Generating Excess Returns through Value Investing
– Evidence from the Nordic Equity Markets

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Abstract

This study evaluates the performance of different value investing strategies. The strategies involve investing in publicly listed companies at the Nordic market from 1998 to 2012. Two standard portfolios were formed based on strategies by the widely acclaimed originator of value investing Benjamin Graham and hedge fund manager Joel Greenblatt. The most important findings were however not made when testing these portfolios. Instead the portfolios generating significant excess returns throughout the time period were discovered when performing the sensitivity analysis. The findings are in accordance with what has been referred to as "Graham's Last Strategy", as well as with the basic principles of value investing. These principles include the pursuit for large discrepancies between current price and intrinsic value during normal economic conditions. The study is also in line with several aspects of the mean reversion phenomenon.

Keywords: Value Investing, Nordic Equities, Excess Returns

Contents

Introduction

Benjamin Graham (1894-1976) is widely acclaimed to be the originator of value investing.[1] This is mainly because he wrote two very influential books on this topic: *Security Analysis* and *The Intelligent Investor*. These books became of such importance in the field of fundamental analysis that they continued to be updated several decades after his death in 1976. Graham wrote these books as part of his academic work at Columbia Business School, but he was also one of the managers of the mutual fund called the Graham-Newman Corporation. Graham's basic idea was that value investors should attempt to buy companies at prices which are significantly lower than their intrinsic value. It is important that the discrepancy between price and value is large, because it provides a "margin of safety" (room for errors in estimating the intrinsic value) as well as a higher probability of a large potential upside.[2]

One of the most well-known disciples of Benjamin Graham, who has followed Graham's core learning points for value investing throughout his career, is Warren Buffett. In an article called "The Superinvestors of Graham and Doddsville" Buffett gives several examples of investors that have generated considerable excess returns through following the value investing rationales. These track records also include Buffet himself and a part of his path towards becoming the richest man in the world in 2008.[3]

At the end of this article, Buffett argued that value investing was largely overseen by the market on average by stating that:

"In conclusion some of the more commercially minded among you may wonder why I am writing this article. Adding many converts to the value approach will perforce narrow the spreads between price and value. I can only tell you that the secret has been out for 50 years, ever since Ben Graham and Dave Dodd wrote Security Analysis, yet I have seen no trend towards value investing in the 35 years I've practiced it. … The academic world, if anything, has actually backed away from the teaching of value investing over the last 30 years. ... There will continue to be wide discrepancies between price and value in the market place, and those who read their Graham and Dodd will continue to prosper".

Another follower of Benjamin Graham's value investing principles is Joel Greenblatt. However, Greenblatt argued that several of the requirements used by Graham in his original investment models are too strict to follow in the contemporary world. He therefore outlined a more simplistic model, which he invested in accordance with and which provided him with great success.

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[1] Chen, N. & Zhang, F. (1998). *Risk and Return of Value Stocks.*
[2] Graham, B. (1973). *The Intelligent Investor (4th ed., 2003).*
[3] Forbes.com – The List of Billionaires.

The Content of this Study

In this study the investment strategy for the Defensive Investor, which was originally outlined by Benjamin Graham in the book *The Intelligent Investor*, is tested together with Greenblatt's investment strategy originally outlined in the book *The Little Book that Beats the Market*. Both of these two main strategies are then broken down into several complementary portfolios, initially thought of as a way of sensitivity testing the main strategies. As it later turned out, some of these complementary portfolios actually provided the most important results of this study, results which are in accordance with the findings of what has been referred to as "Graham's Last Strategy".

The study involves investing in publicly listed Nordic equities between 1998 and 2012. The results are benchmarked towards the FTSE Nordic 30 Index and the Fama French 3 Factor Model.

Research Questions

The two research questions for this study are:

- Which portfolio has generated the highest return during the tested time period?
- Has any portfolio generated a positive risk adjusted return which is significant at a 95% confidence level during the tested time period?

Previous Research

Portfolio Performance

In 1934 Benjamin Graham and David L. Dodd published the book *Security Analysis*. The book was revised and a second version was published in 1940. The second version is considered to be one of the most influential investment books of all times. It has for instance been commonly referred to as the "bible of value investing". The authors not only introduce the concept of value investing and value stocks in the book; they also make a large contribution to fundamental analysis in its entirety. For example, they adopt an early definition that separates fundamental analysis from technical analysis. Graham made a clear distinction between speculation and long-term investing through focusing on fundamentals. He was only interested in the latter and focused on securities trading at a bargain price, which in his reasoning provided a "margin of safety" that would give room for error, imprecision, bad luck or becoming a victim of an irrational behavior of the stock market. Although the first version of *Security Analysis* could be seen as outdated in several aspects, its core structure has remained relevant with a sixth version of the book being published in 2009.

The *Intelligent Investor* is another book written by Benjamin Graham which follows up on *Security Analysis*. While *Security Analysis* was more concerned with valuation of different securities, the *Intelligent Investor* focuses more on practical investment thinking and portfolio strategies for the individual investor. Graham outlined strategies for stock selection both for the Enterprising Investor and the Defensive Investor. The Enterprising Investor approach targets the individuals that are willing to continually research, monitor and select stocks, while the Defensive Investor will be the one without the time and interest to put enough effort into following the approach for the Enterprising Investor.

The *Intelligent Investor* did not only provide several analytical tools for fundamental analysis, it was also one of the first books in its field to outline the emotional and behavioral aspects that are important to consider when investing at the stock market. A lot of this reasoning boils down to avoid putting too much emphasis on market timing, especially in the short run. Instead, Graham advocates what he refers to as *pricing*, which means that an investor should make his buy and sell decisions depending on the current price vis-à-vis the fair value of the company under normal economic conditions. Graham argued that timing is a speculative approach that would only allow very few individuals to outperform the market over time, while a pricing approach would allow for significantly better prospects of consistently outperforming the market.

A lot of Graham's strategies and analytical tools were primarily used for forecasting future earnings. Graham also had a relatively conservative approach, preferring companies with a track record of stable previous earnings power and preferably for several consecutive years. Ou and Penman (1989) treated future earnings power as the most important valuation notion and attempted to identify financial descriptors and their importance in predicting future earnings power. Lev and Thiagarajan (1993) investigated key value drivers behind earnings power and excess returns for publicly listed companies and their research shows that several of the tested fundamentals can be used in explaining the excess returns. Lev and Thiagarajan's study is supported by Abarbanell and Bushee (1997), who found that previous years fundamentals are generally very useful when predicting future levels of profitability and excess returns.

Another finding by Abarbanell and Bushee (1997) is that analysts in general tend to underestimate the importance of information presented in financial statements; therefore Abarbanell and Bushee argued that there is a need for more efficiency in the analysts' fundamental analysis.

Earnings growth forecasts are often done through discounting future cash flows, where one of the key value drivers is the forecasted sales growth. Goedhart, Russell and Williams (2001) showed that there is an upward bias in growth expectations on average. The earnings growth forecasts in the S&P 500 are systematically overoptimistic. They showed that high growth is not sustainable for the typical company and the decline from high growth rates are generally very rapid. There is a mean reversion of growth rates over time, which in their study is very evident within the first 10 years of inclusion. In year 5 the highest growth portfolio in their study outperforms the lowest growth portfolio by 5 percentage points. At year 10 the difference is reduced to only 2 percentage points.

Exhibit 1 – Revenue Growth Decay Analysis
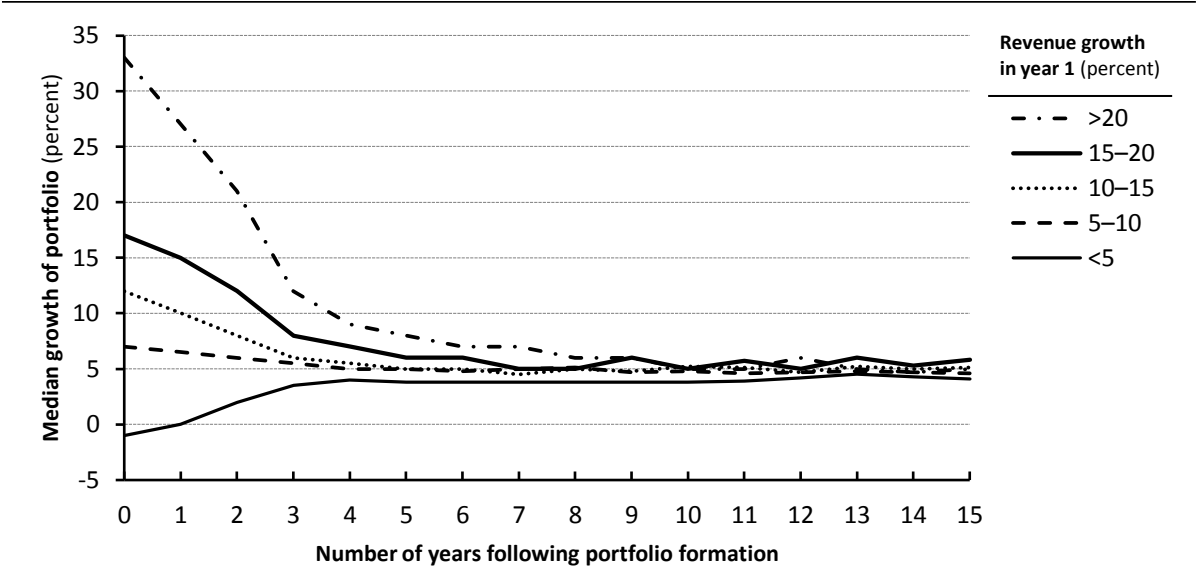
[1] At year 0, companies are grouped into one of five portfolios, based on revenue growth.
Source: Valuation: Measuring and Managing the Value of Companies, 5th Edition, McKinsey & Company Inc.

Not only growth rates revert to the mean. Goedhart, Russell and Williams (2001) also formed portfolios based on Return on Invested Capital (ROIC) and found that companies which have a high ROIC at inclusion, on average see their ROIC fall gradually during a 15 year time horizon. Companies with a low ROIC at inclusion see their ROIC increase over time on average. However, although the companies with the highest ROIC cannot maintain their outstanding performance over time, their returns reverse significantly less to the mean than the growth rates of high growth companies. The difference between the highest and the lowest ROIC portfolios after 15 years is 10%. Thus, Goedhart, Russell and Williams (2001) showed that the mean reversion phenomena is significantly stronger for growth than for ROIC. In other words, it is easier for a company to retain a high level of return on invested capital over a 15 year time horizon than it is to sustain a high growth rate.

The mean reversion phenomenon is also addressed by Haugen (1999) who concludes that strong mean reversion is the case for abnormal profits. Haugen argues that abnormal profits can be earned by companies in the short run, but in the long run positive abnormal profits will revert to a normal level due to increasing competition. Profits that are abnormally low will, on the other hand, increase strongly as they revert to the mean (some companies will go bankrupt, but the average company among the companies with abnormally low profits will revert to the medium profit level). Market expectations for the most successful companies will be very high while the unsuccessful companies will have very low market expectations. So when the high requirements for the previously very successful companies are not met any more, their stock price will be lowered, whereas the previously unsuccessful firms will perform above the expectations on average and beat the market. In other words, the successful companies become overvalued and the unsuccessful companies undervalued. Haugen also argues that the previously successful companies are generally growth stocks and the previously unsuccessful companies are value stocks.

Lakonishok, Shleifer and Vishny (1994) used several reference studies to show that value stocks outperform the market. The reasoning behind this is debated, but can in most cases be divided into two main groups. Some argue that value stocks are significantly riskier and therefore the risk adjusted return is not higher, while others argue that although value stocks are riskier the additional risk taken is lower than the additional return received when investing in value stocks (on average). Lakonishok, Shleifer and Vishny (1994) adhere more to the second group and argue that value investing strategies might produce higher returns because investors in the market overreact to past performance. The previous bad news are expected to continue and therefore value stocks become oversold and growth stocks overbought, simply because investors get overexcited about them.

Piotroski (2000) defined value stocks as those with high book-to-market ratios (B/M) and found that less than 44% of the value stocks in his study earned a positive risk adjusted excess return in the two years following portfolio formation. However, some of these companies outperformed the market so much that they compensated for other strongly underperforming companies. Therefore, Piotroski created a model which attempted to separate value stocks with strong prospects from those with weak prospects. His study showed that only investing in high B/M companies with strong future prospects would have generated an average annual return which would have been at least 7.5% higher than what would have been received if investing in the whole sample of high B/M companies in his study.

Greenblatt (2006) was impressed by Piotroski's results, but argued that the largest third of the stocks by market cap in Piotroski's study did not significantly outperform the average stocks with high B/M ratios. Greenblatt was not surprised by the results and argued that mispriced large caps are harder to find than mispriced small caps. This is because there are significantly more small caps than large caps and small caps generally have lower analyst coverage and fewer followers among investors. Greenblatt argued that for those reasons small caps are generally mispriced to a larger extent than large caps. Therefore, it is crucial to have a good screening tool when assessing small caps future prospects. Greenblatt recommended a formula based on two key ratios: the earnings yield (EBIT/Enterprise Value) and return on capital employed (ROCE). He argued that investing in companies where both of these ratios are high would imply buying good companies at bargain prices. Greenblatt's reasoning is somewhat supported by Goedhart, Russell and Williams (2001) which found that high levels of ROIC are far more persistent over time than high growth levels.

Greenblatt wants to buy these persistently high performing companies at a low price and therefore sets a high earnings yield criterion as well as a high return on capital criterion. His study is performed on U.S. data between 1988 and 2004 and his fundamental investing formula averages a return of 30.8% per year while the S&P 500 averages 12.4% per year during the same time period.

Concluding Remarks on Portfolio Performance

Benjamin Graham was one of the pioneers in fundamental analysis. Many of the theories outlined by him are still valid today and it would therefore be interesting to evaluate the performance of these portfolio strategies during the last decades. We have therefore decided to pursue with a modified version of the strategy for the Defensive Investor as outlined by Graham.

The portfolio performance part of the previous research section starts with Graham and ends with Greenblatt, because of the intention to show which major contributions that have been made to this topic in between these two. Greenblatt's strategy is chosen as the other portfolio strategy. This is partly because it becomes interesting to contrast one of the oldest strategies based on fundamental analysis with one of the more recent ones, but more importantly because of the success that Greenblatt's strategy has had on the U.S. market. It therefore becomes interesting to test whether a strong performance could have been obtained if the strategy had been adopted on the Nordic market and during a partially different time period than in the original study by Greenblatt.

Benchmark Selection

Treynor and Mazuy (1966) tested if the performance of 57 mutual funds could be explained by an ability to successfully time the market. The model is often referred to as the Market Timing Model. They used a quadratic regression to separate the fund managers' ability to anticipate major turns in the stock market from successfully selecting undervalued stocks. Their findings suggest that none of these mutual funds were successful in timing the market during the studied time horizon. Instead they argued that the alpha generated by skillful managers would primarily be due to a good ability to identify undervalued stocks. This is also in line with Graham's (1973) reasoning that an investor attempting to find undervalued stocks would have significantly better prospects to consistently outperform the market, than those investors seeking to do so only by trying to time the market.

Jensen (1968) introduced a model that is often referred to as Jensen's Alpha, which incorporates an alpha measure into the Capital Asset Pricing Model (CAPM). Alpha is defined as the risk-adjusted excess return over the return predicted by CAPM. A portfolio that generates a positive alpha is seen to provide a risk-adjusted return in excess of the market portfolio. Jensen's Alpha became one of the most frequently used measures in portfolio performance evaluation.

However, the Market Timing Model and Jensen's Alpha both became criticized. Grinblatt (1992) highlighted that it's very important in portfolio performance evaluation that the portfolios' performance is tested towards an efficient benchmark. The result of the performance evaluation varies a lot depending on which benchmark is used. Grinblatt questioned the credibility of CAPM as a benchmark model, arguing that it suffers from size and dividend yield biases. The critique against CAPM is also a critique against Jensen's Alpha since it is based on CAPM.

Grinblatt also argued that Jensen's Alpha does not account for the excess returns generated by managers with a timing ability. On the other hand, the previous research by Treynor and Mazuy (1966) had shown that none of the fund managers in their study demonstrated a clear timing ability. Even Grinblatt himself found that most funds fail to successfully time the market.

Ferson and Schadt (1996) constructed a conditional version of Treynor and Mazuy's unconditional regressions. They showed that a negative timing coefficient can occur in an unconditional model such as Treynor and Mazuy's, even if a manager follows a buy and hold strategy and consequently does not even attempt to time the market. Therefore the model is specified incorrectly. For the conditional model which is outlined by Ferson and Schadt, the findings suggest that the incorporation of conditional information removes the evidence of negative timing coefficients. In other words, Ferson and Schadt (1996) argue that Treynor and Mazuy's Market Timing Model cannot be used as a credible model for portfolio performance benchmarking.

Ferson and Schadt (1996) also questioned Jensen's Alpha and argued that it is well documented that the model faces severe problems when betas and expected returns vary a lot over time. They also argue that it is problematic that portfolio performance studies evaluated against CAPM and Jensen's Alpha show that the alphas are negative to a much larger extent than they are positive. This is unreasonable since the pursuit for alpha is a zero sum game. The average generated alpha at a given market is zero and therefore the strong bias towards negative alphas is indicating one of many limitations with Jensen's Alpha as a model for portfolio performance benchmarking.

Ferson and Schadt (1996) argued that the issue of finding a reliable benchmark model for evaluating portfolio performance remained unsolved after more than 30 years of continuous attempts to find such a model. However, they did not address the three factor model introduced by Fama and French in 1992. The Fama French 3 Factor Model originated from a critique against CAPM's ability to predict portfolio returns in an accurate manner.

Running regressions for the Fama French 3 Factor Model and CAPM, shows that CAPM has a very low explanatory power for the distribution of risk premiums between 1970 and 2011. However, if CAPM is extended with 2 additional factors, one for size differences and one for differences in Book-to-Market level (B/M), then the risk premiums under this time period are significantly better explained. Fama and French argued that firm size and differences in B/M levels are two important factors for explaining differences in risk between different stocks.

The Fama French 3 Factor Model became a very popular model for benchmarking portfolio performance. The critique against it is especially directed towards the theory behind it, which is the Efficient Market Hypothesis (EMH). Therefore, many investigations have been performed both to test whether a specific strategy or equity fund has created a risk adjusted excess return, but also as a way of questioning the Efficient Market Hypothesis.

Concluding Remarks on Benchmark Selection

We argue that the Efficient Market Hypothesis has suffered from much stronger critique than the Fama French 3 Factor Model has as a benchmark model. However, a valid point is that a model loses credibility if the theory behind it loses credibility. We therefore argue that there is a need for a more academically valid model for risk-adjusted performance benchmarking, but in absence of better alternatives, we have chosen to proceed with the Fama French 3 Factor Model as our choice of academic benchmark model. We find that the Jensen's Alpha model and the Market Timing Model by Treynor and Mazuy have suffered too severe critique to be adequately credible as benchmark models for portfolio performance evaluation. In addition, we have also chosen to use a practical index called the FTSE Nordic 30 to serve as an additional benchmark.

Theoretical Framework and Method

Graham's Investment Strategy

One of the core learning points that Graham wanted to communicate is to look for companies with large discrepancies between price and value.[4] Generally the starting point is to estimate the value of a specific company under normal economic conditions. This can be done in several ways, but Graham thought it was important to emphasize that the choice of investment approach should depend on the characteristics of the investor. Graham separated investors in two main groups: the Enterprising Investor and the Defensive Investor. The Enterprising Investors are defined as those "willing to continually research, select and monitor a dynamic mix of stocks, bonds and mutual funds". The Defensive Investors are basically all other investors.

Graham outlined a strategy for stock selection, which he recommends the Defensive Investor to pursue. The strategy includes seven criteria and the portfolio is recommended to be rebalanced yearly. The original criteria as outlined by Graham are presented in Exhibit 2 along with the modification of these criteria used in this study.

Exhibit 2 – The Original and Modified criteria of Graham's investment strategy for the Defensive Investor

Graham's Original Criteria[5]	Modified Criteria used in this study[6]
1. Sales ≥ USD 100 million	1. Sales ≥ SEK 1 billion
2. Current Ratio ≥ 2	2. Current Ratio ≥ 1.5
3. Long-Term Debt ≤ Net Working Capital	3. Long-Term Debt ≤ Net Working Capital
4. Positive Earnings for the last 10 years	4. Positive Earnings for the last 8 years
5. Uninterrupted Dividend payments for the last 20 years	5. Uninterrupted Dividend payments for the last 8 years
6. Cumulative Earnings Growth ≥ 33% over the last 10 years	6. Cumulative Earnings Growth ≥ 33% over the last 8 years
7. Current price should not exceed 15 times average earnings of the past three years	7. Select the 20 companies with the lowest P/E ratio which satisfy all other requirements

Graham wanted to provide the Defensive Investor with a model for stock selection that provided safety but yet generated excess returns. The smallest companies are excluded in Graham's model, which is one way of lowering the risk. This is both done through setting a minimum sales requirement, but also indirectly through setting a requirement for uninterrupted dividend payments during the past 20 years, since a company that has managed to pay out dividends for 20 consecutive years has generally grown relatively large. The model also excludes companies in a weak financial position through setting a relatively high current ratio requirement and requiring that long-term debt does not exceed net working capital. The earnings requirement excludes loss making companies and prioritizes companies with stable earnings. The dividend requirement is also a criterion that indicates a relatively stable performance of a business over time. The growth requirement is rather low, since it implies an average annual earnings growth of approximately 3%.

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[4] Graham, B. (1973). The Intelligent Investor (4th ed., 2003), *Preface by Warren E. Buffett* (page *viii*)
[5] Graham also suggested an additional requirement of a maximum Price/Assets ratio of 1.5 or a combined criterion, where the P/E ratio times the Price/Assets ratio is not higher than 22.5
[6] The reasoning behind the modifications is discussed on pages 11-12

One explanation for such a low hurdle is that Graham put little emphasis on growth and set this requirement so that companies included in the portfolio would have good prospects to grow slightly faster than the average company in the stock market during the holding period. The P/E ratio requirement entails that the companies fulfilling all the mentioned criteria are currently sold at an attractive price. Generally, companies with a long track record of performance stability, conservative financing and adequate size should be expected to have a high P/E ratio. Therefore, Graham (1973) argued that the existence of several companies which fulfill these criteria but have a relatively low P/E ratio is mostly due to undervaluation.

Criteria Considerations and the Choices Made

Greenblatt (2006) argued that the original requirements for the Defensive Investor as outlined by Graham are rather strict and met by very few companies today. The strictness of the criteria is even more pronounced when testing Graham's original investment strategy for the purposes of this study. Graham had the U.S. market in mind when he set the requirements. Since the Nordic market is significantly smaller the strictness of the requirements needs to be lowered. Data availability issues have also been considered. A conclusion of all this is that the original requirements for the Defensive Investor need to be modified in order for the strategy to be applicable on the Nordic Equity markets.

The Sales Criterion

Graham used the sales criterion as a proxy for size. It is likely that his thought was to exclude the smallest small caps by setting a sales requirement. The reason for this is that small companies are seen as being riskier than large companies on average. However, Graham argues that the sales requirement is rather arbitrary and that it's problematic that it's not inflation adjusted.

In this study, the sales requirement is set to SEK 1 billion.

The Current Ratio and Long-Term Debt Criteria

These two criteria combined represent the strength of the financial position for a business. The current ratio is calculated as Current Assets$_t$/Current Liabilities$_t$. The current ratio is a commonly used liquidity ratio and a 2-to-1 level provides a solid cash reserve in case of a downturn. The other requirement concerning financial position is that long-term debt should not exceed net working capital. The main rationale of investing in conservatively financed companies is that they generally suffer less from economic downturns. This provides the Defensive Investor with an appropriate safety margin. However, the Current Ratio requirement of 2-to-1 is arguably very restrictive so lowering the current ratio to 1.5 would provide sufficient liquidity without excluding too many companies.

The Criteria for Positive Earnings Persistence, Dividend Payments and Earnings Growth

Empirically, the earnings stability requirement of 10 consecutive years of positive earnings will for most years when the portfolio is rebalanced imply that companies fulfilling this requirement manage to make a profit even during times of economic crisis. Ensuring that a company is stable is further strengthened by the requirement that dividends have been paid out for the last 20 years. On top of that Graham's original criteria include an earnings growth requirement corresponding to an average earnings growth of 3% per year during the last 10 years. In this study, the requirements for all these three criteria are lowered to 8 years. Reasons for this include that it is needed since the Nordic market is significantly smaller than the US market and thus it is probable that fewer companies fulfill the criteria in the Nordics.

Another reason is that the original requirement that a company must have been paying out dividends for the past 20 years, implies that several companies will be excluded simply because they have not existed for 20 years. In addition to that, many companies do not even start to pay out dividends regularly before the early years of the company is over. Therefore it is arguably unnecessary to require that dividends are paid out for 20 consecutive years. Also lowering the growth horizon to 8 years but keeping the request for a cumulative growth of 33% over these years implies requesting a higher growth rate per year, but during a shorter time period than Graham's original requirements.

The Price-to-Earnings Criterion

In this study the P/E ratio is used as the last requirement for filtering. Among the companies which fulfill all of the other six requirements, the 20 companies with the lowest P/E ratios have been included in the main portfolio for Graham's strategy. The return of a portfolio is dependent on the price paid and therefore it is arguably preferable to lower the other requirements and let more companies through to the last round of filtering on the P/E ratio. Graham uses an average of the previous three years earnings in the denominator. However, this can cause some problems. Especially for companies with high earnings growth because the earnings generated three years ago will be much lower than the most recent earnings. Therefore the denominator will be understated. Instead, the most common practice today is using forward looking P/E ratios where the earnings figure is based on a forecast of the earnings one year ahead. However, research has shown that these earnings measures often deviate a lot from the actual earnings.[7] Therefore the trailing P/E ratio has been used in this study, where the most recent annual earnings are used in the denominator.[8]

Portfolio Formation

A modified version of Graham's strategy for the Defensive Investor has been tested on the Nordic stock market from 1998 to 2012. The criteria that need to be fulfilled are outlined in Exhibit 2. The portfolio is rebalanced once every year on the last trading day of June using the information from the latest available annual report. This is done in order to ensure that the information used in portfolio formation was publicly available at the time of portfolio formation. However, the stock prices (used in the P/E ratio) are derived on the last trading day of June during each year of portfolio formation.

Complementary Portfolios

The idea of forming complementary portfolios is to test how much value is added by each criterion in the strategy. Graham's strategy consists of 7 criteria in total and in this study the P/E ratio is used as the last criteria for filtering. If for example 40 companies fulfill all other criteria, 20 companies will be filtered away using the P/E ratio. In comparison to setting a fixed value requirement for the P/E criterion, this approach ensures that a sufficient number of companies are included at all times, thus providing the amount of companies needed for sufficient diversification. However, this also implies that the more criteria a company needs to fulfill in order to be included in the portfolio, the fewer companies will remain to be filtered on the P/E ratio and thus the average P/E ratio in the portfolio will be higher. Therefore one of the goals of this test is to examine whether an additional criterion adds enough value to be worth paying more for. Another goal is to examine which criteria that are the most important ones. In order to do that different combinations of the criteria are tested. For example one portfolio has the requirement that a company needs to fulfill any 3 criteria out of 5.

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[7] Graham, B. (1973). *The Intelligent Investor (2003, 4th ed.).* Commentary on Chapter 14, page 374.
[8] Penman, S. H. (2010). *Financial Statement Analysis and Security Valuation*, page 79.
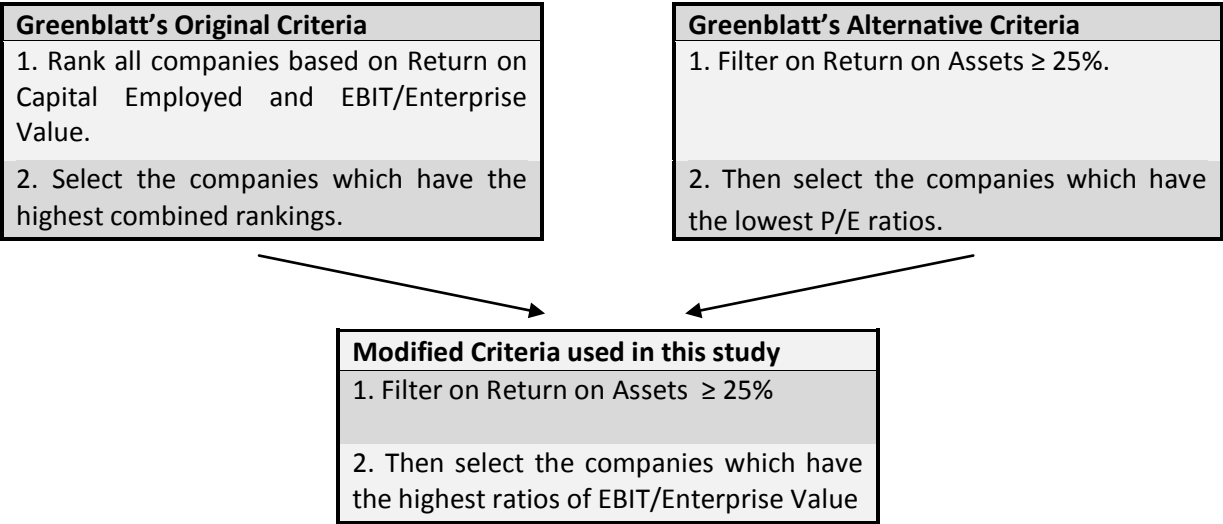
These 5 criteria are the requirements for: Current Ratio, Long-Term Debt, Positive Earnings Persistence, Dividend Payments Persistence and Earnings Growth. The sales requirement (which is used as a size indicator) is included in the main portfolio, but is not included in any of the complementary portfolios. One reason for this is that the sales requirement is so low that very few companies are filtered away because of it. Another reason is that several empirical researches have shown that the average return for small companies is higher than for large companies and therefore the results should not be improved by setting a size requirement.[9] The sales requirement is used instead of using market cap as the size requirement because this makes the strategy more comparable to Graham's original strategy.

Greenblatt's Investment Strategy

Benjamin Graham is repeatedly referred to in Greenblatt's book: "The Little Book that Beats the Market". Greenblatt adheres to Graham's argument that an investor should strive to buy companies which are traded at large discounts in relation to their fair values, thus providing a "margin of safety" as well as a higher probability of obtaining excess returns. He also argues that the fair values of most listed companies move relatively little from one year to another, while the prices of the same companies fluctuate a lot on average.[10] In the long run however, the prices will equal the fair values and thus an investor can benefit from buying stocks at prices significantly lower than their fair value during normal economic conditions.[11] Both Greenblatt and Graham advocate patience in investing and that it can take several years before their respective strategies pay off as intended to.

Although Greenblatt's strategy relies on many of the core theories developed by Graham, Greenblatt argues that the original requirements included in the strategy for the Defensive Investor, are very strict and only met by very few listed companies in today's markets. A large part of Graham's success was obtained during the Great Depression and throughout the Second World War, times when the stock market was perceived as very risky. Because of this, many stocks were priced cheaply.[12] Greenblatt argues that his strategy has less strict requirements than Graham's; it is more flexible and has better prospects to do well in the future. The strategy is presented in the table below.

Exhibit 3 – The Original and Modified criteria of Greenblatt's investment strategy

Greenblatt's Original Criteria	Greenblatt's Alternative Criteria
1. Rank all companies based on Return on Capital Employed and EBIT/Enterprise Value.	1. Filter on Return on Assets ≥ 25%.
2. Select the companies which have the highest combined rankings.	2. Then select the companies which have the lowest P/E ratios.

Modified Criteria used in this study
1. Filter on Return on Assets ≥ 25%
2. Then select the companies which have the highest ratios of EBIT/Enterprise Value

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[9] Haugen, R. A. (1999). *The New Finance: The Case Against Efficient Markets.*
[10] Greenblatt, J. (2006). *The Little Book that Beats the Market*
[11] Greenblatt, J. (2006). *The Little Book that Beats the Market,* page 97
[12] Greenblatt, J. (2006). *The Little Book that Beats the Market,* page 49

Greenblatt's strategy involves investing in companies which have a high return on capital and a high earnings yield. In short, this is described as "buying high performing companies at bargain prices".[13] In a large sample of companies this will imply "buying companies performing well above average at prices well below average", according to Greenblatt (2006). In his study, Greenblatt demonstrates that the combination of the two criteria has led to an impressing average annual return of 30.8% per year from 1988 to 2004. The average annual return for the S&P 500 during the corresponding period was 12.4%. The entire portfolio consisted of stocks trading at the U.S. stock market. The portfolio was rebalanced once a year and consisted of 30 stocks during the entire time period.

The Return on Capital Criterion

Generally, a high return on capital for example measured as ROCE, ROA, ROE or ROIC, is an indication that a company has a strong competitive advantage.[14] This is especially true if the high return on capital has been persistent during several consecutive years. Greenblatt (2006) argues that companies which generate high returns, generally also have better prospects to reinvest their profits in projects which will generate high returns. This is also supported by Goedhart, Russell and Williams (2001) who have shown that high levels of ROIC are rather persistent over time.[15]

Greenblatt favored using Return on Capital Employed (ROCE) as the capital requirement.[16] As an alternative he recommends using Return on Assets (ROA) instead of ROCE.[17] The reason for using ROA instead of ROCE in this study is because of significantly better data availability for ROA among the publicly listed Nordic companies during the tested time period. ROA is calculated using EBIT as the earnings measure, which benefits from being calculated before taxes and interest expenses. This enables a comparison between companies with different debt levels and tax rates. It could also be argued that it is more interesting to see which earnings that are generated from operating activities rather than a mix of operating activities, financial and tax deduction activities. It is also important to note that the different Nordic countries have different tax rates and tax policies; in addition to that many companies generate their earnings in several different countries and are thus affected by their tax rules. Therefore EBIT is a very appropriate earnings measure.

The Earnings Yield Criterion

Filtering companies on a high EBIT/Enterprise Value is chosen instead of filtering on low P/E ratios.[18] One of the reasons for this is that the earnings measure in the P/E ratio is generally calculated after tax and as explained earlier it is preferable to use an earnings measure which is calculated before tax and interest expenses for comparability reasons. A reason for using Enterprise Value instead of only the market value of equity is because the operating earnings are generated by assets financed by both equity and debt. Another reason is that using Enterprise Value enhances comparability between companies with different levels of debt financing.

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[13] Greenblatt, J. (2006). *The Little Book that Beats the Market,* page 45
[14] Greenblatt, J. (2006). *The Little Book that Beats the Market, page 85*
[15] Goedhart, Russell & Williams (2001). *Prophets and Profits. McKinsey on Finance, No.2*
[16] ROCE is defined as: EBIT/(Net Working Capital + Net Fixed Assets)
[17] ROA is defined as: $EBIT/((Total Assets_t + Total Assets_{(t-1)})/2)$.
[18] Enterprise value is defined as Market Value of Equity + Interest-bearing Net Debt.

A high operating earnings yield is an indication that a company earns a lot in comparison to the purchase price of the business. It can also indicate that the company has a justified debt level and that it is trading at a low price.

Portfolio Formation

A modified version of Greenblatt's strategy is tested on the Nordic stock market between 1998 and 2012. The criteria that need to be fulfilled are outlined in Exhibit 3. The portfolio is rebalanced once every year on the last trading day of June. In accordance with Greenblatt's recommendations, the standard ROA requirement is set to only include companies which have a ROA of at least 25%.[19] This is the first requirement that a company needs to pass in order to be considered for inclusion in the portfolio. After meeting the ROA requirement the 20 companies which have the highest earnings yield are selected.

Complementary Portfolios

Similarly to the complementary portfolios for Graham's strategy, those for Greenblatt are constructed with the purpose of testing the importance each criterion has in generating the returns. The complementary portfolios for Greenblatt are however structured differently than those for Graham. Each year, the publicly listed stocks on the Nordic market are separated into four different groups based on their level of ROA. These portfolios are therefore called Quartile portfolios. The 1st quartile includes the companies with the highest ROA level and the 4th quartile the companies with the lowest ROA level. Since the Greenblatt strategy consists of two criteria, ROA and Earnings yield, all 4 quartile portfolios are divided into high and low yield portfolios. Thus the 1st Quartile Portfolio is divided into one portfolio including the companies with the highest earnings yield (and the highest ROA level) and another portfolio with the companies with the lowest earnings yield (but with the highest ROA level). This results in 8 complementary portfolios. The portfolio called 1st Quartile High Earnings Yield is rather similar to the Greenblatt standard portfolio, with the difference that the Standard Portfolio contains fewer stocks and consequently has a higher average ROA and a higher average earnings yield.

However, there are some companies which manage to achieve a ROA level of at least 25% during several consecutive years. Therefore it is reasonable to believe that these companies are worth paying more for (here indicated by a lower earnings yield), since these companies have a momentum of high performance. Therefore an additional complementary portfolio has been constructed which primarily involves investing in companies which have had a ROA level of at least 25% during at least two consecutive years. If less than 20 companies fulfill these criteria, then the rest of the companies which are included have to fulfill the standard requirements only. An important distinction between this portfolio and the other portfolios based on Greenblatt's strategy is that in this portfolio preference is given to the ROA criterion at the expense of high earnings yields. Therefore the portfolio is called Greenblatt Momentum Preference.

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[19] Except for the portfolio formed in 2003, during which the ROA requirement was lowered to 22% because of significantly fewer companies managing to satisfy the standard threshold of 25%.

The Fama French Three Factor Model

When evaluating the performance of an investment strategy, the return generated from the strategy should be set in relation to an appropriate benchmark. A statistically significant alpha generated in the regression would indicate that a strategy is capable of generating a return which cannot be easily captured by conventional models. The benchmark model used in this study is the Fama French 3 Factor Model.

The reasons for choosing this model have been discussed in the Previous Research section. Empirically the Fama French 3 Factor Model manages to capture the stock performance much better than CAPM for example. For this reason the Fama French 3 Factor Model is frequently used in contemporary academic research and has been referred to as a "cornerstone of empirical financial research".[20] The equation for the model is:

$$R_{p,t} - R_{f,t} = \alpha_p + \beta_{Mkt}(R_{Mkt} - R_{f,t}) + \beta_{SMB}R_{SMB} + \beta_{HML}R_{HML} + \varepsilon_{p,t}$$

$R_{p,t}$ is the return of a tested portfolio during a specific time period. The returns and the risk free rate $R_{f,t}$ are calculated on a monthly basis. Swedish 6 month government bond rates are used as the risk free rate. Alpha (α_p) is the risk adjusted excess return generated from the tested portfolios. An accumulated alpha which is positive and significant indicates that a tested portfolio generates an excess return adjusted for market, size and value factors, which according to Fama and French are associated with a higher risk. Alpha is calculated as the residual in this model. Beta (Mkt) sets the volatility of a tested portfolio in relation to the market portfolio. The return of the market portfolio is calculated as a value-weighted return based on all publicly listed companies in the Nordics.

SMB stands for Small minus Big and is calculated by subtracting the average return generated from the largest stocks from that of the smallest stocks. All companies listed at the Nordic market are sorted on market capitalization and the 25% which has the highest market cap are included among the large companies. The average return from these companies is subtracted from the average return of the remaining companies which correspond to 75% of the market. The SMB portfolio is value weighted and constructed on the last trading day of June each year. The portfolio formation procedure is in accordance with the one employed by Fama and French (1993) in their original study.[21]

HML stands for High minus Low which is calculated through subtracting the monthly returns of the companies with the lowest Book-to-Market ratios from the companies with the highest Book-to-Market ratios. All listed companies in the Nordic market are ranked on their B/M ratios. The returns for the 30% of stocks which have the lowest B/M ratios are subtracted from the returns for the 30% of stocks with the highest B/M ratios. The portfolio is rebalanced each year on the last trading day in June, although the book value is extracted from the latest annual report. The returns are value-weighted and the procedure is in accordance with the original study by Fama and French (1993).

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[20] Chan, L. K. C., Dimmock, S. G., Lakonishok, J. (2006). Benchmarking Money Manager Performance: Issues and Evidence
[21] The exact construction procedure is slightly different as Fama and French used U.S. data originating from 3 different stock exchanges (NYSE, AMEX and NASDAQ). Nevertheless, the resulting portfolio characteristics are closely matching those achieved by Fama and French.

Return Measurements

A monthly total return index is used to measure the returns of all the individual stocks and consequently for all the portfolios and benchmarks. A total return means that the return includes both movements in stock price and dividends paid out during the period. The dividends are continuously reinvested in the stocks they have been generated from. This is done in order to ensure that the results are relevant for investors.

Time Period Considerations

Thomson Reuters Datastream is a database which commenced an extensive coverage of European markets in 1988 after opening a data processing center in Ireland. Therefore the availability of financial accounting data for publicly listed Nordic companies significantly improves from 1988 and onwards. This also implies that variables calculated before 1988 might be expressed in a different format, which is the case for the Total Return Index. This index used to treat dividends differently before 1988. For this reason, extending the research period to include data before 1988 would make this study more prone to data errors in the results and decrease comparability. As some of Graham's criteria require a pre-investment horizon of 10 years, data availability considerations make 1998 the first investment year in this study.

The Nordic Market

The Nordic stock market consists of companies listed in Sweden, Norway, Denmark, Finland and Iceland. All countries are small open economies which are rather reliant on foreign trade. The largest part of the export is to countries in Western Europe and the U.S. This has implied that the region is sensitive to global economic cycles, for example the region has suffered extensively from the latest financial crisis.[22]

Historically the region has invested considerable amounts in public welfare including infrastructure, education and science.[23] This has facilitated the economic development which involves successfully monetizing on both the natural resources in the region, as well as creating a strong service oriented society. All of this has contributed to the fact that the Nordic region is one of the richest regions in the world with numerous large international companies.[24] [25]

Main Industries

Overall the region has been monetizing on natural resources such as forestry, mining, fishing and food products. Norway has also been successfully monetizing on their extensive oil resources. In addition to that, many companies are involved in businesses related to machinery and electronic equipment. However, many of the fastest growing businesses are service oriented; this has especially been the case for Sweden and Finland during the tested time horizon.[26] Both countries have a large exposure to the information and communications industry.[27]

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[22] Norden.org
[23] Norden.org
[24] Forbes.com – The World's Biggest Public Companies
[25] CIA.gov – The World Factbook
[26] Indexmundi.com – Swedish GDP by Sector
[27] CIA.gov – The World Factbook

Dominating Companies

In 2011, Statoil's revenues accounted for 24% of Norway's GDP and Nokia's revenues accounted for 20% of Finland's GDP. Therefore, the movements on the Norwegian and Finish markets have been strongly affected by two companies during the studied time period. These companies can therefore have a large explanatory power for short term fluctuations on these markets. However, investing in the Nordic market implies significantly lower weights for large companies such as Statoil and Nokia than investing in only the Norwegian or the Finish market. Their size in relation to the entire Nordic stock market in terms of market capitalization corresponded to 8.34% for Statoil and 1.85% for Nokia in December 2011. In this study, it has been tested to set a market cap limit, so that no company has a larger market cap then 5% of the market. However, the impact on the results generated by setting this market cap limit was low.

These results imply that the Nordic region as a whole provides good diversification opportunities in a sense that none of the countries does on a standalone basis. Finding high performing companies in accordance with Graham's and Greenblatt's criteria were harder during the worst years of the IT boom, but it would have been a lot worse if investments had only been made in one of the countries' stock markets.

Results and Analysis

Some of the results in this study were at first rather unexpected, because the two best performing portfolios were not among the two main portfolios. Instead the best performing portfolios were found when sensitivity testing Graham's strategy for the Defensive Investor. As it later turned out, Graham also appears to have made the same findings and he suggested a new strategy based on them. The results in this section are presented in the order they were discovered. Following this story facilitates the understanding of the rationale behind the results and the derivation of them.

Results for the main portfolios

Among the two main portfolios which were tested, the Greenblatt Standard portfolio performed the best during the tested time period. It generated an average annual return of 23.31% between July 1998 and July 2007. However, after that the strategy suffered hard from the first years of the financial crisis, which eventually led to an average annual return of 11.12% during the whole time period ending in July 2012. When benchmarked against the Fama French 3 Factor model, the risk adjusted excess return is insignificant when taking the entire time horizon into account.[28]

One reason for the rather poor performance of the Graham Standard portfolio is that the 6 criteria that need to be fulfilled leave little room for filtering on the P/E ratio, thus many of the companies which meet the modified requirements for Graham's strategy have a high P/E ratio. This indicates that the investors at the Nordic market are willing to pay a substantial premium for these companies' stable performance, resilience and conservative financing. This consequently affects the results negatively.

**Exhibit 4** – The Graham and Greenblatt Standard Portfolios

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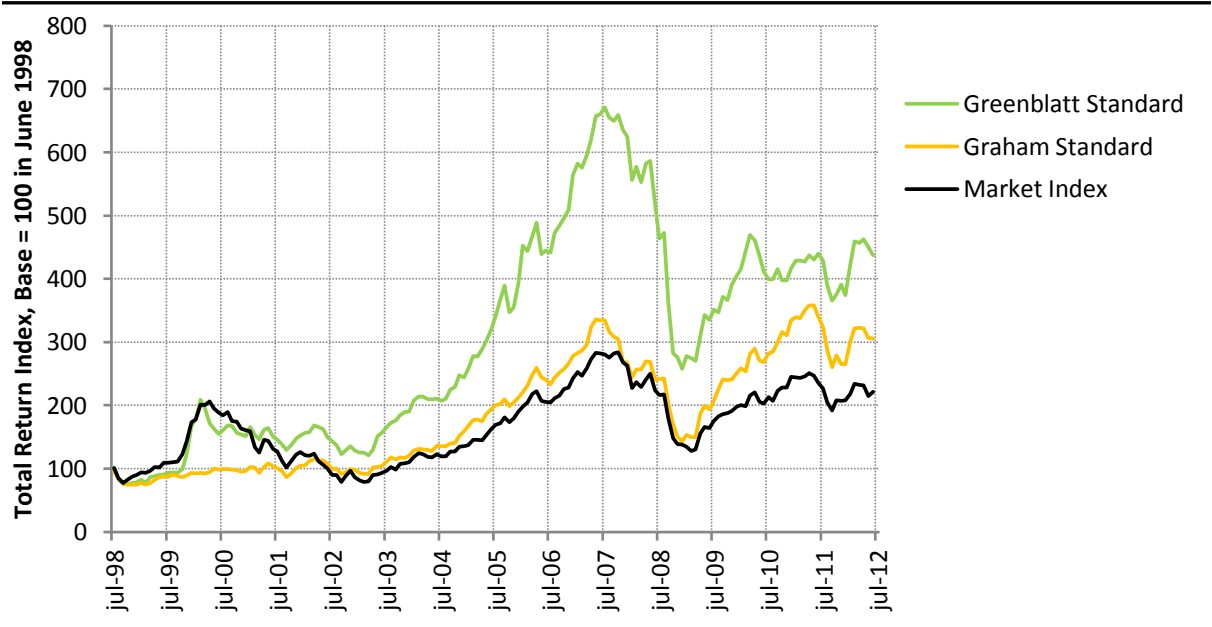
[28] These results are based on a 95% confidence level; the alpha is significant on a 90% confidence level.

Results for Greenblatt's complementary portfolios

The Greenblatt Momentum Preference Portfolio

When examining the results of the complementary portfolio named Greenblatt Momentum Preference, it appears that prioritizing persistence in high levels of ROA over a high earnings yield is a bad idea. Greenblatt's strategy builds on a rationale that companies which combine having a high ROA with a high earnings yield are often undiscovered gems of the market.[29] The poor performance of the Momentum Preference portfolio can be seen as indicative of this rationale. The reason for this is that it appears that investing in companies which meet the ROA requirement of 25%, no matter what the earnings yield is, will imply paying too much for some companies. In other words, our results indicate that it is important to combine high levels of ROA with high levels of earnings yield, for an investor who wishes to invest in accordance with Greenblatt's strategy.

Exhibit 5 – The Greenblatt Momentum Preference Portfolio
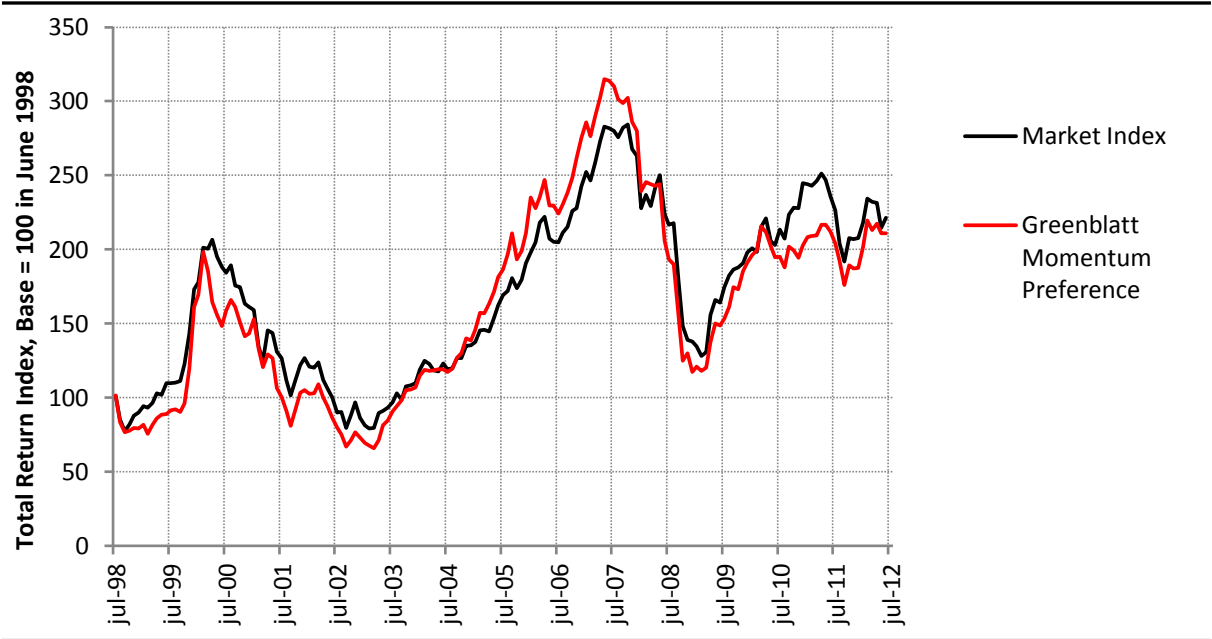
The Quartile Portfolios

The importance of combining a high ROA with a high earnings yield is also supported by the complementary portfolios named Quartile Portfolios, which are based on Greenblatt's strategy. Exhibit 6 illustrates the difference between the Quartile portfolio which has the highest level of ROA combined with a high earnings yield and the portfolio which has the lowest ROA combined with a high earnings yield. The results support the notion that companies with a high ROA perform significantly better than companies with a low ROA given that the earnings yield is high.

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[29] Greenblatt, J. (2006). *The Little Book that Beats the Market*

Exhibit 6 – Complementary Portfolios for the Greenblatt strategy
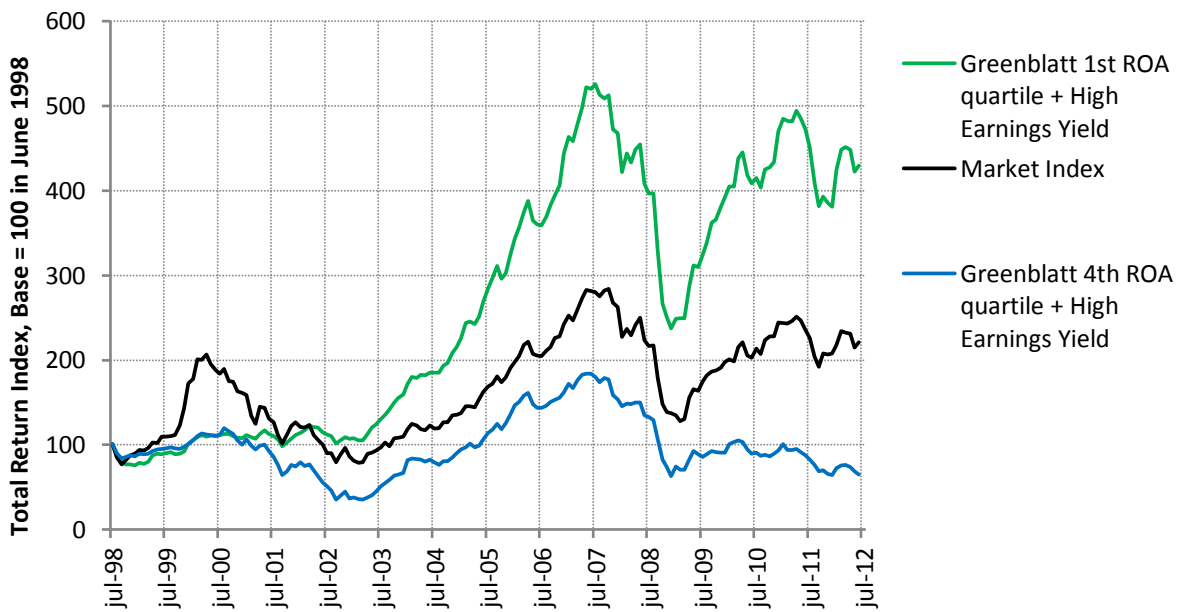
Exhibit 7 illustrates the importance of combining a high ROA with a high earnings yield. As can be seen in the graph, the portfolio which has a high ROA but a low earnings yield strongly underperforms the market. The Momentum Preference Portfolio follows the market rather closely and is also suffering from having a rather low earnings yield. These results also indicate that the stock market generally creates a strong buy pressure on high ROA companies with high earnings yields which drives up the stock price and consequently drives down the earnings yield.

Exhibit 7 – Complementary portfolios for the Greenblatt strategy
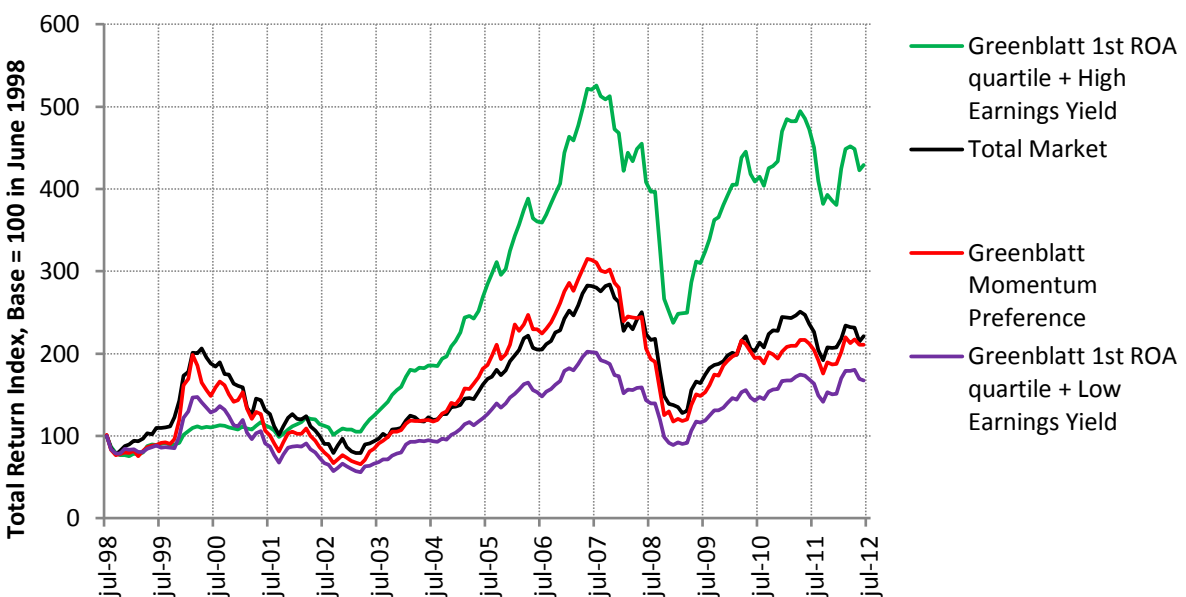
The cornerstone of value investing is buying companies which have a large discrepancy between price and value.[30] This reasoning is supported by the complementary portfolios connected to Greenblatt's strategy. The results imply that buying companies with a high ROA at high prices has not been a good investment at the Nordic market during the time period of this study. The results are vastly improved if an investor only buys high ROA companies at high earnings yields (indicating a low price). Since the results show an indication of a relatively steep price increase in these companies, it is also recommended to rebalance the portfolio at least once a year.

Performance of the Market

The results in this study are derived using a Total Return Index, which includes an assumption of reinvesting all dividends. An effect of this assumption is that the average annual return becomes rather high over time because of a compounded interest effect. The average annual return of the Nordic stock market during the time period of this study is 5.84%, given that all dividends have been reinvested.

Exhibit 8 illustrates two Nordic market indices. The main difference between them is the number of companies included in each index. The FTSE Nordic 30 includes the 30 largest companies in the Nordics. The Market Index is the index used in the Fama French 3 Factor Model for benchmarking. No exclusion of listed companies is made in this index. The high correlation between them suggests that adding more than 30 companies to a Nordic benchmark index adds little explanatory value of the total returns at the market.

Exhibit 8 – Market Indices

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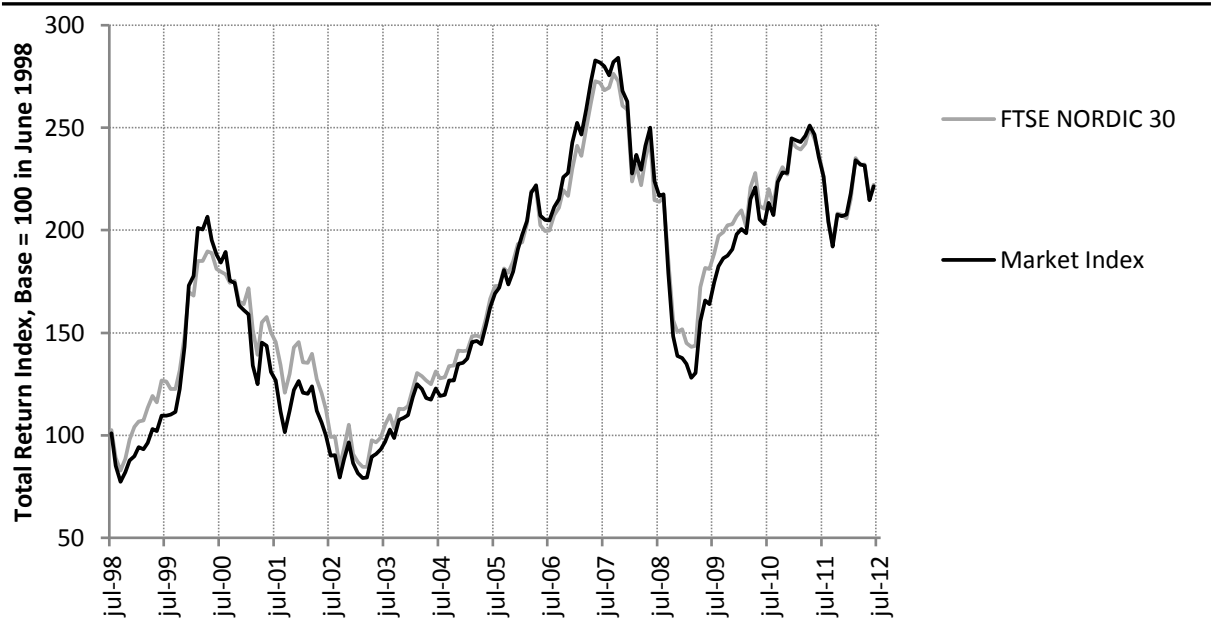
[30] Graham,B. (1973). *The Intelligent Investor (4th ed. 2003), Chapter 12*
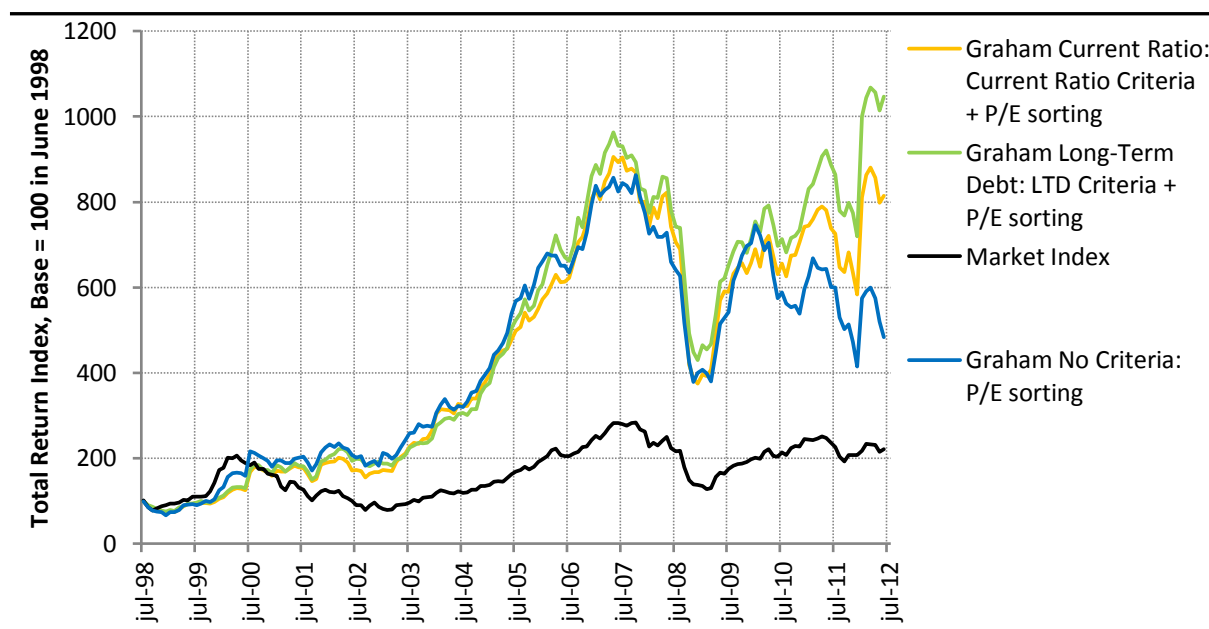
The Top Performers

One way of testing the importance of different criteria in a model is through creating portfolios based on fewer criteria and examining the results. A preferred result would then be that the more criteria that a company needs to fulfill in order to be included in the portfolio, the better the strategy performs. For Graham's strategy for the Defensive Investor, the results in this study indicate that the performance is higher the fewer criteria that are fulfilled before selecting the companies with the lowest P/E ratio. At least it can be concluded, that portfolios including companies which only needed to fulfill 1 criterion performed significantly better than portfolios where 5 or 6 criteria needed to be fulfilled. The fewer criteria that needs to be fulfilled, the lower will the average company's P/E ratio be. Therefore, the results indicate that buying companies which trade at a low P/E ratio is far more important in order to reach high returns, than setting several criteria and to consequently suffer from buying these companies at higher P/E ratios on average. However, as illustrated in Exhibit 9, the returns also fluctuate significantly more in the portfolios only fulfilling one of Graham's criteria.

Exhibit 9 – Complementary Portfolios for the Graham strategy
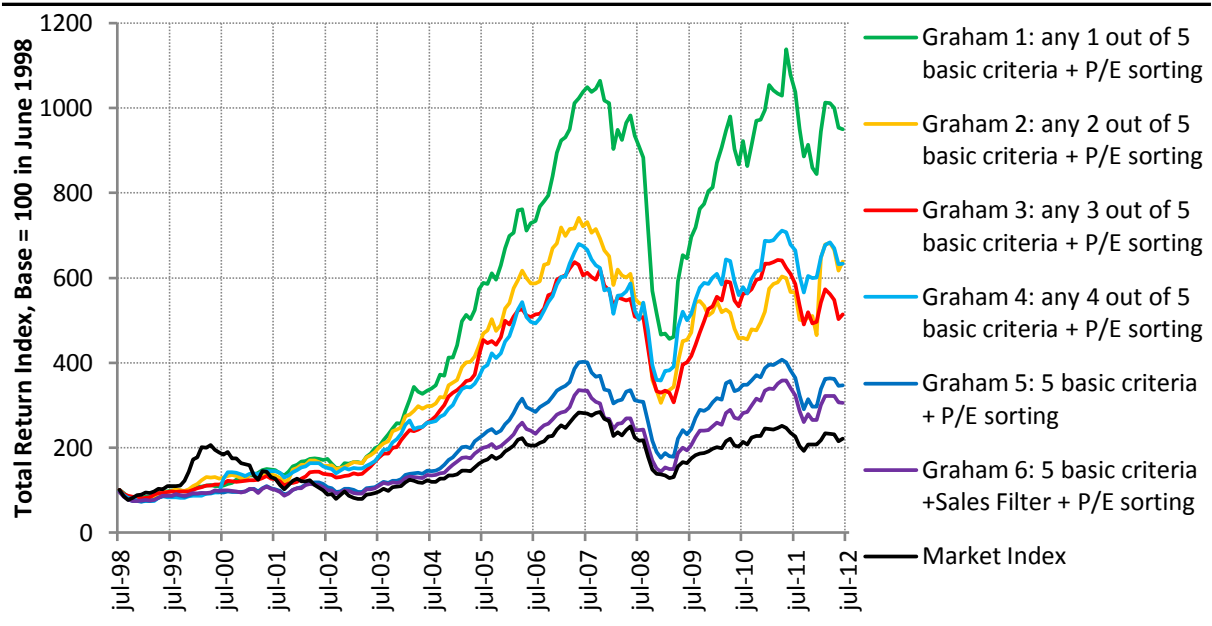
The criterion which generates the highest return when combined with the P/E ratio is the requirement that Long-Term Debt should be lower than Net Working Capital (denoted as LTD < NWC). The alpha for this strategy is 12.21% per year and is significant at a 95% confidence level. The alpha is the risk adjusted return in excess of the annual market return of 5.84%. The p-value for this portfolio is 0.009 which indicates a very high significance level.

Exhibit 10 – Complementary Portfolios for the Graham Strategy

One reason for this portfolio being the top performer in this study, might simply be because it is one of the easiest criteria to fulfill and that the P/E ratio is therefore one of the lowest for this criterion. On the other hand, the criterion which is second best when combined with a very low P/E ratio is the current ratio requirement. This portfolio generated a risk adjusted excess return of 9.45% per year. It is intuitive to believe that companies with conservative financing (which the requirement long-term debt ≤ net working capital is an indication of) and sufficient liquidity (indicated by the current ratio) have performed better, especially during the worst years of the financial crisis because it emerged partly due to high leverage and low liquidity.[31] Very low P/E ratios indicate that the market puts very little faith in these companies' future prospects and they are probably perceived to be very risky on average. Being conservatively financed and sufficiently liquid in combination with a very low P/E ratio might indicate that these companies riskiness is currently overestimated by the market. It should be realised that very low P/E ratios indicate a very large potential upside. The potential downside is at this point most concerned with the bankruptcy risk. Conservative financing and good liquidity are the two factors which lower the bankruptcy probability. In that sense, companies with very low P/E ratios which fulfill the requirement of LTD < NWC or have a rather high current ratio, might on average have a high upside potential and a relatively low bankruptcy risk.

As illustrated in Exhibit 10 the performance of three portfolios followed each other closely until the beginning of 2010 where the performance of the portfolio only including the companies with the lowest P/E ratio decreases, while the performance of the portfolios including a requirement for debt and current ratio increases. This difference has accumulated to be rather large in July 2012. One reason for this might simply be that liquid and conservatively financed companies are preferred to a larger extent by the Nordic market after the financial crisis. This is not unexpected since the financial crisis was to a large extent a result of high levels of debt financing and extensive liquidity issues arising as a consequence of that.[32]

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[31] The Wall Street Journal – What Caused the Financial Crisis?
[32] The Wall Street Journal – What Caused the Financial Crisis?

Graham's Last Strategy

Summarizing the top results in this study, the best performing portfolio is the complementary portfolio which fulfills the requirement of LTD < NWC and which has a very low P/E ratio on average. The alpha is significant and corresponds to a positive risk adjusted excess return of 12.21% per year during the tested time period. The portfolio which has performed second best is the corresponding complementary portfolio which has a current ratio requirement of at least 1.5 only including the 20 companies with the lowest P/E ratio among these. Although these results were not expected as the study commenced, the results would probably not have surprised Benjamin Graham. Because the results are actually very well aligned with what has been referred to as his last strategy.[33] In one of the latest interviews that he did, he stated this about projecting earnings, evaluating market share, and analyzing individual companies:

"Those factors are significant in theory, but they turn out to be of little practical use in deciding what price to pay for particular stocks or when to sell them. My investigations have convinced me you can predetermine these logical "buy" and "sell" levels for a widely diversified portfolio without getting involved in weighing the fundamental factors affecting the prospects of specific companies or industries."

Instead Graham's last strategy involved taking the search for large discrepancies between price and value to its extreme as he recommended an investor to build its portfolio based on the following criteria:[34]

- A maximum P/E ratio of 7x-10x (Based on 2x current AAA bond rates)
- Equity/Asset ratio of at least 0.5

Graham further recommended that the portfolio should be well diversified and should include at least 30 stocks. The stocks should be sold after a 50% gain or a two year holding period (given that a 50% gain has not been obtained before that).

Limitations

No size limitations on the companies included in the portfolios were set except for the 6 criteria portfolio for Graham which includes a sales requirement. All beta values for SMB are positive indicating a bias towards small caps and mid caps. Because of this, some companies included in the portfolios might be too small for an average Nordic portfolio manager to invest a considerable part of the funds capital in, without having a substantial price effect. However, mutual funds with the ability to invest in the largest small stocks or only mid caps would still have been able to have followed the strategy successfully during the time period of this study.

The strategies in this study are tested from 1998 to 2012. Showing that the alphas for the top performing portfolios will remain at a high level for a longer time period would have been an additional indication that these strategies seems to be persistent over time.

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[33] Gurufocus.com – The Simplest Way to Select Bargain Stocks
[34] Gurufocus.com – The Simplest Way to Select Bargain Stocks

Conclusion

This study involved testing value investing strategies on the Nordic market between 1998 and 2012. Among the two standard portfolios which were tested, the Greenblatt Standard Portfolio performed significantly better than the Graham Standard Portfolio. However, none of these two strategies were among the top performers. The best performing strategies instead involved investing in companies with very low P/E ratios that were conservatively financed and liquid. The results indicate that investors at the Nordic market became more concerned with the company's debt levels and their liquidity after the financial crisis had struck. This benefited companies with a very low valuation that were conservatively financed. A low valuation is associated with a large potential upside and the conservative financing is associated with a lower bankruptcy risk than what might have been anticipated by the market. The cornerstone of value investing is to search for companies which have a large discrepancy between the current price and the intrinsic value during normal economic conditions. This rationale seems to have a high explanatory value for the results in this study. The top performing strategy was the Long-Term Debt Portfolio which combined a debt restriction requirement with a very low average P/E ratio. The strategy generated an average annual return of 18.24% of which 12.21% constituted a significant alpha. An important part of this finding was that the alpha was positive and significant even though the returns were benchmarked towards the Fama French 3 Factor Model, which incorporates size and value factors.

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Appendices

Appendix 1 – Portfolio Formation

		Portfolio Name	Description
Standard Portfolios		Graham Standard Portfolio	Includes all modified criteria for Graham's original strategy. On the last trading day of June, from 1998 to 2012, the stocks are filtered to only include companies with: A Current Ratio higher than 1.5; Long-term Debt not exceeding Net Working Capital; positive earnings for the last 8 years; Dividends paid out for the last 8 years; cumulative earnings growth of at least 33% over the last 8 years; Sales higher than SEK 1 bn. The filtered stocks are then sorted on their respective P/E ratio and the 20 stocks with the lowest P/E ratio are included in the portfolio. The portfolio is rebalanced on the last trading day of June in each year.
		Greenblatt Standard Portfolio	The stocks are filtered in two steps. The first requirement a company needs to fulfill is a ROA of at least 25%. Among these, the 20 companies with the lowest ROA are included in the portfolio.
Complementary Portfolios	**Graham**	5 Criteria	Same as the Graham Standard Portfolio, but the sales criterion is excluded.
		4 Criteria	The sales criterion is excluded, out of the 5 remaining criteria the stocks has to satisfy any 4. The 20 stocks which have the lowest P/E ratio and satisfy all mentioned criteria are included in the portfolio.
		3 Criteria	Same as above, but has to satisfy any 3 out of 5 criteria. Then selected based on the P/E ratio.
		2 Criteria	Same as above, but has to satisfy any 2 criteria. Then selected based on the P/E ratio.
		1 Criterion	Same as above, but any 1 criterion. Then selected based on the P/E ratio.
		Lowest P/E ratio	Includes the 20 companies which have the lowest P/E ratio
		Current Ratio	The stocks need to have a Current Ratio higher than 1.5, then the 20 stocks with the lowest P/E ratio are included in this portfolio.
		Long-Term Debt	Same as above, but needs to have Long-Term Debt lower then Net Working Capital.
		Earnings Persistence	Same as above, but needs to have had positive Earnings for the last 8 years.
		Dividend Persistence	Same as above, but needs to have had positive Dividends for the last 8 years.
		Earnings Growth	Same as above, but needs to have had a cumulative Earnings Growth of at least 33% over the last 8 years.
	Greenblatt	1st ROA Quartile High Yield	All stocks are sorted based on the ROA requirement; the 25% which has the highest ROA are then sorted based on the Earnings Yield. The 50% which has the highest Earnings Yield are included in this portfolio.
		1st ROA Quartile Low Yield	Same as above, but the lowest 50% by Earnings Yield are included in this portfolio.
		2nd ROA Quartile High Yield	After sorting on ROA, the second quartile of stocks is sorted based on the Earnings Yield. The highest 50% by Earnings Yield are included in this portfolio.
		2nd ROA Quartile Low Yield	Same as above, but the lowest 50% by Earnings Yield are included in this portfolio.
		3rd ROA Quartile High Yield	After sorting on ROA, the third quartile of stocks by ROA is sorted based on the Earnings Yield. The highest 50% by Earnings Yield are included in this portfolio.
		3rd ROA Quartile Low Yield	Same as above, but the lowest 50% by Earnings Yield are included in this portfolio.
		4th ROA Quartile High Yield	After sorting on ROA, the stocks with the lowest ROA are sorted based on the Earnings Yield. The highest 50% by Earnings Yield are included in this portfolio.
		4th ROA Quartile Low Yield	Same as above, but the lowest 50% by Earnings Yield are included in this portfolio.
		Momentum Preference	Stocks which have had a ROA of at least 25% for at least two consecutive years are included. When there are less than 20 of those, the rest is filled with companies which have a ROA of at least 25% for the corresponding year and among these, the companies which have the highest Earnings Yield are selected.

Appendix 2 – Descriptions of Data Variables collected from Datastream

Variable	Comments	Codes	Definitions
Current Ratio ≥ 1.5	Calculated as: Current Assets(t) / Current Liabilities(t)	WC02201 WC03101	Current Assets – includes cash and other assets that are expected to be realized in cash, sold or consumed within one year or one operating cycle. Generally, it is the sum of cash and equivalents, receivables, inventories, prepaid expenses and other current assets. Current Liabilities – include debt and other obligations that the company expects to pay within one year. It includes but is not restricted to: accounts payable, short-term debt, notes payable, current portion of long-term debt, all accrued expenses, other current liabilities, income taxes payable, dividends payable, state franchise taxes, deferred credits etc.
Long-Term Debt ≤ Net Working Capital		WC03251 WC03151	Long-term debt – includes all interest bearing financial obligations, excluding amounts due within one year. It is shown net of premium or discount. It includes but is not restricted to: mortgages, bonds, debentures, convertible debt etc. Working capital – represents the difference between current assets and current liabilities.
Positive Earnings Persistence	A combination of Net Income and EPS is used.	WC01706 EPS	Net Income after Preferred Dividends – represents the net income after preferred dividends that the company uses to calculate its basic earnings per share. EPS – latest annual rate that reflects the last financial year or be derived from an aggregation of interim period earnings.
Dividends		WC05101	Dividends per Share – is the total amount of dividends per share declared during the fiscal year. It includes extra dividends declared during the year.
Earnings Growth		EPS	EPS – latest annual rate that reflects the last financial year or derived from an aggregation of interim period earnings.
Sales		WC01001	Net Sales or Revenues – correspond to gross sales and other operating revenue less discounts, returns and allowances.
P/E		PE	This is the price divided by the earnings rate per share at the required date. Thus the current price divided by the latest annual earnings figure.
ROA	Calculated as: EBIT /((Total Assets(t)+Total Assets (t-1))/2)	WC18191 WC02999	EBIT – earnings of a company before interest expense and income taxes. It is calculated by taking the pretax income and adding back interest expense on debt and subtracting interest capitalized. Total Assets – represent the sum of total current assets, long term receivables, investment in unconsolidated subsidiaries, other investments, net property plant and equipment and other assets.
Earnings Yield	Calculated as: EBIT/ Enterprise Value	WC18191 WC18100	EBIT – earnings of a company before interest expense and income taxes. It is calculated by taking the pretax income and adding back interest expense on debt and subtracting interest capitalized. Enterprise Value – Market Capitalization at fiscal year end + Preferred Stock + Minority Interest + Total Debt minus cash.
Market Value		MV	Market value – is the share price multiplied by the number of ordinary shares outstanding. The amount in issue is updated whenever new tranches of stock are issued or after a capital change. For companies with more than one class of equity capital, the market value is expressed according to the individual issue. Market value is displayed in millions of units of local currency.
Book Value		WC05491	Book Value Outstanding Shares Fiscal – represents the book value (proportioned common equity divided by outstanding shares) at the company's fiscal year end.
Total Return Index		RI	A return index is available for individual equities and unit trusts. This shows a theoretical growth in value of a share holding over a specified period, assuming that dividends are re-invested to purchase additional units of an equity or unit trust at the closing price applicable on the ex-dividend date.

Source: Thomson Reuters Datastream

Appendix 3 –Regression Results from the Fama French 3 Factor Model for Main and Complementary Portfolios

Graham Standard Portfolio		Adjusted R^2	0.767
Annual Alpha	0.22%	P-value for α	0.931
	Coefficient	*Standard Error*	*P-value*
$\beta(R_{Market} - R_f)$	0.944	0.041	0.000
$\beta(SMB)$	0.428	0.076	0.000
$\beta(HML)$	0.482	0.049	0.000

Graham 5 criteria		Adjusted R^2	0.791
Annual Alpha	0.96%	P-value for α	0.681
	Coefficient	*Standard Error*	*P-value*
$\beta(R_{Market} - R_f)$	0.945	0.038	0.000
$\beta(SMB)$	0.523	0.071	0.000
$\beta(HML)$	0.529	0.045	0.000

Graham 4 criteria		Adjusted R^2	0.595
Annual Alpha	6.19%	P-value for α	0.078
	Coefficient	*Standard Error*	*P-value*
$\beta(R_{Market} - R_f)$	0.868	0.055	0.000
$\beta(SMB)$	0.583	0.104	0.000
$\beta(HML)$	0.518	0.066	0.000

Graham 3 Criteria		Adjusted R^2	0.734
Annual Alpha	4.79%	P-value for α	0.036
	Coefficient	*Standard Error*	*P-value*
$\beta(R_{Market} - R_f)$	0.773	0.036	0.000
$\beta(SMB)$	0.581	0.067	0.000
$\beta(HML)$	0.472	0.043	0.000

Graham 2 criteria		Adjusted R^2	0.602
Annual Alpha	7.38%	P-value for α	0.054
	Coefficient	*Standard Error*	*P-value*
$\beta(R_{Market} - R_f)$	0.939	0.060	0.000
$\beta(SMB)$	0.898	0.112	0.000
$\beta(HML)$	0.428	0.072	0.000

Graham 1 criterion		Adjusted R^2	0.683
Annual Alpha	8.96%	P-value for α	0.004
	Coefficient	*Standard Error*	*P-value*
$\beta(R_{Market} - R_f)$	0.909	0.048	0.000
$\beta(SMB)$	0.557	0.090	0.000
$\beta(HML)$	0.527	0.057	0.000

Graham No Criteria		Adjusted R^2	0.495
Annual Alpha	7.31%	P-value for α	0.166
	Coefficient	*Standard Error*	*P-value*
$\beta(R_{Market} - R_f)$	1.006	0.083	0.000
$\beta(SMB)$	1.117	0.155	0.000
$\beta(HML)$	0.282	0.099	0.005

Greenblatt Standard Portfolio		Adjusted R^2	0.707
Annual Alpha	6.67%	P-value for α	0.077
	Coefficient	*Standard Error*	*P-value*
$\beta(R_{Market} - R_f)$	1.054	0.059	0.000
$\beta(SMB)$	0.811	0.111	0.000
$\beta(HML)$	0.048	0.071	0.500

Greenblatt 1st ROA Quartile High Yield		Adjusted R^2	0.866
Annual Alpha	3.56%	P-value for α	0.037
	Coefficient	*Standard Error*	*P-value*
$\beta(R_{Market} - R_f)$	0.881	0.027	0.000
$\beta(SMB)$	0.622	0.051	0.000
$\beta(HML)$	0.389	0.032	0.000

Greenblatt 1st ROA Quartile Low Yield		Adjusted R^2	0.900
Annual Alpha	-0.59%	P-value for α	0.746
	Coefficient	*Standard Error*	*P-value*
$\beta(R_{Market} - R_f)$	0.979	0.030	0.000
$\beta(SMB)$	0.646	0.056	0.000
$\beta(HML)$	-0.043	0.036	0.234

Greenblatt 2nd ROA Quartile High Yield		Adjusted R^2	0.864
Annual Alpha	6.08%	P-value for α	0.000
	Coefficient	*Standard Error*	*P-value*
$\beta(R_{Market} - R_f)$	0.785	0.024	0.000
$\beta(SMB)$	0.530	0.045	0.000
$\beta(HML)$	0.444	0.029	0.000

Greenblatt 2nd ROA Quartile Low Yield		Adjusted R^2	0.914
Annual Alpha	-1.15%	P-value for α	0.406
	Coefficient	*Standard Error*	*P-value*
$\beta(R_{Market} - R_f)$	0.919	0.022	0.000
$\beta(SMB)$	0.593	0.042	0.000
$\beta(HML)$	0.326	0.027	0.000

Greenblatt 3rd ROA Quartile High Yield		Adjusted R^2	0.866
Annual Alpha	0.12%	P-value for α	0.945
	Coefficient	*Standard Error*	*P-value*
$\beta(R_{Market} - R_f)$	0.886	0.027	0.000
$\beta(SMB)$	0.692	0.051	0.000
$\beta(HML)$	0.486	0.032	0.000

Greenblatt 3rd ROA Quartile Low Yield		Adjusted R^2	0.838
Annual Alpha	-3.87%	P-value for α	0.062
	Coefficient	*Standard Error*	*P-value*
$\beta(R_{Market} - R_f)$	0.968	0.034	0.000
$\beta(SMB)$	0.860	0.064	0.000
$\beta(HML)$	0.306	0.041	0.000

Appendix 3 – Regression Results from the Fama French 3 Factor Model for Main and Complementary Portfolios *(continued)*

Graham Current Ratio	Adjusted R^2		0.583
Annual Alpha	9.45%	P-value for α	0.038
	Coefficient	Standard Error	P-value
β($R_{Market} - R_f$)	1.062	0.070	0.000
β(SMB)	0.965	0.132	0.000
β(HML)	0.431	0.085	0.000

Graham Long-Term Debt	Adjusted R^2		0.535
Annual Alpha	12.21%	P-value for α	0.009
	Coefficient	Standard Error	P-value
β($R_{Market} - R_f$)	0.959	0.071	0.000
β(SMB)	1.047	0.134	0.000
β(HML)	0.382	0.086	0.000

Graham Earnings Persistence	Adjusted R^2		0.550
Annual Alpha	5.77%	P-value for α	0.120
	Coefficient	Standard Error	P-value
β($R_{Market} - R_f$)	0.839	0.058	0.000
β(SMB)	0.591	0.110	0.000
β(HML)	0.542	0.070	0.000

Graham Dividend Pay-Out Persistence	Adjusted R^2		0.579
Annual Alpha	6.06%	P-value for α	0.092
	Coefficient	Standard Error	P-value
β($R_{Market} - R_f$)	0.859	0.056	0.000
β(SMB)	0.641	0.106	0.000
β(HML)	0.536	0.068	0.000

Graham Earnings Growth	Adjusted R^2		0.710
Annual Alpha	3.48%	P-value for α	0.207
	Coefficient	Standard Error	P-value
β($R_{Market} - R_f$)	0.887	0.044	0.000
β(SMB)	0.612	0.082	0.000
β(HML)	0.560	0.053	0.000

Greenblatt 4th ROA Quartile High Yield	Adjusted R^2		0.713
Annual Alpha	-7.37%	P-value for α	0.032
	Coefficient	Standard Error	P-value
β($R_{Market} - R_f$)	1.085	0.057	0.000
β(SMB)	1.133	0.107	0.000
β(HML)	0.211	0.069	0.003

Greenblatt 4th ROA Quartile Low Yield	Adjusted R^2		0.576
Annual Alpha	2.66%	P-value for α	0.618
	Coefficient	Standard Error	P-value
β($R_{Market} - R_f$)	1.090	0.085	0.000
β(SMB)	1.432	0.160	0.000
β(HML)	-0.035	0.103	0.731

Greenblatt Momentum Preference	Adjusted R^2		0.785
Annual Alpha	1.84%	P-value for α	0.562
	Coefficient	Standard Error	P-value
β($R_{Market} - R_f$)	1.053	0.051	0.000
β(SMB)	0.716	0.096	0.000
β(HML)	-0.087	0.061	0.160