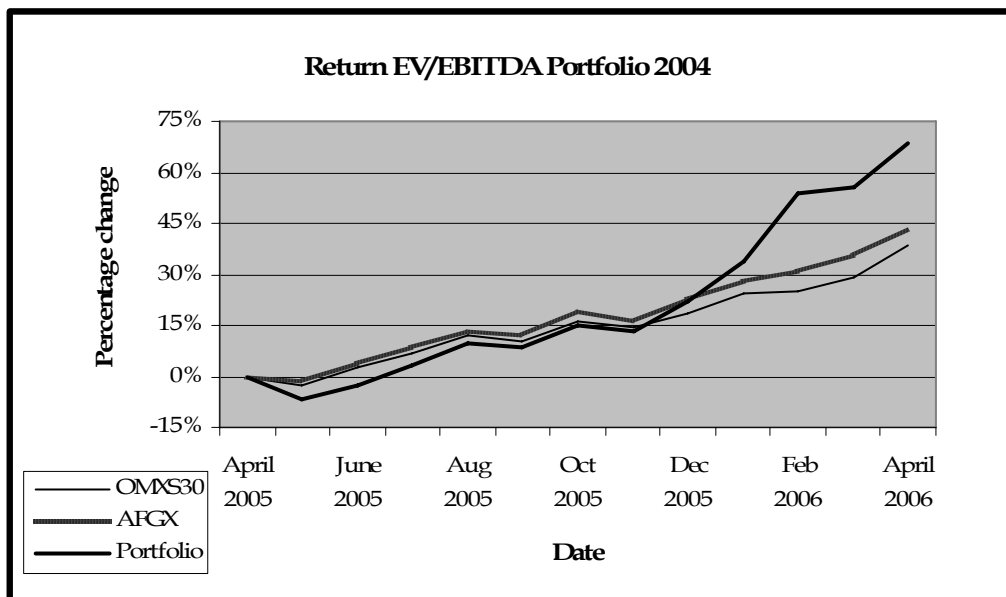


Figure 5.9 Unadjusted Return on the EV/EBITDA Portfolio 2004

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

The risk adjusted return on this portfolio was 61.87 percent. Thus it was 6.43 percentage points lower than the unadjusted return, 23.06 percentage points higher than the return on the OMXS30 and 18.38 percentage points higher than the return on the AFGX.

EV/EBITDA Portfolio 2005

In table 5.10 below, the companies in the study with the lowest EV/EBITDA during 2005 are presented:

Table 5.10 EV/EBITDA Portfolio 2005

Company	EV/EBITDA 2005	Share Price April 3, 2006	Share Price Nov 30, 2006	Unadjusted Return	Risk Adjusted Return
H&M B	1,05	288	319	10,76%	5,71%
BOLIDEN AB	5,46	124	165	33,06%	24,41%
VOLVO B	5,57	376	445	18,35%	11,36%
TELIASONERA	6,76	46,8	51,8	10,68%	4,01%
TELE2 B	6,79	92,5	88	-4,86%	-12,98%
SKANSKA B	7,23	127,5	122,5	-3,92%	-11,36%

A portfolio consisting of equal proportions invested in each of these stocks would have an unadjusted return of 10.68 percent between April 3 and November 30, 2006. During the same period the return on the OMXS30 was 2.38 percent and the return on the AFGX was 3.75 percent. Hence, the unadjusted return on the portfolio was 8.3 percentage points higher than the return on the OMXS30 and 6.93 percentage points higher than the return on the AFGX. Figure 5.10 displays the unadjusted return on this portfolio compared to the return on the OMXS30 and the AFGX.

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

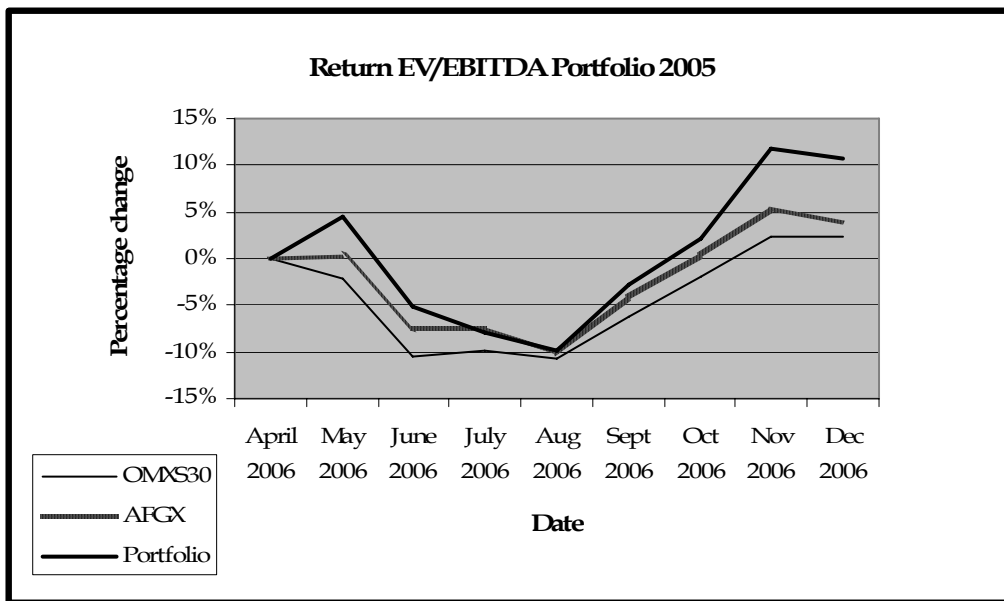


Figure 5.10 Unadjusted Return on the EV/EBITDA Portfolio 2005

The risk adjusted return on this portfolio was 3.53 percent. This means that it was 1.15 percentage points higher than the return on the OMS30 and 0.23 percentage points lower than the return on the AFGX.

5.2 Summary of the P/E and EV/EBITDA Portfolios

A summary of the unadjusted returns on the portfolios can be seen in table 5.11 on the following page.

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

Table 5.11 Summary Unadjusted Portfolio Return

	Unadjusted Return	Return OMXS30	Portfolio - OMXS30	Return AFGX	Portfolio - AFGX
P/E Portfolio 2001	-27,96%	-40,47%	12,51%	-39,84%	11,88%
P/E Portfolio 2002	48,94%	50,31%	-1,37%	56,18%	-7,24%
P/E Portfolio 2003	22,42%	11,48%	10,94%	14,97%	7,45%
P/E Portfolio 2004	120,16%	38,81%	81,35%	43,48%	76,68%
P/E Portfolio 2005	9,81%	2,38%	7,43%	3,75%	6,06%
EV/EBITDA Portfolio 2001	-26,23%	-40,47%	14,24%	-39,84%	13,61%
EV/EBITDA Portfolio 2002	91,74%	50,31%	41,43%	56,18%	35,56%
EV/EBITDA Portfolio 2003	34,60%	11,48%	23,12%	14,97%	19,63%
EV/EBITDA Portfolio 2004	68,30%	38,81%	29,49%	43,48%	24,81%
EV/EBITDA Portfolio 2005	10,68%	2,38%	8,30%	3,75%	6,93%

In table 5.12 below, a summary of the risk adjusted returns on the portfolios is presented:

Table 5.12 Summary Risk Adjusted Portfolio Return

	Risk Adjusted Return	Return OMXS30	Portfolio - OMXS30	Return AFGX	Portfolio - AFGX
P/E Portfolio 2001	-35,09%	-40,47%	5,38%	-39,84%	4,75%
P/E Portfolio 2002	43,44%	50,31%	-6,87%	56,18%	-12,74%
P/E Portfolio 2003	17,25%	11,48%	5,77%	14,97%	2,29%
P/E Portfolio 2004	113,89%	38,81%	75,08%	43,48%	70,41%
P/E Portfolio 2005	2,69%	2,38%	0,31%	3,75%	-1,06%
EV/EBITDA Portfolio 2001	-32,70%	-40,47%	7,77%	-39,84%	7,14%
EV/EBITDA Portfolio 2002	85,65%	50,31%	35,34%	56,18%	29,48%
EV/EBITDA Portfolio 2003	30,27%	11,48%	18,79%	14,97%	15,30%
EV/EBITDA Portfolio 2004	61,87%	38,81%	23,06%	43,48%	18,38%
EV/EBITDA Portfolio 2005	3,53%	2,38%	1,15%	3,75%	-0,23%

6. ANALYSIS

In this chapter, the empirical findings are analyzed. We start by analyzing the P/E portfolios individually and then the entire strategy is analyzed. The EV/EBITDA strategy is analyzed in the same way. After that, the strategies are compared in order to see if any of them has been more successful than the other. Additional costs and taxes are discussed thereafter. The chapter ends with a discussion regarding what our results indicate about whether the market is efficient or not.

The purpose of this study was to investigate whether it is possible to outperform the overall stock market by investing in stocks that are undervalued. Two different strategies were used; investing in stocks that were undervalued according to the price-earnings ratio, and investing in stocks that were undervalued according to the enterprise multiple.

6.1 Analysis of the P/E Strategy

The P/E strategy succeeded in outperforming the market four out of five years. The only portfolio that did not perform better than the market was the 2002 portfolio, as can be seen in table 6.1 below:

Table 6.1 Unadjusted Portfolio Return on the P/E Portfolios

P/E Portfolios	Unadjusted Return	Return OMXS30	Portfolio - OMXS30	Return AFGX	Portfolio - AFGX
P/E Portfolio 2001	-27,96%	-40,47%	12,51%	-39,84%	11,88%
P/E Portfolio 2002	48,94%	50,31%	-1,37%	56,18%	-7,24%
P/E Portfolio 2003	22,42%	11,48%	10,94%	14,97%	7,45%
P/E Portfolio 2004	120,16%	38,81%	81,35%	43,48%	76,68%
P/E Portfolio 2005	9,81%	2,50%	7,31%	3,75%	6,06%

On average, the unadjusted P/E portfolio return was 22.15 percentage points higher than the return on the OMXS30. Though, this high result is largely due to the high return on the P/E portfolio 2004. Only in 2002, the P/E portfolio failed in performing better than the OMXS30. The same is true for the P/E portfolio versus the AFGX. Only in 2002 the portfolio failed in outperforming this index. On average, the unadjusted P/E portfolio outperformed the AFGX with 18.97 percentage points. The aggregate return on the portfolios composed with the P/E strategy was 217 percent, compared to the aggregate return on the AFGX that was 99.8 percent and the aggregate return on the OMXS30 that was 35.88 percent

6.1.1 Analysis of the Individual P/E Portfolios

In order to evaluate the results of the P/E strategy, we will study each individual P/E portfolio and examine the development of the price of each stock. We believe this to be important in order to decide whether the results can be interpreted as a proof that the P/E strategy is in fact is a good strategy, or if the results are just due to luck.

P/E Portfolio 2001

The development of the prices of the stocks in this portfolio can be seen in figure 6.1 on the following page.

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

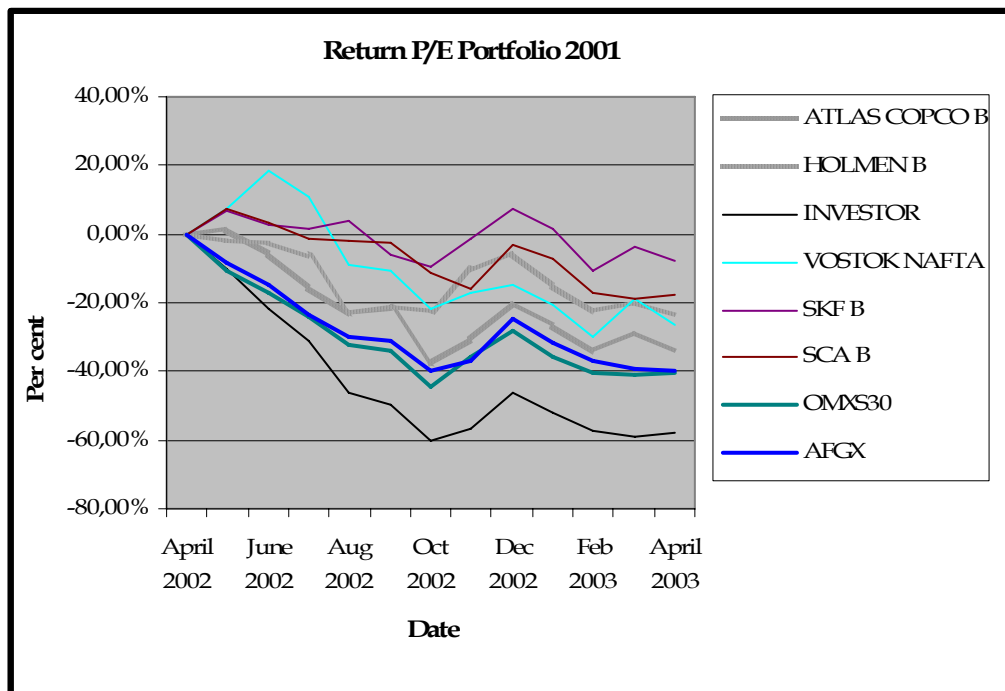


Figure 6.1 Unadjusted Return on Each Stock in the P/E Portfolio 2001

In 2002 the stock market was still influenced by the crash of 2000. Although the return on the portfolio was -27.96 percent, the portfolio still performed better than both the indexes, which is what we aim to examine in this study. During this year, only one of the shares, Investor, had a lower return than the both indexes OMXS30 and AFGX. Moreover, Investor was also the stock with the highest P/E ratio, 11.1, of the six stocks in the portfolio this year. Thus, we regard the P/E strategy as successful this year.

P/E Portfolio 2002

In table 6.2 on the following page, the development of the prices of the stocks in the P/E portfolio 2002 is presented:

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

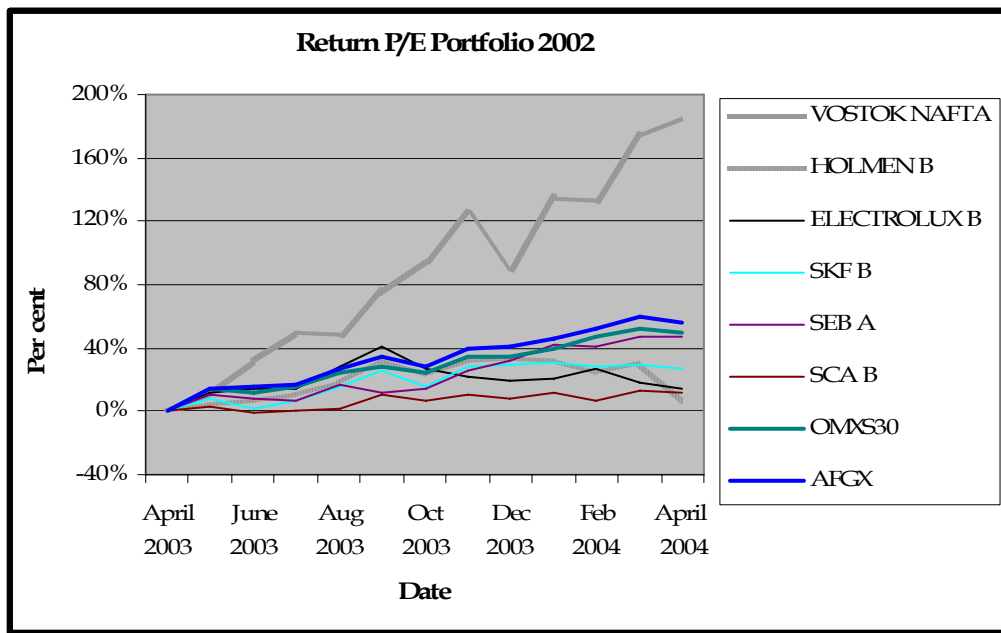


Figure 6.2 Unadjusted Return on Each Stock in the P/E Portfolio 2002

This year, the portfolio did not succeed in outperforming the two indexes. The portfolio had an unadjusted return that was 1.37 percentage points lower than the return on the OMXS30 and 7.24 percentage points lower than the return on the AFGX. Further, we can conclude that only one of the stocks, Vostok Nafta, succeeded in performing better than the indexes, and this stock had an unadjusted return on 185.19 percent, that is, a very high return. As a conclusion, this year the P/E strategy failed in outperforming the market, and without Vostok Nafta, the portfolio would have performed even worse than it actually did. However, Vostok Nafta was the stock with the lowest P/E ratio. It had a P/E ratio of only 3, whereas all the other stocks in the portfolio had P/E ratios of around 10.

P/E Portfolio 2003

The development of the prices of each of the stocks in the P/E portfolio 2003 is presented in the figure below:

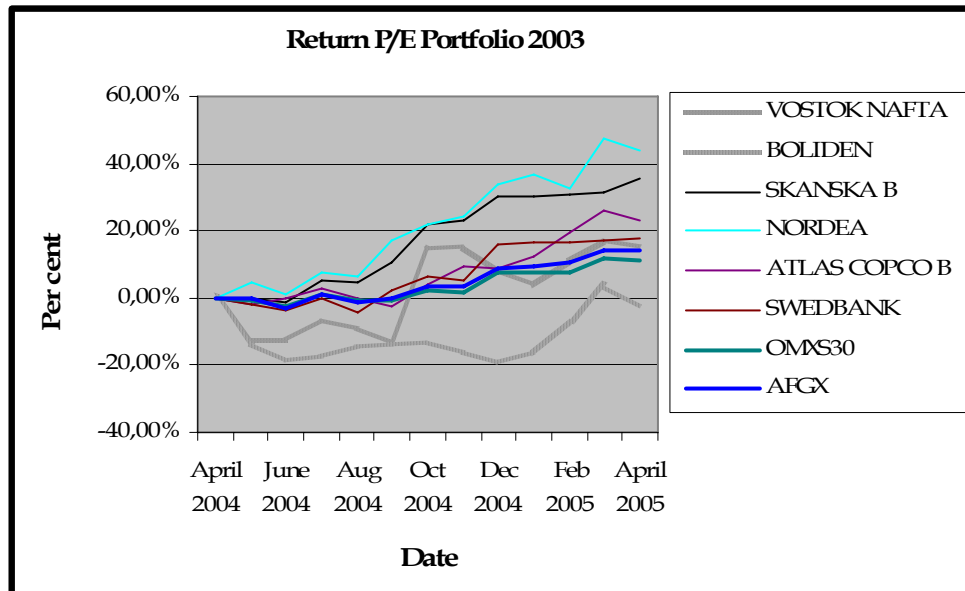


Figure 6.3 Unadjusted Return on Each Stock in the P/E Portfolio 2003

During this year, 2004, only one of the six stocks in the portfolio, Boliden, had a lower unadjusted return than the two indexes. All the other stocks outperformed the indexes, and the portfolio as a whole had a return of 22.42 percent, whereas the return on the OMXS30 was 11.48 percent and the AFGX had a return of 14.94 percent. Year 2004 was a good year at the stock market but although the market as a whole went very well this year, the majority of the stocks in the P/E portfolio performed even better. We believe that the P/E strategy was successful this year in picking out stocks that outperformed the overall market. Although, when drawing this conclusion we are aware of the fact that Boliden was the stock with the second lowest P/E ratio in the 2003 portfolio could somewhat weaken this P/E strategy.

P/E Portfolio 2004

In the figure below the development of the prices on each of the stocks in the P/E portfolio 2004 is presented:

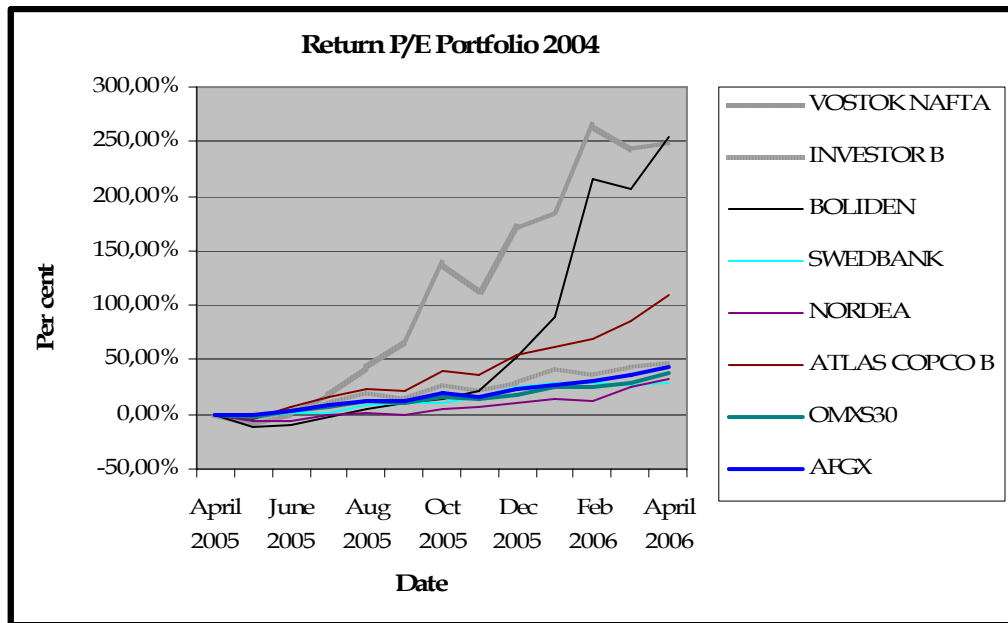


Figure 6.4 Unadjusted Return on Each Stock in the P/E Portfolio 2004

This year, the return on the OMXS30 was 38.81 percent and the return on the AFGX was 43.48 percent. The unadjusted portfolio return was 120.16 percent. Hence, the portfolio outperformed the market significantly. As can be seen in the figure above, two of the stocks, Vostok Nafta and Boliden had particularly high returns of around 250 percent and therefore added much to the high return of the portfolio as a whole this year. Further, Atlas Copco also had a high return of over 100 percent. Two of the stocks, Swedbank and Nordea, did not succeed in outperforming the two indexes. Although two stocks performed worse than the market, we believe that the P/E strategy, in total, was successful in outperforming the indexes this year due to its significantly higher return.

P/E Portfolio 2005

The development of each of the stocks in the P/E portfolio 2005 is presented in figure 6.5 below:

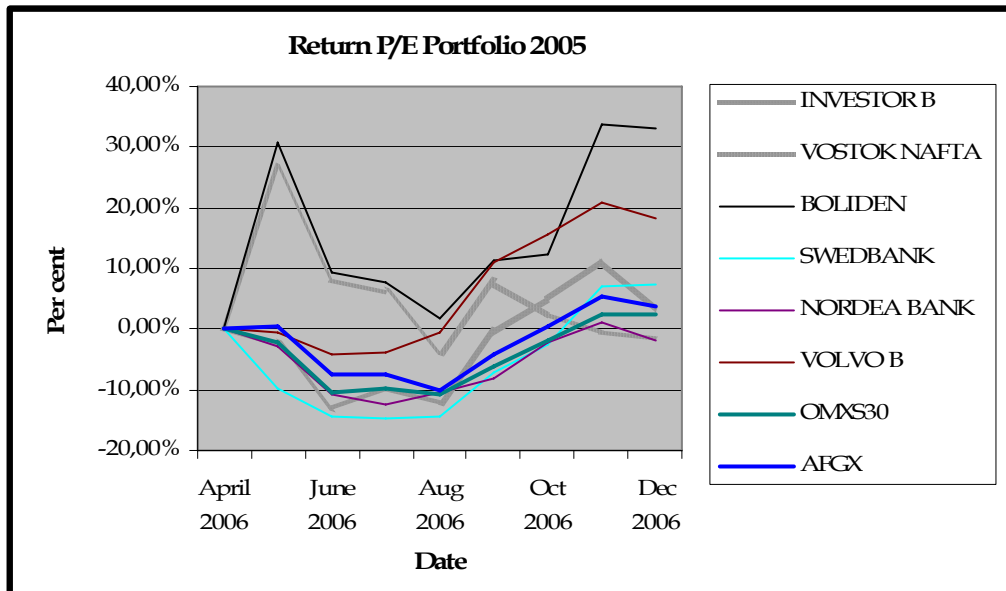


Figure 6.5 Unadjusted Return on Each Stock in the P/E Portfolio 2005

During this period, the return on the OMXS30 was 2.38 percent, and the return on the AFGX was 3.75 percent. The unadjusted return on the portfolio was 9.81 percent. Two stocks did not succeed in outperforming the OMXS30, and three stocks did not succeed in outperforming the AFGX. However, two stocks outperformed the two indexes considerably; Investor and Volvo B. Investor had a P/E ratio of 2, the lowest ratio of all the stocks in the portfolio, something that can be said to strengthen the strategy. Volvo on the other hand, had the highest P/E ratio (10.4) of the stocks in the portfolio. In total, the portfolio outperformed the index significantly and therefore we believe that the purpose of the strategy was fulfilled this year as well.

6.1.2 Risk Adjusted Returns on the P/E Portfolios

After risk adjusting the returns, the portfolios composed with the P/E strategy had higher returns than both the indexes in three out of the five years, year 2001, 2003 and 2004. In year 2002 the P/E portfolio performed worse than both the OMXS30 and the AFGX, and in 2005 the portfolio solely outperformed the OMXS0 and only by 0.19 per cent. The risk adjusted returns on the portfolios compared to the returns on the two indexes can be seen in figure 6.6 below;

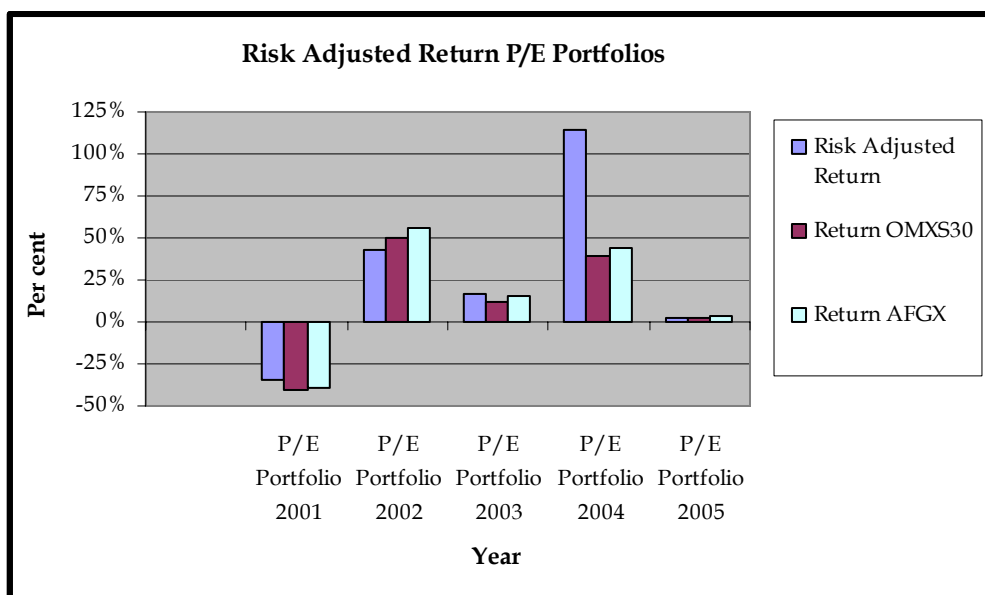


Figure 6.6 Risk Adjusted Return on the P/E Portfolios 2001-2005

6.1.3 Summary of the P/E strategy

Four out of five years, the unadjusted returns on the P/E portfolios were higher than the returns on the two indexes, OMXS30 and AFGX. On average, the unadjusted returns on the portfolios were 22.17 percentage points higher than the return on the OMXS30 and 18.97 percentage points higher than the return on the broader index AFGX.

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

After adjusting for risk, the returns on the P/E portfolios were higher than the OMXS30 four out of five years and higher than the AFGX three out of five years. On average the risk adjusted returns on the portfolios were 15.93 percentage points higher than the return on the OMXS30 and 12.73 percentage points higher than the return on the AFGX.

The aggregate unadjusted return on the P/E portfolios was 217 percent, whereas the aggregate return on the OMXS30 during the studied period was 35.88 percent and the aggregate return on the AFGX was 99.8 percent.

To sum this up, we believe that the P/E strategy as a whole was successful in outperforming the market, which here is represented by the AFGX.

6.2 Analysis of the EV/EBITDA Strategy

Our study showed that by investing in stocks that were undervalued according to the enterprise multiple one would have outperformed the two indexes all five years.

Table 6.2 Unadjusted Portfolio Return on the EV/EBITDA Portfolios

EV/EBITDA Portfolios	Actual Return	Return OMXS30	Portfolio - OMXS30	Return AFGX	Portfolio - AFGX
EV/EBITDA Portfolio 2001	-26,23%	-40,47%	14,24%	-39,84%	13,61%
EV/EBITDA Portfolio 2002	91,74%	50,31%	41,43%	56,18%	35,56%
EV/EBITDA Portfolio 2003	34,60%	11,48%	23,12%	14,97%	19,63%
EV/EBITDA Portfolio 2004	68,30%	38,81%	29,49%	43,48%	24,81%
EV/EBITDA Portfolio 2005	10,68%	2,50%	8,18%	3,75%	6,93%

On average, the unadjusted EV/EBITDA portfolio return was 23.31 percentage points higher than the return on the OMXS30, and 20.11 percentage points higher than the return on the AFGX. The aggregate return on the P/E strategy was 252.2 percent, compared to the aggregate return on the AFGX that was 99.8 percent and aggregate return on the OMXS30 that was 35.88 percent during the studied period.

6.2.1 Analysis of the Individual EV/EBITDA Portfolios

In order to evaluate the result of the EV/EBITDA strategy, we will study each individual EV/EBITDA portfolio and examine the development of the price of each stock. We regard this as important in order to be able to decide if the results can be interpreted as proof that the EV/EBITDA strategy actually is a good strategy, or if the results are just due to luck.

EV/EBITDA Portfolio 2001

In figure 6.7, the return on each stock in the EV/EBITDA portfolio 2001 is displayed.

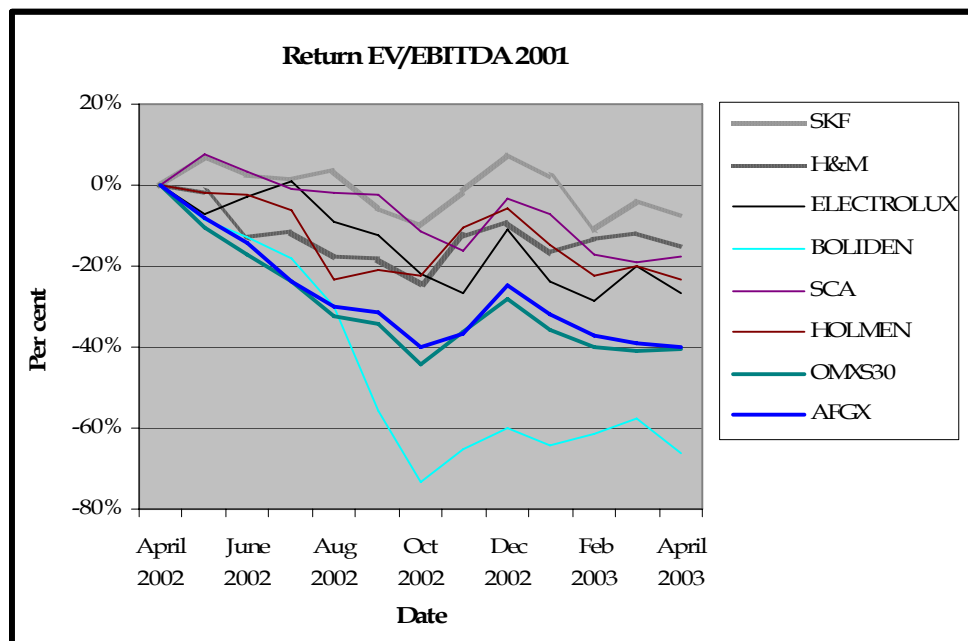


Figure 6.7 Unadjusted Return on Each Stock in the EV/EBITDA Portfolio 2001

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

This year, the return on the OMXS30 was -40.47 percent, and the return on the AFGX was -39.84 percent. The portfolio return was -26.23. As mentioned earlier, in 2002 the stock market was still affected by the stock market crash of 2000.

Only one of the stocks in the portfolio, Boliden, performed worse than the two indexes. Nevertheless, this stock had a very low return, -66.21 percent, and therefore, it affected the aggregate portfolio return significantly. Boliden had an EV/EBITDA multiple of 3.2, the third highest multiple in the portfolio (Holmen had the highest multiple of 4.71, followed by SCA with 4.69).

EV/EBITDA Portfolio 2002

In figure 6.8 below, the unadjusted return on each of the stocks in the EV/EBITDA portfolio 2002 is presented:

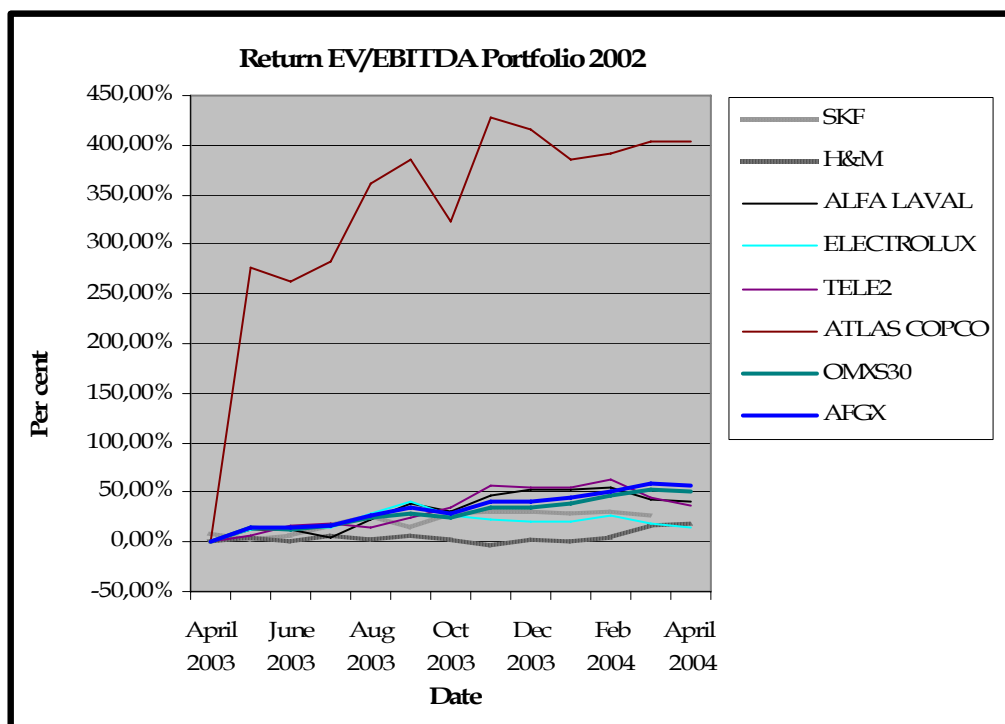


Figure 6.8 Unadjusted Return on Each Stock in the EV/EBITDA Portfolio 2002

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

This year, the return on the OMXS30 was 50.31 percent and the return on the AFGX was 56.18 percent. The unadjusted return on the portfolio was 91.74 percent. In year 2003, the stock market started to recover from the crisis of 2000. The EV/EBITDA strategy was successful in outperforming the indexes only because of one stock, namely Atlas Copco, which had a return of over 400 percent. All the other five stocks in the portfolio had lower returns than both the indexes. Moreover, Atlas Copco was the stock in the portfolio with the highest EV/EBITDA, 4.75. This means that, if only the five stocks with the lowest multiple had been included in the portfolio, it would not have outperformed the market. This can be said to weaken the strategy this year, even though it still managed to outperform the market.

EV/EBITDA Portfolio 2003

The unadjusted return on each of the stocks in the EV/EBITDA portfolio 2003 is presented in the figure below:

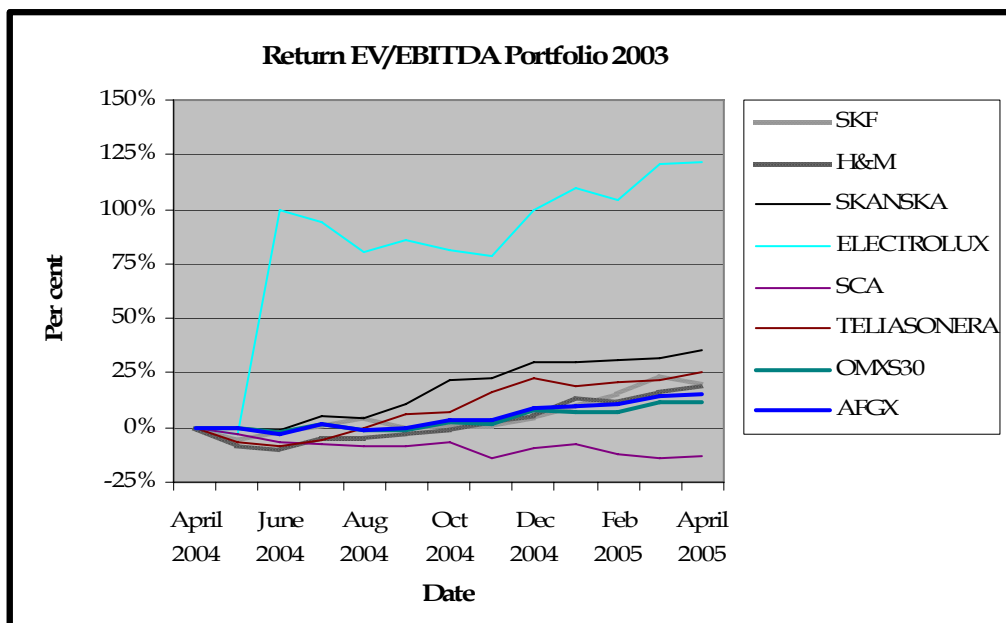


Figure 6.9 Unadjusted Return on Each Stock in the EV/EBITDA Portfolio 2003

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

The return on the OMXS30 was 11.48 percent and the return on the AFGX was 14.94 percent. The unadjusted return on the portfolio was 34.6 percent. One of the stocks, Electrolux, had an unadjusted return as high as 121.9 percent and only one of the stocks, SCA, had a lower return than the two indexes. SCA also had the second highest EV/EBITDA multiple of 5.76. The EV/EBITDA strategy succeeded in generating higher return than both the indexes and therefore we regard the EV/EBITDA strategy as successful this year.

EV/EBITDA Portfolio 2004

In the figure below, the unadjusted return on each of the stocks in the EV/EBITDA portfolio 2004 is presented:

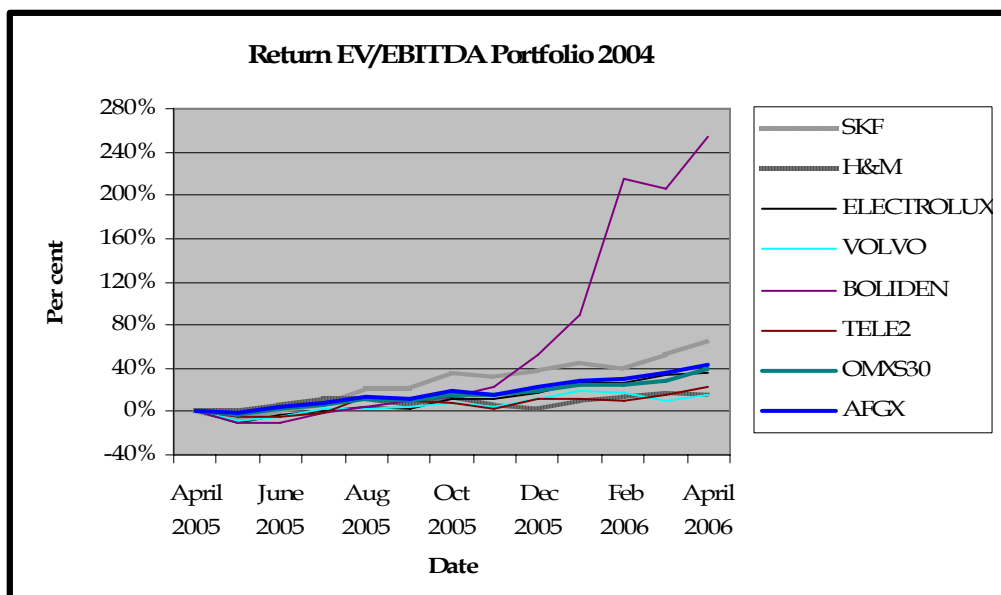


Figure 6.10 Unadjusted Return on Each Stock in the EV/EBITDA Portfolio 2004

This year, the return on the OMXS30 was 38.81 percent and the return on the AFGX was 43.48 percent. The unadjusted portfolio return was 68.3 percent. As many as four stocks had lower returns than the two indexes, only Boliden and SKF

outperformed the indexes. Boliden had the most outstanding performance, with a return of more than 250 percent. SKF had the lowest multiple in the portfolio, 0.92, but Boliden on the other hand had the second highest multiple of 4.85. This year, the EV/EBITDA portfolio did succeed in outperforming the indexes, however, the strategy was not as successful in picking stocks that performed better than the market, as it was during most other years in the study.

EV/EBITDA Portfolio 2005

In the figure below, the unadjusted return on each of the stocks in the EV/EBITDA portfolio 2005 is presented:

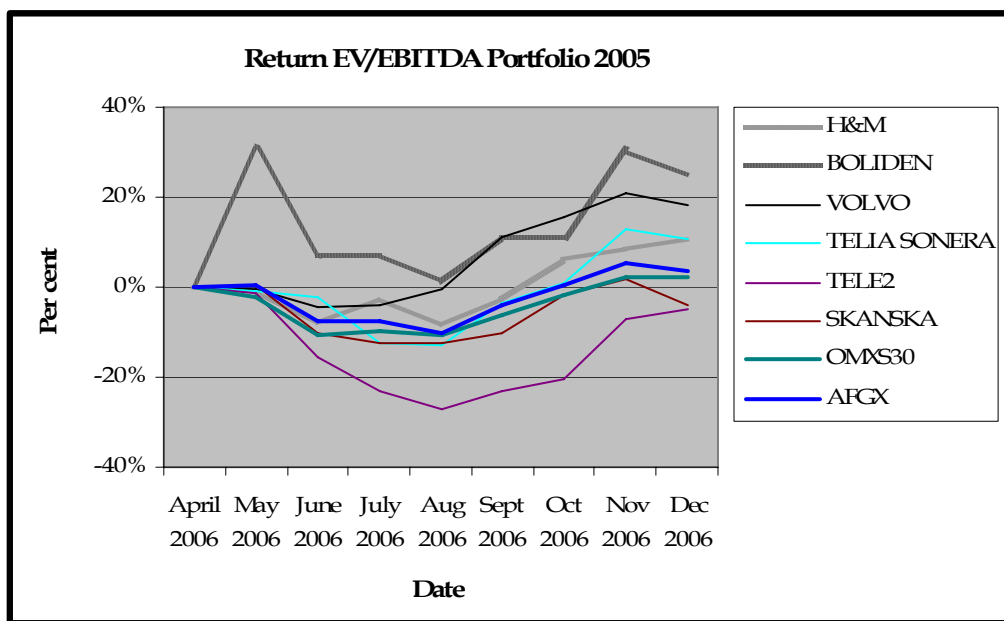


Figure 6.11 Unadjusted Return on Each Stock in the EV/EBITDA Portfolio 2005

This period, the return on the OMXS30 was 2.38 percent, and the return on the AFGX was 3.75 percent. The unadjusted return on the portfolio was 10.68 percent. Two stocks had lower returns than the indexes, Tele2 and Skanska. These two stocks also had the two highest multiples in the portfolio, 6.79 and 7.23. Boliden,

that had the highest return of all the stocks, also had the second lowest multiple, 5.46. All the other stocks had significantly higher returns than the indexes. As a conclusion, we regard the EV/EBITDA strategy as successful this year.

6.2.2 Risk Adjusted Returns on the EV/EBITDA Portfolios

After risk adjusting the returns, the portfolios composed with the EV/EBITDA strategy had higher returns than the OMXS30 during all five years, and higher returns than the AFGX during four out of five years. The risk adjusted returns on the portfolios in comparison to the returns on the two indexes can be seen in the figure below:

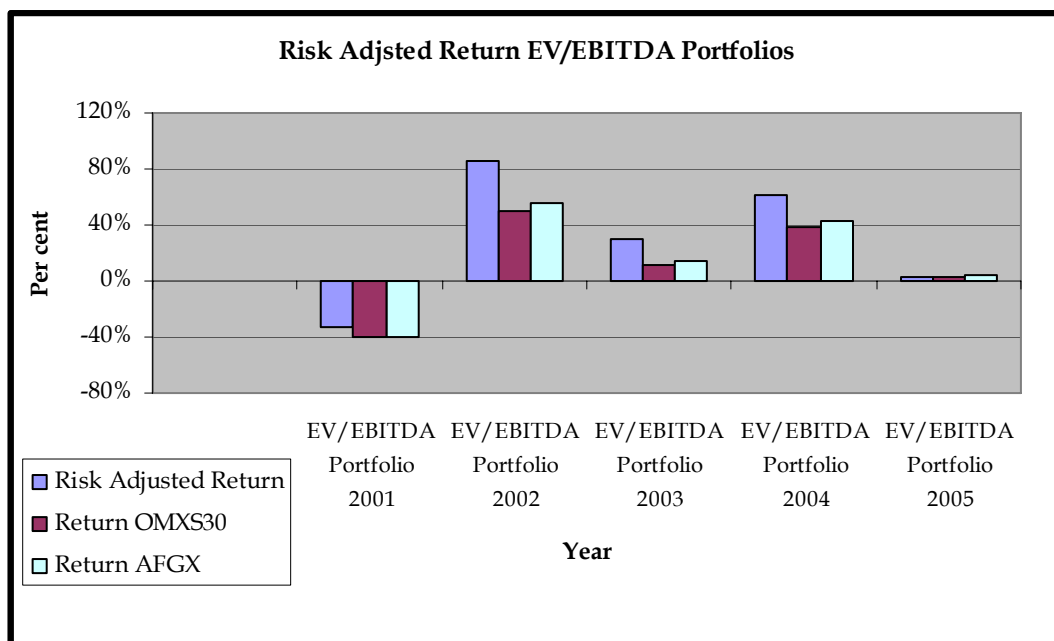


Figure 6.12 Risk Adjusted Return on the EV/EBITDA Portfolios 2001-2005

6.2.3 Summary of the EV/EBITDA Strategy

The unadjusted returns on the EV/EBITDA portfolios were higher than the return on the two indexes OMXS30 and AFGX during all five years. On average, the unadjusted returns on the portfolios were 23.31 percentage points higher than the return on the OMXS30 and 20.11 percentage points higher than the return on the broader index AFGX.

After adjusting for risk, the returns on the EV/EBITDA portfolios were higher than the OMXS30 all five years and higher than the AFGX four out of five years. The only portfolio that had a lower risk adjusted return than the AFGX was the EV/EBITDA portfolio 2005, and that portfolio return was only 0.23 percentage points lower than the return on the AFGX. On average the risk adjusted returns on the portfolios were 17.22 percentage points higher than the return on the OMXS30 and 14.02 percentage points higher than the return on the AFGX.

To sum this up, the EV/EBITDA strategy was very successful in outperforming the market, which here is represented by the AFGX, during most years and on average it was very successful.

6.3 Comparison of the P/E and EV/EBITDA Strategies

In previous sections we have analyzed the yearly performance of each stock in the different portfolios to examine to what extent single stocks have affected the results. In order to decide whether the strategies have been successful in produce higher returns than the overall market or not, the strategies should also be examined at an aggregate level.

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

In table 6.3 below, the aggregate unadjusted return of the portfolios composed with the P/E and the EV/EBITDA strategies, the OMXS30 and the AFGX are presented.

Table 6.3 Comparison of the Growth of the P/E and EV/EBITDA Portfolios
(Unadjusted return)

Period	P/E	EV/EBITDA	OMXS30	AFGX
2001	-27,9%	-26,2%	-40,47%	-39,84%
2002	7,3%	40,5%	-13,84%	11,34%
2003	31,2%	89,1%	-3,65%	30,95%
2004	188,7%	218,2%	33,90%	89,59%
2005	217,0%	252,2%	35,88%	99,80%

As shown in table 6.3, the most profitable strategy for an investor would have been to invest according to the EV/EBITDA strategy during this period of time. The aggregate growth of the EV/EBITDA portfolios, reweighed once every year, was more than 250 percent, which is more than 30 percentage points above the growth of the P/E portfolio. By investing according to the OMXS30, the investment would have grown approximately 36 percent during the period, and an investment in the AFGX would have grown by almost 100 percent. As shown in table 6.3, both the P/E and the EV/EBITDA strategy produced significantly higher aggregate unadjusted returns than the two indexes.

The aggregate risk adjusted portfolio returns are presented in table 6.4 on the following page.

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

Table 6.4 Comparison of the Growth of the P/E and EV/EBITDA Portfolios

Period	P/E	EV/EBITDA	OMXS30	AFGX
2001	-35,1%	-32,7%	-40,47%	-39,84%
2002	-6,9%	24,9%	-13,84%	11,34%
2003	9,2%	62,8%	-3,65%	30,95%
2004	133,5%	163,5%	33,90%	89,59%
2005	139,8%	172,8%	35,88%	99,80%

When looking at the risk adjusted aggregate returns in table 6.4, the most profitable strategy for an investor would still have been to invest according to the EV/EBITDA strategy during this period of time. The growth of the EV/EBITDA portfolios, reweighed once every year, was more than 170 percent, which is more than 30 percentage points above the growth of the P/E portfolio. Both investment strategies would have generated higher returns than the OMXS30 and the AFGX even after adjusting for risk, which can be seen in table 6.4 above.

In figure 6.13 below, one can follow the development of the unadjusted returns on the investments and the development of the two indexes during the period.

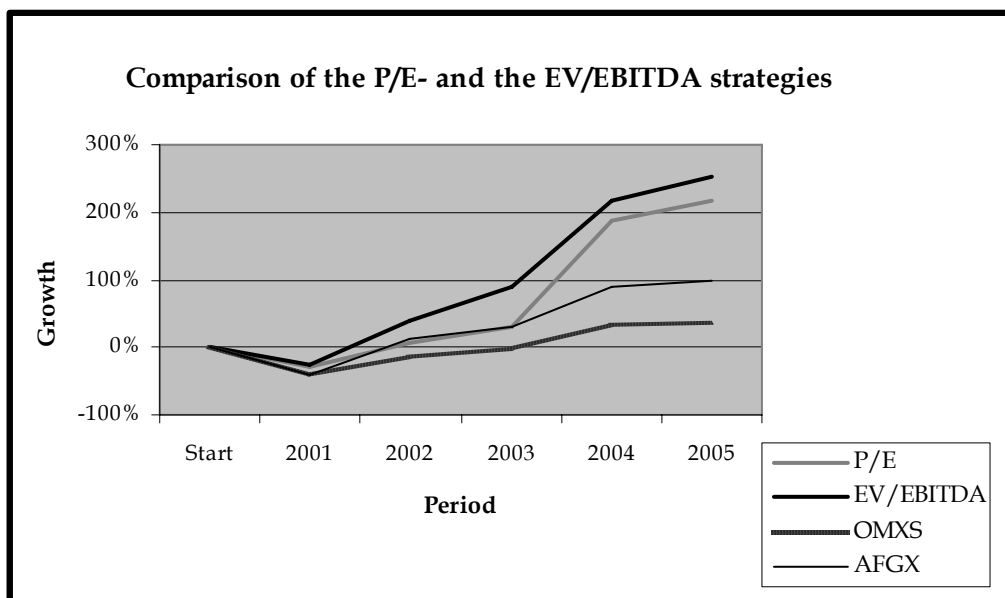


Figure 6.13 Comparison of the P/E and the EV/EBITDA Strategies (unadjusted return)

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

Both the P/E and the EV/EBITDA strategy proved to be successful in outperforming the market. The EV/EBITDA strategy resulted in the highest return during this period of time and had a growth of 252.2 percent, although the P/E strategy also performed very well and reached a growth level of 217 percent.

In figure 6.14 below, the development of the risk adjusted returns on the investments according to the two strategies and the development of the two indexes during the period are presented.

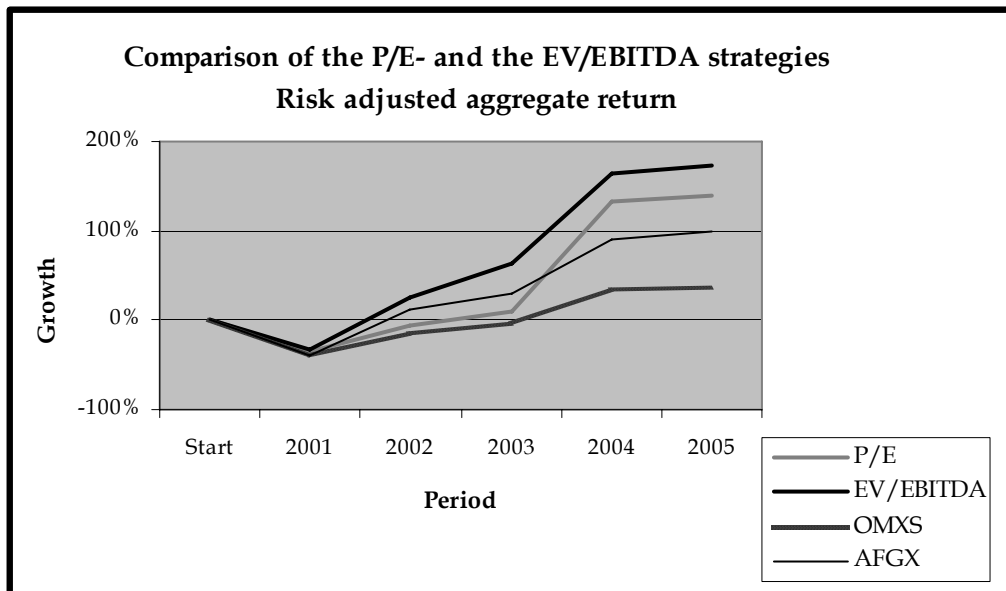


Figure 6.14 Comparison of the P/E and the EV/EBITDA Strategies (risk adjusted return)

Even after risk adjusting, both the P/E and the EV/EBITDA strategy proved to be successful strategies in outperforming the market and they both generated a higher return than the OMXS30 and the AFGX. The EV/EBITDA strategy was the most successful strategy during this period of time and had a growth of 172.8 percent, although the P/E strategy also performed very well and reached a growth level of 139.8 percent.

6.4 Additional Costs

In the delimitations section of this thesis, we stated that we would not take into account any transaction costs or taxes. Though, when analyzing the results, these costs have to be considered in order to decide whether or not the strategies were effective in outperforming the market, which in this study is represented by the AFGX index. We will not compute the exact size of the transaction costs, but when looking at the final results we will try to estimate their impact on the results. In this section we will also briefly discuss what effects information and processing costs could have on our results.

6.4.1 Transaction costs and taxes

In this study, the transactions made have been very few because we have only reweighed our two portfolios once a year, and only the stocks that were not part of the six lowest multiples during the following year were traded. Moreover, since the returns on the P/E and EV/EBITDA portfolios were that much higher than the return on the AFGX, we conclude that if transaction costs and taxes were taken into account, the strategy would still be successful in outperforming the AFGX.

Although neither transaction costs nor taxes have been taken into account in this study, it is important to be aware of their existence and the effects they can have on the results, especially when calculating aggregate returns over long periods of time.

6.4.2 Information and processing costs

The two investment strategies used in this thesis are relatively passive since the portfolios were composed once a year and then the investments were held during one year without interference. Further, the information that we used in this thesis is

rather easily accessible and it can be collected from public sources. Therefore, the information and processing costs were relatively low and have not affected the result of the study.

6.5 Is the market efficient?

For the Efficient Market Hypothesis, EMH, to be valid, it should be impossible for investors to consistently outperform the overall stock market, but in this study we succeeded in doing so. However, one cannot entirely dismiss the EMH only because we have managed to outperform the market during the studied period of time by investing in low P/E and EV/EBITDA portfolios. First of all, the EMH is not as rigid as implied above. For example, if the results of this study are due to luck then the EMH could still be valid. (Damodaran 2002) Further, if this study would be performed during a different or a longer period of time, the results might be different.

According to Fama (1970) there are three different levels of market efficiency: weak, semi-strong, and strong efficiency. Just because the market is not strongly efficient it may still be efficient in some of the weaker forms.

In this study we made our investments based upon historical data, so called technical analysis. If the market is efficient in its weak form, it should be impossible for investors to predict and outperform the market by using historical data. Therefore, our results indicate that the market is not efficient in its weak form. If the market is not efficient in its weak form, it can neither be semi-efficient nor strongly efficient. Yet again, the possibility that the results obtained are due to luck still exists.

According to Haugen (2001) one of the main characteristics of an efficient market is that trading rules or specific investment strategies do not produce superior returns but this study indicates the opposite. The investment strategies used in this thesis did produce superior return, and this should not have been possible if the market was efficient.

Fama (1991) states that in an efficient market, the only way to obtain higher returns than the overall market is by taking on riskier investments (if the results are not due to luck). However, even after risk adjusting the returns on our portfolios, they still generated superior returns than the market. This also indicates market inefficiency.

Despite the fact that the EMH is one of the most studied propositions in all the social sciences, economists have not reached a consensus about whether markets are efficient or not. (Lo 2000) After the realization of our study and the analysis of the results obtained, we could reach two different conclusions about market efficiency, depending on what we believe regarding the data collected and the performance of our different portfolios.

On one hand, it can be said that despite the fact that our results contradict the EMH, it could still be valid. This could be the case if our results are due to luck and the abnormally high return on one or two stocks in each portfolio.

On the other hand, we could also state that the EMH is not valid due to the fact that both investment strategies succeeded in generating significantly higher returns than the market. Although, during some years the high returns on the portfolios were only due to the exceptionally high returns on a few stocks, the fact that the strategies succeeded in picking them can strengthen the strategies and thereby contradict the EMH.

Finally, one should keep in mind that the stock market volatility has been rather high during the studied period, which includes both the years that followed the stock market crash of 2000, the recovery and the more prosperous recent years.

7. CONCLUSIONS

In this chapter, the conclusions we have reached in the analysis are presented.

The purpose of this study was to investigate whether it is possible to outperform the overall stock market by investing in stocks that are undervalued according to the EV/EBITDA multiple and the P/E ratio. Our study shows that so is the case. Even after adjusting for risk, the strategies we used were successful.

In this study we used technical analysis of historical data. According to the weak form of the efficient market hypothesis, it should not be possible to outperform the market by doing this. We are of the opinion that our results indicate that the market is not efficient and that it is possible to continuously outperform the market by using trading rules or investment strategies.

Even though our results indicate market inefficiency, we believe that in order to be able to draw more exact conclusions about whether the market is efficient or not, a thorough study during a longer period of time should be performed. However, we believe that our study indicates the absence of market efficiency on the Swedish stock market during the period 2002 – 2006.

8. REFERENCES

8.1 Written Sources

Bernhardsson, J. (2003) P/e-talet – ett enkelt sätt att värdera företagens vinst, *Aktiespararen*, Vol. 4, p. 42-45, Sweden

Brealey, R. A., Myers, S. C., Allen, F. (2006) *Corporate Finance*, McGraw-Hill, New York, USA

Bryman, A., Bell, E. (2005) *Företagsekonomiska forskningsmetoder*, Liber Ekonomi, Korotan Ljubljana, Slovenia

Börsguide 2005:2, Avanza Vikingen, 2005, Uppsala, Sweden

Börsguide 2004:2, Avanza Vikingen, 2004, Uppsala, Sweden

Börsguide 2003:2, Delphi Economics AB, 2003, Uppsala, Sweden

Börsguide 2002:2, Delphi Economics AB, 2002, Uppsala, Sweden

Börsguide 2001:2, Delphi Economics AB, 2001, Uppsala, Sweden

Carhart, M. M. (1997) *On Persistence in Mutual Fund Performance*, *The Journal of Finance*, Vol. 52, No. 1, pp. 57-82.

Damodaran, A. (2002) *Investment Valuation: Tools and Techniques for Determining the Value of Any Asset*, Wiley Finance, New York, USA

Haugen, R. A. (2001) *Modern Investment Theory*, Prentice-Hall, New York, USA

Heakal, R. (2002) What is Market Efficiency?, Investopedia

Fama, E. (1970) *Efficient Capital Markets – A review of theory and empirical work*, Journal of Finance Vol. 25, No. 2

Fama, E. (1991) *Efficient Capital Markets: II*, Journal of Finance Vol. 46, No. 5

Fama, E., French, K. R. (1988) *Permanent and Temporary Components of Stock Prices*, Journal of Political Economy, Vol. 96, No. 2

Fitch, S. (2002) *P/Es for the Smart Money*, Forbes; 5/13/2002, Vol. 169 Issue 11, p184-186

Ghauri, P., Grønhaug, K. (2005) *Research Methods in Business Studies*, Prentice Hall, Dorchester, UK

Jacobsen, D. I. (2002) *Var, hur och varför?*, Studentlitteratur, Lund, Sweden

Jensen, M. C. (1968) *The Performance of Mutual Funds in the Period 1945-1964*, The Journal of Finance, Vol. 23, No. 2, pp. 389-416.

Kendall, M. (1953) *The Analysis of Economic Time Series, Part I. Prices*, Journal of the Royal Statistical Society 96

La Porta, R., Lakonishok, J., Shleifer, A., Vishny, R. (1997) *Good News for Value Stocks; Further Evidence on Market Efficiency*, The Journal of Finance, Vol. 2, No. 52

Lekvall, P., Wahlbin, C. (2001) *Information för marknadsföringsbeslut*, IHM Förlag, Göteborg, Sweden

Lie, E., Lie, H. J. (2002) *Multiples Used to Estimate Corporate Value*, Financial Analyst Journal, March/ April 2002

Lo, A. W. (2000) *Finance: A Selective Survey*, Journal of the American Statistical Association, Vol. 95, No. 450

McClure, B. (2006) *A clear look at EDITDA*, Investopedia

Sharpe (1964) *Capital Asset Prices - A Theory of Market Equilibrium Under Conditions of Risk*, The Journal of Finance, Vol. 19, No. 3, September 1964, pp. 425-442.

Van Bergen, J. (2004) *Working Through the Efficient Market Hypothesis*, Investopedia

Wang, K., Li, Y., Erickson, J. (1997) *A New Look at the Monday Effect*, The Journal of Finance, Vol. 2, No. 52

Wayman, R. (2002) *EBITDA: The Good, the Bad and the Ugly*, Investopedia

Wiedersheim-Paul, F. & Eriksson, L-T. (1999) *Att utreda forskna och rapportera*, Liber Ekonomi, Malmö, Sweden

8.1.1 Annual Reports

ABB Annual Report 2005

Alfa Laval Annual Reports 2003 and 2005

Autoliv Annual Report 2005

Assa Abloy Annual Report 2005

Atlas Copco Annual Report 2005

Astra Zeneca Annual Report 2005

Boliden Annual Report 2002, 2004 and 2005

Electrolux Annual Report 2004

Eniro Annual Report 2004, 2003, 2002

Ericsson Annual Report 2005

H&M Annual Report 2005

Handelsbanken Annual Report 2003 and 2005

Holmen Annual Report 2005

Investor Annual Report 2005

Nokia Annual Report 2005

Nordea Annual Report 2005

Sandvik Annual Report 2005, 2004, 2002

SCA Annual Reports 2002, 2003 and 2005

SEB Annual Report 2005

Securitas Annual Report 2005

Skanska Annual Report 2005

SKF Annual Report 2005

Stora Enso Annual Report 2005

Swedbank (former Föreningsparbanken) Annual Reports 2002 - 2005

Swedish Match Annual Report 2001 - 2005

Tele2 Annual Report 2002 - 2005

Telia Sonera Annual Report 2005

Volvo Annual Report 2001 - 2005

Vostok Nafta Annual Report 2005/2004

8.2 Electronic Sources

- Efficient Market Hypothesis

<http://www.alvinhan.com/Efficient-Market-Hypothesis.htm>

November 14, 2006

- Finansportalen

<http://www.finansportalen.se/utbildningaktier.htm>

December 15, 2006

- Investopedia

<http://www.investopedia.com>

November 3, 2006

<http://www.investopedia.com/terms/p/price-earningsratio.asp>

November 6, 2006

November 18, 2006

<http://www.investopedia.com/terms/e/efficientmarkethypothesis.asp>

November 21, 2006

- Mindxpansion

<http://www.mindxpansion.com/options/em.html>

November 5, 2006

- Riksbanken

<http://www.riksbank.se>

December 17, 2006

- Öhrlings PricewaterhouseCoopers

[http://www.pwc.com/extweb/pwcpublishations.nsf/docid/3585870af9d64a05802570dd00478157/\\$file/riskpremiestudie2006.pdf](http://www.pwc.com/extweb/pwcpublishations.nsf/docid/3585870af9d64a05802570dd00478157/$file/riskpremiestudie2006.pdf)

December 17, 2006

http://www.pwc.com/se/swe/ins-sol/survey-rep/riskpremie_2005.pdf

December 17, 2006

9. APPENDIX

Table 9.1 Average P/E ratios of the Studied Companies 2001-2005

	2005	2004	2003	2002	2001
ABB	20,4	0	0	0	0
ALFA LAVAL	17,1	20,5	14,5	65,8	-
AUTOLIV INC SDR	14,9	14,7	11,4	13,5	36,5
ASSA ABLOY B	15,1	24,2	>100	34	52,3
ATLAS COPCO A	13	13,7	14	0	14,1
ATLAS COPCO B	11	10,7	9,8	0	4,7
ASTRA ZENECA	13,4	21,6	24,3	27,3	25,9
BOLIDEN AB	6,5	8,2	3,8	19,1	0
ELECTROLUX B	30,8	14,7	10,8	10,5	12,4
ENIRO	16,6	21,8	38,7	0	35,2
ERICSSON B	16	15,8	0	0	0
H & M B	22,8	22,5	22,6	27,1	40,6
HOLMEN B	15,4	16,5	12,7	9,3	8,5
INVESTOR B	2	8,1	0	37,8	11,1
NORDEA BANK	9,4	9,6	9,5	17,1	12,6
NOKIA SDB	16	22,1	18,2	29,2	63,7
SANDVIK	13	15,1	19,6	16,9	14,5
SCA B	>100	18,6	12,9	12,6	10
SEB A	11,8	12,3	10,7	11,7	12,6
SECURITAS B	23,2	36,9	38,4	56	75,5
SHB A	10,5	11,5	11,1	12,7	12,8
SKANSKA B	11	11,2	7,8	0	>100
SKF B	11,6	10,7	13,6	10,5	8,9
STORA ENSO R	0	12,4	61,8	0	12,3
SWEDBANK	8,5	9,3	9,8	13,9	12,9
SWEDISH MATCH	16	13,9	14,7	17,7	14,1
TELE2 B	14,4	23,1	17,6	>100	>100
TELIASONERA	15,1	12,9	16,1	0	87,4
VOLVO B	10,4	11,9	>100	56,3	0
VOSTOK NAFTA SDB	2	2,6	3,2	3	4,2
MEDIAN	13,9	13,8	13,25	13,1	12,8

Source: Six Trust

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

Table 9.2 Enterprise Multiples of the Studied Companies 2001-2005

	2005	2004	2003	2002	2001
ABB	8,74	7,36	14,05	7,64	8,96
ALFA LAVAL	12,57	8,18	7,83	2,27	-
AUTOLIV INC SDR	8,64	8,31	9,69	7,95	11,46
ASSA ABLOY B	9,78	10,11	9,29	9,80	16,08
ATLAS COPCO A	8,75	7,49	6,42	4,75	5,03
ATLAS COPCO B	9,38	9,42	15,47	11,41	15,99
ASTRA ZENECA	5,46	4,85	13,80	5,87	3,20
BOLIDEN AB	9,74	4,43	5,08	2,98	2,44
ELECTROLUX B	21,21	9,16	9,94	8,96	12,49
ENIRO	11,44	11,35	-44,71	-7,87	-22,76
ERICSSON B	1,05	1,66	1,37	1,42	1,89
H & M B	7,97	7,02	6,10	4,83	4,71
HOLMEN B	-	-	-	-	-
INVESTOR B	7,42	8,05	8,72	7,72	7,94
NORDEA BANK	13,61	11,42	12,05	12,20	24,13
NOKIA SDB	7,76	7,64	9,02	6,27	8,09
SANDVIK	8,11	5,90	5,76	5,00	4,69
SCA B	9,52	8,37	7,83	5,57	6,92
SEB A	8,38	9,01	8,61	8,13	15,79
SECURITAS B	7,98	8,16	8,46	7,16	8,61
SHB A	7,23	6,69	4,20	9,15	8,91
SKANSKA B	7,62	0,92	1,15	1,13	1,27
SKF B	122,51	60,70	67,69	115,32	60,66
STORA ENSO R	7,37	7,81	7,31	6,47	7,28
SWEDBANK	9,57	10,69	9,64	8,71	7,75
SWEDISH MATCH	6,79	4,86	10,53	3,14	14,95
TELE2 B	6,76	5,90	5,98	380,58	8,44
TELIASONERA	5,57	4,51	10,89	7,06	7,90
VOLVO B	20,21	98,45	66,95	5,93	28,23
VOSTOK NAFTA SDB	8,51	7,93	8,66	6,76	8,09
MEDIAN	13,9	13,8	13,25	13,1	12,8

Source: Reuters

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

Table 9.3 Beta of the Studied Companies 2001-2005

	2005	2004	2003	2002	2001
ABB	2,08	1,88	1,55	0	0
ALFA LAVAL		0	0	0	-
ASSA ABLOY B	1,17	1,07	1,07	0,95	0,95
ASTRA ZENECA	0,58	0,31	0,07	0	0
ATLAS COPCO A					
ATLAS COPCO B	1,13	1,21	0,95	0,62	0,7
AUTOLIV INC SDR	0,76	0,94	0,67	0,54	0,4
BOLIDEN AB	1,37	1,42	0,98	0	0
ELECTROLUX B	0,88	0,85	0,77	0,74	0,52
ENIRO	0,87	0	0	0	0
ERICSSON B	3,37	3,14	2,86	2,41	1,98
H & M B	0,57	0,78	0,76	0,85	0,81
HOLMEN B	0,67	0,71	0,57	0,56	0,76
INVESTOR B	1,27	1,03	0,85	0,75	0,65
NOKIA SDB	1,31	1,29	1,25	1,31	1,34
NORDEA BANK	0,89	0,8	0,53	0,39	0
SANDVIK	0,41	0,6	0,59	0,57	0,69
SCA B	0,4	0,36	0,3	0,3	0,47
SEB A	0,74	0,82	0,69	0,87	0,97
SECURITAS B	1,13	0,92	1	0,79	0,71
SHB A	0,49	0,42	0,27	0,17	0,32
SKANSKA B	1,1	1	0,79	0,43	0,4
SKF B	0,65	0,78	0,62	0,69	0,75
STORA ENSO R	0,93	0,73	0,52	0	0
SWEDBANK	0,71	0,71	0,44	0,32	0,51
SWEDISH MATCH		-0,2	-0,21	-0,18	-0,07
TELE2 B	1,25	1,39	1,6	1,59	1,48
TELIASONERA	0,93	0,84	0	0	0
VOLVO B	1	0,96	0,67	0,51	0,46
VOSTOK NAFTA SDB	0,94	0,79	0,72	0,55	0,86

Source: Börsguide 2001-2005

P/E and EV/EBITDA Investment Strategies vs. the Market
- A Study of Market Efficiency

Table 9.4 Expected Return According to CAPM
 (of the companies included in the portfolios)

	2005	2004	2003	2002	2001
ALFA LAVAL	2,49%	2,00%	2,01%	2,72%	-
ATLAS COPCO B	7,57%	7,20%	6,09%	5,51%	7,14%
BOLIDEN AB	8,65%	8,11%	6,22%	2,72%	3,99%
ELECTROLUX B	6,45%	5,66%	5,32%	6,05%	6,33%
H & M B	5,05%	5,35%	5,27%	6,55%	7,63%
HOLMEN B	5,50%	5,05%	4,46%	5,24%	7,41%
INVESTOR B	8,20%	6,43%	5,66%	6,10%	6,91%
NORDEA BANK	6,49%	5,44%	4,28%	4,48%	3,99%
SCA B	4,29%	3,55%	3,30%	4,07%	6,10%
SEB A	5,82%	5,53%	4,97%	6,64%	8,35%
SKANSKA B	7,44%	6,30%	5,40%	4,66%	5,79%
SKF B	5,41%	5,35%	4,67%	5,83%	7,36%
SWEDBANK	5,68%	5,05%	3,90%	4,16%	6,28%
TELE2 B	8,11%	7,98%	8,89%	9,88%	10,65%
TELIASONERA	6,67%	5,61%	2,01%	2,72%	3,99%
VOLVO B	6,99%	6,13%	4,89%	5,02%	6,06%
VOSTOK NAFTA SDB	6,72%	5,40%	5,10%	5,20%	7,86%