VALUE INVESTING: EVIDENCE FROM THE DUTCH STOCK MARKET

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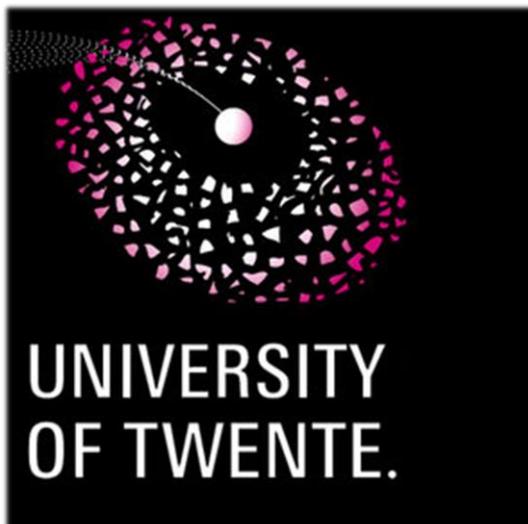
VALUE INVESTING: EVIDENCE FROM THE DUTCH STOCK MARKET

Abstract

This study tests the performance of value investing strategies for the Dutch stock market using stock market data covering the period between 1995 and 2013. The topic of value investing has been covered extensively in the financial literature, but there is not much evidence on the effectiveness of value investing on the Dutch stock market. The purpose of this article is to strengthen the evidence using a large dataset covering the last twenty years. The data for this research is based on stocks trading at the Euronext Amsterdam.

The purpose of this research is to test whether price/earnings ratio, book value to market value, price to cash flow and dividend yield are effective value indicators for the Dutch stock market. Previous research has shown that many of these indicators do have a correlation with the performance of a stock portfolio. Added to the most familiar value indicators are less familiar indicators such as return on assets (ROA) and return on invested capital (ROIC).

Earlier research on the topic of value investing provides strong evidence of the 'value premium'. Portfolios based on stocks with a low valuation tend to consistently outperform portfolios with highly valued stocks. This study tries to measure the value premium on the Dutch stock market and if present, which indicators are the strongest.

The results of this study show there is indeed a value premium on the Dutch stock market, consistent with the majority of the international evidence. The value premium however differs from one indicator to the next. The price to earnings ratio (P/E), the return on assets (ROA) and the return on invested capital (ROIC) are the strongest value indicators. The results also show some value premium for stocks with a high book to market value ratio and for stocks with a high cash flow yield. The relationship between dividend yield and stock performance was unclear.

Keywords: *value investing, growth stocks, value stocks, glamour stocks, portfolio analysis*

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Preface

My enthusiasm towards economics and finance started before entering high school. As a teenager, I was a keen watcher of RTL-Z, the first dedicated financial news channel in the Netherlands. Developments in the economy and the stock market fascinated me and in high school I enjoyed the economy class the most (along with history and geography).

While my enthusiasm towards economics and the stock market was already present from an early age, I became much more interested to learn about it after the financial crisis of 2008. The stock market crashed and investors started to panic. That was the moment where I wanted to know more about the causes for such violent stock market swings.

After reading many books and watching documentaries about the economy and the financial crisis I started to understand the business cycle in the economy and how the stock market reacts to this phenomenon.

From 2011 on, writing about the economy and the stock market became my profession. I started writing for Marketupdate.nl, a Dutch website with news and analysis on the economy in general and the gold market specifically.

While I do not personally invest money in the stock market (I prefer to save in physical gold), I am very interested in how investors think and act on the stock market. More often than not, small investors are convinced they know what kind of stock to buy at which price. They can brag about the good trades they make, but are hesitant to talk about the bets on which they lost money.

Some people dedicate their career to investing in the stock market. As professional fund managers they get a fee for investment other people's money. It fascinates me, because scientific research shows that most fund managers fail to outperform the market despite their full time dedication to investing (Cuthbertson, Nitzsche, & O'Sullivan, 2008). In the long run, a completely random investment strategy performs just as well as a strategy based momentum trading or the relative strength index (Biondo et al, 2013). Early

research on active investment strategies show that, because of management fees and transaction costs, many professional investors fail to outperform a simple buy-and-hold strategy (Jensen, 1967).

While it appears to be so difficult to outperform the stock market, there seems to be a strategy which still delivers on its promise. This strategy is called value investing and is all about selecting so called 'undervalued' stocks. Björn Kijl of the University of Twente introduced me to this topic and pointed me to the vast amount of literature on the topic. He introduced me to the work of successful value investors like Benjamin Graham and Joel Greenblatt.

Once I started digging into the existing scientific research of value investing, I observed there was little evidence on the value premium in the Dutch stock market. Using the Worldscope stock market database, I gathered all the data necessary to perform a thorough study on the value premium in the Netherlands. Using the most recent stock market data, I was able to see the impact of the latest financial crisis on the performance of value investing.

In this master thesis, I try to test the value premium on the Dutch stock market using a wide variety of financial ratios. The purpose of this research is to find out whether the value premium exists in the Netherlands and whether it diminishes or expands over time. Previous research has shown that the value premium is different from one country to the next (Fama & French, 1998). In some cases, no value premium was measured at all, for example in Turkey (Gonenc & Karan, 2003) and Japan (Fama & French, 2012). Chen and Zhang (1998) found no clear value premium in Thailand and Taiwan.

I would like to thank Björn Kijl for the time he spent on reading my work and providing feedback. Because my research question was not very clear from the start, it took some time to find the right approach for this research. Xiaohong Huang helped me a lot in setting goals and confining the research to its essence. Her feedback was very valuable and I would like to thank her as well. I would also like to thank the University of Rotterdam for providing me with the required stock market data and the University of Twente for providing me access to many journals with scientific articles on value investing. Using the EBSCO database I was able to construct a thorough literature review on the international evidence on the value premium.

Abbreviations

P/E	Price to earnings ratio
P/B	Price to book value of equity ratio
P/S	Price to sales ratio
P/CF	Price to cash flow ratio
DY	Dividend yield
CAPM	Capital Assets Pricing Model
ROA	Return on Assets
ROIC	Return on Invested Capital
HML	High Minus Low, the spread in annual return between companies with a high and a low book-to-market ratio

1. Introduction

In 1949, Benjamin Graham published a book titled *The Intelligent Investor*. In this book he lays the foundation for a structured approach to investing called 'value investing'. The idea behind value investing is that a stock market is only efficient in the long run and that a rational investor can take advantage of overly optimistic or pessimistic valuations on the stock market. In his book, Graham introduces an imaginary 'Mr. Market', which has severe mood swings from one day to the other. These mood swings correspond with the overall movements of the stock market, which can sometimes be violent as well.

According to Graham, a value investor should refrain listening to Mr. Market in the decision making process. Instead, the investor should stick to his or her own analysis and act accordingly. By systematically selecting those stocks neglected by most investors, the intelligent investor can consistently outperform the market.

Graham experienced this phenomenon already in the first half of the 20th century. Selecting stocks based solely on certain valuation metrics doubled stock market return compared the Dow Jones index. The value premium was so profound that Graham switched his focus from individual stocks to a group approach.

When talking about value investing, there are basically two paths one can follow. On one hand there is the qualitative view on value investing, where the management of a firm, the profit margin on their products and the growth potential of the market are important as well in making investment decisions. A true value investor takes into account not only the value of the assets of a company, but also the earnings power and the growth potential (Greenwald, Kahn, Sonkin, & van Biema, 2001). The financial literature often takes the quantitative approach to value investing, reducing the whole concept to a few financial ratios which can easily be calculated for each company, regardless of the market in which they operate and the growth potential of that market.

It took some time before the work of Benjamin Graham found support in the financial literature. Basu (1977) was one of the first to systematically evaluate the relationship between the price/earnings ratio of a stock and the stock return. After this publication many followed (see chapter 2). Research on the topic of value investing was expanded to

a number of different financial ratios and international evidence on value investing started to appear. Fama and French published the article *Value versus Growth: The International Evidence* (1998), in which they found a value premium in twelve out of thirteen tested markets. The international evidence on the value premium was confirmed by many others, as explained in chapter 2.

The purpose of this research is to test the value premium on the Dutch stock market, using a large set of financial indicators. Chapter 2 contains an extensive literature review on value investing, summarizing the main findings in past literature for and against the existence of the value premium worldwide. Chapter 3 presents the research question, together with the research methodology and the data. In chapter 4, the empirical results from the research are presented. The results are presented separately for each of the mentioned financial indicators. Chapter 5 summarizes the results from the empirical analysis and presents the main conclusions.

2. Literature review

In this chapter we summarize the findings in the literature on the topic of value investing. First we will present literature confirming the existence of the value premium. After that we will also discuss literature questioning this phenomenon. In chapter 2.3, we will discuss the international evidence, referring to scientific research performed in foreign markets.

2.1 Evidence supporting value investing

Value investing is an investment strategy based on the assumption that stocks move back and forth between undervaluation and overvaluation. Over the years, many types of stock market inefficiency has been found and documented in the financial literature.

Irrationality

Rozeff and Kinney (1976) made a case in support of a pattern called 'stock market seasonality', where they found stock returns to be higher in January compared to any other month. Same events were observed by Haugen and Lakonishok (1988) in their book titled '*The Incredible January Effect'*. An efficient market of rational investors would level out such anomalies, because investors would spot the irregularity and act accordingly to make excess returns. Over time, the arbitrage effect would make the anomaly disappear.

A similar anomaly in the stock market was found by Gibbons and Hess (1981) and French (1980) around stock market movements on Mondays. The so called 'Monday Effect' appeared after studying the daily stock market returns from 1962 till 1978. On average the Monday returns were clearly negative on average, with a significant margin of error. The markets apparently didn't see this anomaly during that long period or simply failed to arbitrage it. The data from 1970 till 1978 showed a decrease of the Monday effect, which however confirms some arbitrage in the markets. Research by Lakonishok and Smidt (1988) found statistical evidence for patterns in the stock markets at the end of each month, while Ariel (1990) found anomalies around holidays.

While these anomalies are not the main focus of this research, they support the assumption that investors do not always make rational decisions based on the information that is available to them.

DeBondt and Thaler (1985) and Kahneman & Tversky (1982) show that investors are prone to human properties like overconfidence in their ability to forecast the market movements and waves of optimism and pessimism which causes the stock market to overreact. These findings made a case for a new contrarian investment strategy, buying those stocks that are out of favor and selling or shorting the ones which are popular.

The research on contrarian investments strategies is somewhat related to research on the value premium. A value investor selects stocks which are undervalued based on certain financial ratios such as price to earnings, price to cash flow and price to book value. By systematically selection stocks based on their financial ratio, the value investor expects to achieve a risk adjusted return superior to the stock market index. Graham and Dodd referred to this approach in their book *Security Analysis* (1934).

The value premium

The value premium refers to the spread in return between stocks with a low and stocks with a high valuation, where the excess return cannot (fully) be attributed to additional risk. Investment managers classify stocks with a high book value compared to market value (B/M), a low price/earnings ratio (P/E) or a high cash flow yield (CF) as value stocks. Stocks which offer a high return on assets (ROA) or return on invested capital (ROIC) can also be considered value stocks, because they can be bought at a relatively low price compared to their performance.

The idea that selecting stocks based on these properties could reward an investor with higher returns attracted a lot of attention among academics. The first papers on this subject appeared decades after the publication of *Security Analysis* and *The Intelligent Investor.* Basu (1977) found a relationship between the price/earnings ratio and stock performance, while Capaul, Rowley and Sharpe (1993) and Chan, Hamao and Lakonishok (1991) documented a strong relationship between the book value to market value and stock return. Bauman, Conover and Miller (1998) and Fama and French

(1998) both performed a cross-country study and came to the conclusion that value stocks outperform growth stocks in almost every country. Unfortunately both articles do not explain why the results are not in favor of value investing in all countries. Bauman et al. tested the value premium using both the P/E and the P/B indicator, while Fama and French tested only for the P/B indicator.

According to Lakonishok et al. (1994) and Haugen (1995) the value premium arises because the market undervalues distressed stocks and overvalues growth stocks. Over time, these errors are corrected, resulting in a lower expected return for growth stocks and a higher expected return for value stocks.

The international evidence was tested again by Spyrou and Kassimatis (2009). Their research shows the existence of a value premium in European markets. This premium however can be attributed to a few years of very high returns: for the majority of the sample years the value premium is indistinguishable from zero in most markets, while for certain markets the HML is statistically significant for only 20% of the sample period.

HML stands for 'high minus low' and is part of the three factor asset pricing model of Fama and French. Basically HML is the term used to describe the spread in returns between stocks with a high and low book-to-market ratio.

Arshanapalli, Coggin and Doukas (1998) analyzed stock returns in 18 different equity markets from four different regions. Using data from 1975 till 1995 they found a substantial difference in return between low and high book-to-market stocks in 17 out of 18 markets. Fama and French (2012) also performed a new study on the international value premium. They found common patterns in average returns in developed markets, echoing results from earlier studies on the international value premium. Fama and French found a value premium in average returns in all four regions examined (North America, Europe, Japan, and Asia Pacific).

2.2　Alternative explanations on the value premium

Size effect

While many articles show a value premium, there was some criticism on the research methodology early on. According to Banz (1981), Reinganum (1980) and Stattman (1980), the value premium is more related to firm size than to indicators as the P/E ratio and the price to book value. In their research, they found a stronger relationship between stock performance and size than between stock performance and their financial ratios.

Banz (1981) tested the value premium on a larger time period from 1926 till 1975. He also found a strong value premium, but noted that some of this premium could be explained by firm size. After analyzing stock market data from the NYSE, he found small stocks to outperform large stocks. The results were significant, because they could not be explained solely by volatility risk using the Capital Assets Pricing Model.

The model of Klein and Bawa (1977) gives us a possible explanation of the firm size effect. In their model, they state that many investors do not want to hold stocks of small companies, because of the limited availability of information on the stock. Risk averse investors prefer to invest in those securities which have the most information. The limited diversification among large investors could be the reason why small stocks outperform large stocks. The demand for small stocks is lower, which means there are less bids for these stocks in the market. Once the market recognizes the true value of a stock, the price rises. The financial indicators such as the price/earnings ratio and the ratio of book value to market value could be just the results of this.

Fama and French (1996) built a three factor risk-return model, in which they incorporate both the size effect and the book-to-market ratio to isolate the value premium. Using their model, they were able to fully explain the value premium, including the size factor. Criticism on value investing is that the superior performance is related to the selection of stocks which carry higher risk in terms of volatility.

Risk

When you make the assumption that the value premium is indeed strongly related to firm size, it is useful to analyze the differences between small and large stocks as well. Chan and Chen (1991) performed an analysis using NYSE data and found out there is risk involved in buying stocks from firms with a small market cap. They argue that small firms, at least on the NYSE, tend to be firms which are less efficiently run and have higher financial leverage. Because of this, small firms could also have more trouble getting access to external financing. Therefore, the authors conclude that the additional return on small stocks is largely a compensation for the additional risk for the investor.

Another study published by Chen and Zhang (1998) confirms the importance of the risk factor in value investing. They built a model measuring risk as the amount of volatility of a stock and applied it to six different countries. The results of their research shows that the value premium can be captured once dividend cuts, financial leverage and the standard deviation of returns are included in the equation. The authors conclude that value stocks do indeed outperform growth stocks in most markets, but that the premium is largely explained by additional risk regarding stock volatility.

However, most of the literature on value investing implies that the value premium is at best only partially explained by tolerating additional risk. Basu (1977) concluded that value stock portfolios performed better on both an absolute and a risk-adjusted basis than a portfolio based on growth stocks. Reinganum (1980), Lakonishok et al. (1994), Arshanapalli et al. (1998), Fama and French (1998) and Kwag and Lee (2006) all concluded that the additional performance of the value stocks over glamour stocks could not or only partially be explained by taking on additional risk, where risk is defined as the beta (volatility) of individual stocks.

Risk is not always defined as volatility. Warren Buffett defines risk as the reasoned probability of an investment losing purchasing power. From an article in Fortune:
"Assets can fluctuate greatly in price and not be risky as long as they are reasonably certain to deliver increased purchasing power over their holding period. And as we will see, a non-fluctuating asset can be laden with risk" (Buffett, 2012).

Survivorship bias

Breen and Korajczyk (1994) tested whether selection bias could impact the results when using NYSE/AMEX data. In their research they couldn't find a problem comparing this data with the Compustat database. Kothari, Schanken and Sloan (1995) conclude that firms reporting extreme earnings increases are more likely to have a higher book-to-market value ratio. Their research suggests a small portion of the drift could be attributed to Compustat selection bias.

Chan, Jegadeesh and Lakonishok (1995) examined the potential bias using both the Compustat and CRSP databases. In their article "Evaluating the performance of value versus glamour stocks: The impact of selection bias", the authors take a critical look at the way stock returns are being examined for both value stocks and growth stocks.

Despite the warnings posed by Breen and Korajczyk (1994), research by Kothari, Schanken and Sloan (1995) and Chan, Jegadeesh and Lakonishok (1995) shows that the impact of selection bias - based on discrepancies between Compustat and CRSP - is exaggerated.

They conclude that while there is a slight difference between the average P/E of stocks that are present and missing in the Compustat database, it is too small to question the large amount of evidence supporting the value premium. From all the missing data on the Compustat database, only a small number of stocks was in a financially distressed situation.

Chan et al. (1995) conclude that future research on the value premium should clearly document the potential for selection bias in the sample used. Future research should also mention the proportion of company years not found in the database on which the conclusions are drawn.

2.3   International evidence

Table 1 on the page 17,18 and 19 provides an overview of the international evidence on value investing using the EBSCO database for articles with the term "value growth" published in academic journals.

Based on the vast amount of research on the international value investing premium we can conclude that the premium is not limited to a specific geographic region. The premium doesn't seem to fade away over time, as the results were consistently in favor of the value investing approach between 1970 and 2011.

With the exception of Turkey, Brazil, Taiwan, Thailand, the value investing strategy does deliver superior returns compared to the market index. While results vary from one indicator to the other, the consensus is that selecting stocks based on these indicators can help investors around the world to enhance their portfolio return.

The purpose of this research is to find out whether the value investing strategy works in the Netherlands and which of the many financial ratios delivers the best results. As mentioned above, the value premium can differ substantially from one country to another. The purpose of this research is to find out whether value investing works for the Dutch stock market and whether the value premium is still present using the most recent dataset.

Before we go on to analyze and discuss the Dutch stock market data, let's first take a look at the international evidence on the value premium. The articles selected in this literature review all compare the results of a specific stock market portfolio with the market in general. The selected articles all apply the same methodology of rebalancing the stock portfolio after a while. Using this approach, it is possible to compare the results between countries and in different time periods. In most cases it is set at one year, but some authors look at the value premium over two or three year holding period.

In most studies, the value stocks are selected based on their book-to-market ratio, which is the ratio between the market value of a stock and the book value of the assets of the

underlying business. Others incorporate additional ratios, such as price-to-earnings (P/E), the cash flow yield (CF) and the dividend yield (DY). A number of articles also test the effect of firm size on stock return, to test whether the outperformance can be attributed to size rather than the value indicator itself.

The table below presents a selection of articles on value investing in a variety of stock markets around the world. These articles were collected from the EBSCO database after searching for the keywords "value growth" and were published in a scientific journal. They cover the period from 1970 till 2011 and provide a general view on the performance of value investing. All studies were based on building portfolios from stocks, ranked on a number of financial indicators: **B/M** = book value to market value, **P/B** = price to book value, **P/E** = price to earnings, **P/CF** = price to cashflow, **P/S** = price to sales, **DY** = dividend yield.

Author	Year	Research area (geographic)	Period	Indicators	Conclusion
Chan, Lakonishok	1991	Japan	1971-1988	B/M , P/E , P/CF	Value stocks outperform growth stocks, but the B/M ratio and cash flow yield are stronger indicators than the P/E indicator.
Capaul, Rowley, Sharpe	1993	France, Germany, Switzerland, UK, Japan, US	1981-1992	P/B	Value stocks provided superior risk-adjusted performance in each of the researched countries. However, it is not clear what causes the outperformance.
Arshanapalli, Coggins, Doukas	1998	US, Canada, Austria, Belgium, Denmark, France, Germany, UK, Netherlands, Norway, Spain, Sweden, Switzerland, Australia, Hong Kong, Japan, Malaysia, Singapore	1975-1995	B/M	The results show the superiority of value stocks compared to growth stocks during the period 1975 till 1995. Size and book-to market ratio both have a predictive value in future returns.
Chen, Zhang	1998	US, Japan, Hong Kong, Malaysia, Taiwan and Thailand	1970-1993	B/M , DY , Size	Strong value stock effects persist in the U.S, but Japan, Hong and Malaysia markets show less value investing advantage. In Taiwan and Thailand the benefits of value investing are undetectable.
Bauman, Conover, Miller	1998	Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Italy, Japan, Malaysia, Netherlands, Norway, Singapore, Spain, Sweden, Switzerland, UK	1985-1996	B/M , P/E , P/CF , DY	Value stocks generally outperform growth stocks, but in some years value stocks did underperform.
Fama, French	1998	US, Japan, UK, France, Germany, Italy, Netherlands, Belgium, Switzerland, Sweden, Australia, Hong Kong, Singapore	1974-1994	B/M , P/E , P/CF , DY	Value stocks tend to have higher returns than growth stocks in markets around the world for each of the mentioned indicators
Levis, Liodakis	1999	United Kingdom	1968-1997	B/M	Value stocks did outperform growth stocks
Gonenc, Karan	2003	Turkey	1993-1998	B/M, size	There is no value premium on the Istanbul Stock Exchange. Neither value nor growth stocks manage to outperform the market

Wang	2004	China	1994-2000	B/M, size	Small stocks outperform large stocks and value stocks outperform growth stocks.
Yen, Sun, Yan	2004	Singapore	1975-1997	B/M , P/E , P/CF	Value stocks outperform growth stocks based on each of these indicators
Truong	2009	New Zealand	1997-2007	P/E	The value premium based on the P/E ratio is persistent and could not fully be attributed to risk.
Michou	2009	United Kingdom	1975-2006	B/M , Size	The value spread is not a good predictor of stock returns. There is some predictive power among small stocks, but none among large stocks
Spyrou, Kassimatis	2009	Austria, Denmark, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Sweden, Switzerland, UK	1982-2005	B/M	The value premium is strong on average, but the outperformance of value stocks is significant only in a few occasions
Athanassakos	2009	Canada	1985-2005	P/E , P/B	A value strategy beats a growth strategy. Forming portfolios based on the value investing approach can help investors to achieve superior long-term performance.
Arisoy	2010	France	1997-2007	B/M , P/E , P/CF , DY	The value stocks outperform growth stocks in good times, but they lose more during bad times
Sareewiwatthana	2011	Thailand	1996-2010	P/B , P/E , DY	The value portfolios significantly outperformed growth portfolios on the Thailand stock market.
Huang	2011	Taiwan	1985-2009	B/M , P/E , P/CF , DY	The value premium is significantly positive
Deb	2012	India	1996-2010	P/B	Value stocks outperform growth stocks during the major part of the study period. The value premium was most visible with the 2 to 5 year holding period
Brailsford, Gaunt, O'Brien	2012	Australia	1982-2006	B/M , Size	There is a systemic value premium across all size categories

Fama, French	2012	North America, Europa, Japan (23 countries, not specifically mentioned)	1989-2011	B/M , Size	Value premiums were found in each of the four regions. When taking size into account, the value premium is larger for small stocks in all countries except Japan.
Huang, Yang, Zhang	2013	China	1997-2008	B/M , Size	Value premium does exist in the Chinese stock market
Gharghori, Strykowski, Veeraraghavan	2013	Australia	1992-2009	B/M , P/S , P/E , P/CF, Size	A strong value premium exists on the Australian stock market. Both book to market value and Cashflow to price are strong indicators of value premium.
Kyriazis, Christou	2013	Greece	2003-2008	P/E , B/M , DY	Value investing strategies based on each of these three indicators achieved superior stock performance.
Cordeiro, Machado	2013	Brazil	1995-2008	B/M , P/CF , P/E , Size	The long-term evidence favors growth stocks more than value stocks. The value premium is absent in Brazil based on B/M and Cashflow/price ratios.

Table 1: *International evidence on value investing*

3. Hypothesis, data and methodology

In this chapter, we discuss the main research question and the data and methodology used to draw conclusions on the value premium on the Dutch stock market.

3.1   Hypothesis

The main research question is:

- ***Do value stocks outperform growth stocks in the Dutch stock market?***

Additional questions this research tries to answer are:

- ***Is there a value premium on the Dutch stock market?***
- ***If there is value premium, which indicator is the strongest?***
- ***Do small stocks outperform large stocks?***

Value stocks are defined as stocks with [1] low price in relation to their earnings, [2] high book value compared to the market value, [3] high cash flow yield, [4] high dividend yield, [5] high return on assets or [6] high return on invested capital. To summarize: stocks which provide a lot of value for the price at which they can be obtained.

The questions above will be answered after analyzing stock data for Euronext Amsterdam. The indicators to measure are:

- Price / Earnings ratio (P/E)
- Price / Book Value ratio (P/B)
- Price / Cashflow ratio (P/CF)
- Return on Assets (ROA)
- Return on Invested Capital (ROIC)
- Dividend yield (DY)
- Size

3.2   Data

This study uses data from the Thomson Reuters Worldscope database, which contains stock information for all stocks listed at the Euronext Amsterdam Exchange. This database provides year-end data on stock quotes, Price to Earnings (P/E), Price to Book Value (P/B), Price to Cash Flow (P/CF), Dividend Yield (DY), Return on Assets (ROA) and Return on Invested Capital (ROIC). The database covers stock information from 1994 till 2013.

The Worldscope database contains 197 stock quotes. Of this selection there are 30 without data and 18 duplicates. Once we remove these from our database, we get a final sample of 149 stocks. To be included in the sample, the database should contain information on both stock price and at least one of the indicators mentioned above.

These indicators will be used to test whether there is a value premium on the Euronext Amsterdam. Furthermore, stocks were ranked separately based on size as well, to find out if size matters for stock returns between 1995 and 2013.

The Capital Asset Pricing Model (CAPM) designed by Sharpe (1964) and Lintner (1965) will be applied to find out whether a potential value premium can be attributed to additional risk taken. The CAPM model is a quick way to evaluate the return of a stock or a portfolio against the market average. In order to calculate the required rate of return for the value portfolio, we use the 10 year Dutch bond yield as a proxy for the risk free rate. The average annual yield was obtained from the website of the Nederlandsche Bank. The average annual geometrical rate of return for the value portfolio should be higher than the number we get from the CAPM calculations. If this is the case, the value premium cannot fully be attributed to taking additional risk when buying value stocks.

While the CAPM model has widely been used for portfolio analysis, there are some limitations to the model. When measuring portfolios of small, low beta or value stocks, the CAPM model tends to produce positive abnormal returns (Fama and French, 2004).

3.3   Methodology

At the end of every year the stocks will be ranked separately on the each of the ratios mentioned in chapter 2.1. We collected data from 1994 till 2013 and calculated the return for each stock in the following year. The stocks will be sorted on each ratio (from low to high) and separately on firm size (small to big). After ranking the stocks, the 30% with the lowest valuation is attributed to the 'value portfolio. The 30% with the highest valuation is attributed to the growth portfolio. The remaining 40% in between is attributed to a portfolio called the 'middle' portfolio.

The same methodology was applied by Levis & Liodakis (1999) and Gonenc & Karan (2003). The results for the dividend yield are split in just two portfolios, because of the low number of stocks with data. Splitting these results in three would substantially diminish their statistical power. In this case, the value portfolio consists of the 50% stocks with the lowest dividend yield and the growth portfolio of the 50% stocks with the highest dividend yield. All portfolios are renewed each year, starting in 1995. This is a time period used in many of the articles on value investing. The stock returns are measured as the difference in stock price between the moment of portfolio formation and the following year.

Because portfolios are rebuilt after one year, it is possible to include stocks which do not have data all the way back to 1994. As a result of this, the number of samples differs from one year to another and between value indicators. The number of stocks with useful data in each year for each of the value indicators is mentioned in the results.

I.   *How the annual return for each portfolio is calculated:*

$$R = \frac{S1 + S2 + S3 + \cdots + Sx}{n}$$

R =   Annual return

Sx =   Return for stock x

n =   Number of stocks in the portfolio (growth, middle, value)

II. How the cumulative return for each portfolio over the entire 1994 - 2013 time period is calculated:

$$Rc = R1 * R2 * R3 * \ldots * R19$$

Rc = Cumulative portfolio return

Rx = Return in year x

III. How the average annual return for each portfolio is calculated:

$$Ra = R1 * R2 * R3 * \ldots * R19^{\left(\frac{1}{19}\right)}$$

Ra = Average annual return

Rx = Return in year x

IV. How the value premium is calculated:

$$VP = Rv - Rg$$

VP = Value premium

Rv = Average annual return for the value portfolio

Rg = Average annual return for the growth portfolio

While the tables in chapter 4 show annual performance for value and growth stocks (I), the graphs shows the cumulative gains of both the value and the growth portfolios (II). The stocks in between are colored in red and are titled 'Middle', while the results from all stocks are displayed in purple as the 'Market'. The results of selecting value stocks year after year are displayed by the blue line. Growth stocks are shown in green.

The results are presented for each value indicator separately, to keep the results clear and easy to understand. For each indicator there is a CAPM calculation based on the geometrical average returns for both the value portfolio and the market. The table in chapter 4.8 summarizes the average annual return and the value premium (III and IV).

4. Empirical results

In this chapter we discuss the results of the research methodology described above. The results will be discussed separately for each value indicator. For each indicator we start with the return for the value portfolio (bottom 30%), the middle portfolio (middle 40%) and the growth portfolio (top 30%). Based on this approach, the value premium can be calculated.

After that, we present the compounding return when the stock portfolio is held during the entire period and is rebalanced after each year. This graph directly shows whether an investor can indeed outperform the market in the long run using the value investing approach. It is important to mention that transaction costs were not taken into account.

The last step is to assess the risk involved in buying value stocks. Using the CAPM model, we can calculate the required rate of return for the value portfolio. The outcome of this calculation can be compared with the realized return on the value portfolio.

The beta is calculated on a portfolio basis by comparing the returns of the entire value portfolio to the market return. The risk-free rate is the Dutch 10-year government bond yield, with data from De Nederlandsche Bank.

The CAPM formula:

$$Er = Rf + \beta(E(Rm) - Rf)$$

Er =   *Expected return*

Rf =   *Risk free rate*

B =   *Beta*

E(Rm) =   *Expected market return*

Using this formula we can analyze whether the return of the value portfolio is indeed sufficient to compensate for possible higher volatility of such a portfolio compared to the market.

4.1 Price/earnings ratio

This section presents the results from the analysis of the Euronext stock market data.

Year	# of stocks	Value	Middle	Growth	Market	Value premium
1995	49	16,81%	7,50%	9,83%	11,06%	6,98%
1996	50	61,27%	40,09%	23,05%	41,33%	38,23%
1997	54	18,76%	33,10%	20,20%	25,03%	-1,44%
1998	64	9,29%	15,83%	14,68%	13,55%	-5,39%
1999	70	6,76%	-2,90%	30,01%	9,87%	-23,24%
2000	65	8,30%	9,05%	-12,48%	2,19%	20,78%
2001	87	-5,71%	-10,16%	-24,35%	-13,07%	18,64%
2002	79	-16,94%	-27,12%	-26,22%	-23,75%	9,28%
2003	73	16,29%	24,59%	12,81%	18,54%	3,48%
2004	80	38,48%	17,20%	11,66%	21,92%	26,82%
2005	95	39,06%	36,94%	34,93%	36,97%	4,13%
2006	92	19,30%	20,30%	31,62%	23,44%	-12,32%
2007	97	0,77%	6,01%	9,17%	5,39%	-8,40%
2008	92	-38,51%	-47,53%	-53,68%	-46,66%	15,17%
2009	74	79,94%	36,73%	29,80%	47,52%	50,14%
2010	74	16,69%	17,35%	12,65%	15,76%	4,04%
2011	104	-14,23%	-10,82%	-22,84%	-15,42%	8,61%
2012	77	6,21%	11,82%	1,48%	7,06%	4,73%
2013	47	36,29%	34,14%	27,32%	32,75%	8,96%

Table 2: *Return of portfolios based on their P/E ratio*

A portfolio of stocks with the lowest P/E ratio outperformed the portfolio with high P/E stocks in 14 out of 19 years. In 5 years, the portfolio of low P/E stocks produced a lower return than the portfolio based on stocks with a high P/E ratio. This indicator shows a strong value premium over the time period of this research. The growth stocks clearly deliver the lowest returns, as shown in graph 1.
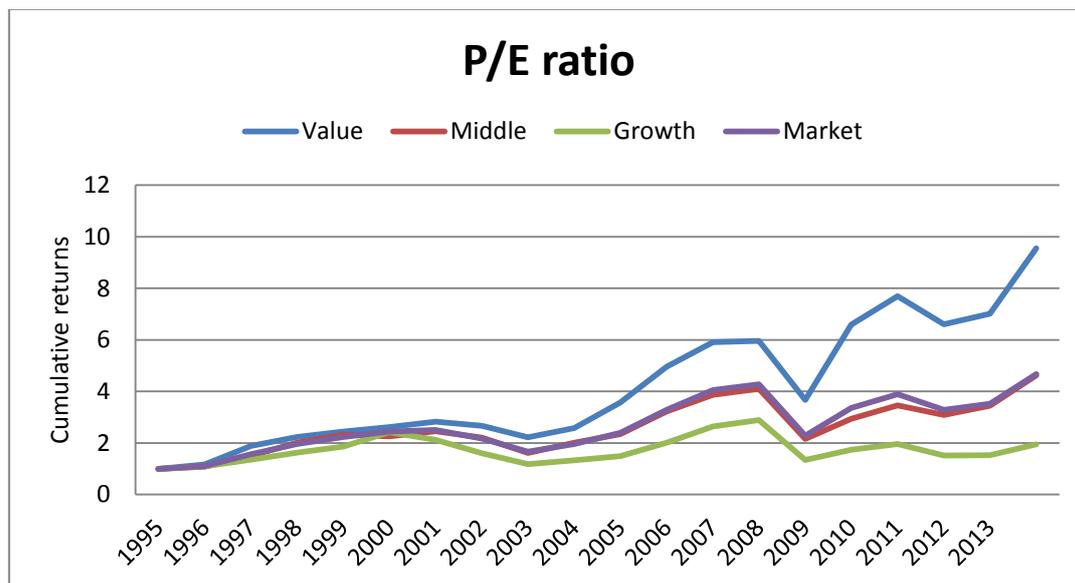
Graph 1: *Cumulative return of portfolios ranked on the P/E ratio*

Year	Value portfolio return	Market return	Risk free rate (10 year bond yield)
1995	16,81%	11,06%	6,90%
1996	61,27%	41,33%	6,15%
1997	18,76%	25,03%	5,58%
1998	9,29%	13,55%	4,62%
1999	6,76%	9,87%	4,65%
2000	8,30%	2,19%	5,41%
2001	-5,71%	-13,07%	4,96%
2002	-16,94%	-23,75%	4,89%
2003	16,29%	18,54%	4,12%
2004	38,48%	21,92%	4,09%
2005	39,06%	36,97%	3,37%
2006	19,30%	23,44%	3,78%
2007	0,77%	5,39%	4,29%
2008	-38,51%	-46,66%	4,23%
2009	79,94%	47,52%	3,69%
2010	16,69%	15,76%	2,99%
2011	-14,23%	-15,42%	2,98%
2012	6,21%	7,06%	1,93%
2013	36,29%	32,75%	1,96%
Geometrical Average	**12,61%**	**8,46%**	**4,23%**
		Beta of the value portfolio (β)	1,0953
		Risk free return(Er)	4,23%
		Required return for value portfolio	**8,86%**

***Table 3:** Average annual rate of return and volatility of the value portfolio*

While the value stocks selected on P/E do outperform the growth stocks and the market average, the question remains whether the results are significant on a risk-adjusted basis. Common practice in portfolio analysis is to include the risk factor, where risk is measured as the amount of volatility of a stock (or portfolio) compared to the market. The dataset used for this study in itself is not sufficient to measure risk as the risk of losing money.

To measure the impact of volatility we calculate the CAPM. This requires a calculation of the required rate of return given the volatility (beta) of the value portfolio in relation to the market and the risk-free rate. The results are shown in table 3 above. Selecting the stocks with the lowest P/E ratio each year for the entire period will reward the investor

with an average return of 12,61% annually. In comparison, the market rewarded the investor with a lower annual return of 8,46%.

Using the CAPM formula, the value portfolio should have a geometrical average annual return which compensates the investor for risk, measured as the β (beta) of the value portfolio between 1995 and 2013.

Using the calculations in table 3, we get the following result:

$$4,23 + 1,095(8,46 - 4,23) = \mathbf{8,86}\%$$

Which leads to the conclusion that the value portfolio based on the P/E ratio does deliver a superior risk-adjusted return, since the annual return is much higher with 12,61% on average.

4.2 Cashflow yield

Selecting stocks based on the cash flow yield, we get the following results.

Year	Number of stocks	Value	Middle	Growth	Market	Value premium
1995	48	14,15%	6,51%	9,49%	9,61%	4,66%
1996	52	40,61%	57,11%	21,23%	40,99%	19,39%
1997	59	24,54%	32,41%	20,89%	26,50%	3,65%
1998	63	2,63%	19,35%	10,34%	11,59%	-7,71%
1999	74	1,30%	6,06%	22,85%	9,64%	-21,55%
2000	77	11,35%	2,59%	-12,08%	0,83%	23,44%
2001	98	-6,72%	-8,62%	-24,14%	-12,65%	17,41%
2002	89	-22,14%	-25,61%	-29,72%	-25,80%	7,58%
2003	94	16,57%	27,50%	26,12%	23,83%	-9,55%
2004	91	21,15%	29,27%	8,90%	20,19%	12,25%
2005	59	34,60%	39,74%	14,68%	30,52%	19,92%
2006	80	14,03%	32,51%	19,58%	23,09%	-5,55%
2007	96	8,95%	5,48%	4,72%	6,30%	4,23%
2008	87	-50,39%	-47,25%	-52,49%	-49,75%	2,11%
2009	82	67,98%	43,37%	33,64%	47,91%	34,34%
2010	76	18,20%	17,53%	16,10%	17,30%	2,10%
2011	88	-4,54%	-12,58%	-24,82%	-13,82%	20,27%
2012	66	-6,04%	7,76%	12,17%	4,91%	-18,22%
2013	39	42,95%	28,20%	27,27%	32,45%	15,68%

Table 4: Return of portfolios based on their cash flow yield

From 1995 till 2013, the value stocks outperformed the growth stocks in 14 years. In 5 years, the value stocks produced lower returns than growth stocks. This indicator does not show a clear value premium, since the middle portfolio did even better than the value portfolio. Growth stocks however delivered the least return.
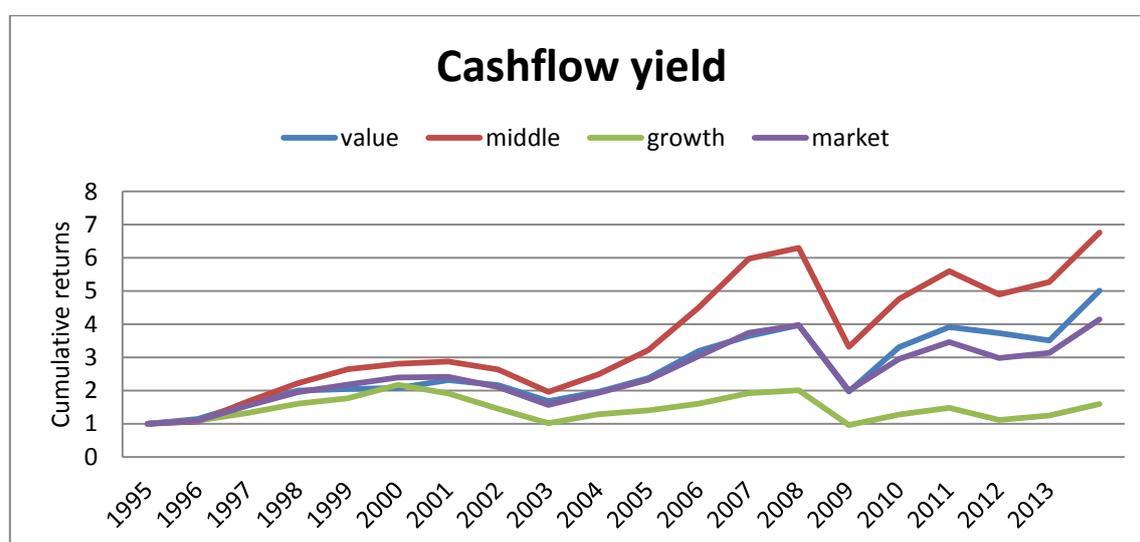
Graph 2: Cumulative return of portfolios ranked on the cash flow yield

Year	Value portfolio return	Market return	Risk free rate (10 year bond yield)
1995	14,15%	9,61%	6,90%
1996	40,61%	40,99%	6,15%
1997	24,54%	26,50%	5,58%
1998	2,63%	11,59%	4,62%
1999	1,30%	9,64%	4,65%
2000	11,35%	0,83%	5,41%
2001	-6,72%	-12,65%	4,96%
2002	-22,14%	-25,80%	4,89%
2003	16,57%	23,83%	4,12%
2004	21,15%	20,19%	4,09%
2005	34,60%	30,52%	3,37%
2006	14,03%	23,09%	3,78%
2007	8,95%	6,30%	4,29%
2008	-50,39%	-49,75%	4,23%
2009	67,98%	47,91%	3,69%
2010	18,20%	17,30%	2,99%
2011	-4,54%	-13,82%	2,98%
2012	-6,04%	4,91%	1,93%
2013	42,95%	32,45%	1,96%
Geometrical Average	**8,85%**	**7,77%**	**4,23%**
		Beta of the value portfolio (β)	1,0296
		Risk free return (Er)	4,23%
		Required return for value portfolio	**7,87%**

Table 5: *Average annual rate of return and volatility of the value portfolio*

Using the CAPM formula, the value portfolio should have a geometrical average annual return which compensates the investor for risk, measured as the β (beta) of the value portfolio between 1995 and 2013. Using the results from the cash flow based stock portfolios, we get the following result:

$$4,23 + 1,0296(7,77 - 4,23) = \mathbf{7,87}\%$$

Which could lead to the conclusion that the value portfolio based on the cash flow ratio does deliver a superior risk-adjusted return as well.

4.3   Book to market value

Because the book to market ratio is mentioned quite often in value investing, we expect a lot from this indicator. The annual return of each portfolio is shown in table 6.

Year	Number of stocks	Value	Middle	Growth	Market	Value premium
1995	56	-8,13%	17,81%	19,70%	10,51%	-27,83%
1996	59	30,67%	35,30%	55,11%	39,93%	-24,45%
1997	66	19,27%	24,01%	33,86%	25,56%	-14,59%
1998	72	0,47%	10,36%	29,40%	13,15%	-28,93%
1999	81	18,10%	7,75%	13,50%	12,52%	4,60%
2000	81	1,03%	6,04%	-10,15%	-0,24%	11,18%
2001	93	-13,34%	-16,41%	-24,22%	-17,84%	10,88%
2002	111	-12,77%	-24,16%	-37,58%	-24,76%	24,81%
2003	109	27,88%	20,26%	27,52%	24,77%	0,35%
2004	109	25,84%	21,73%	14,10%	20,67%	11,74%
2005	113	23,52%	43,24%	38,31%	35,76%	-14,79%
2006	121	22,28%	26,24%	25,81%	24,93%	-3,53%
2007	122	8,27%	2,11%	2,10%	3,97%	6,17%
2008	118	-34,49%	-50,85%	-52,22%	-46,40%	17,73%
2009	120	76,47%	38,45%	44,16%	51,57%	32,31%
2010	118	7,25%	13,14%	23,75%	14,54%	-16,50%
2011	128	-9,66%	-20,73%	-20,47%	-17,37%	10,81%
2012	114	1,46%	7,33%	8,41%	5,90%	-6,95%
2013	79	40,57%	15,27%	26,51%	26,37%	14,06%

Table 6: *Return of portfolios based on their book to market value ratio*

From 1995 till 2013 value stocks outperformed the growth stocks in 11 years. In 8 years, the value stocks produced lower returns than growth stocks. The value portfolio produced a higher return than the growth portfolio.
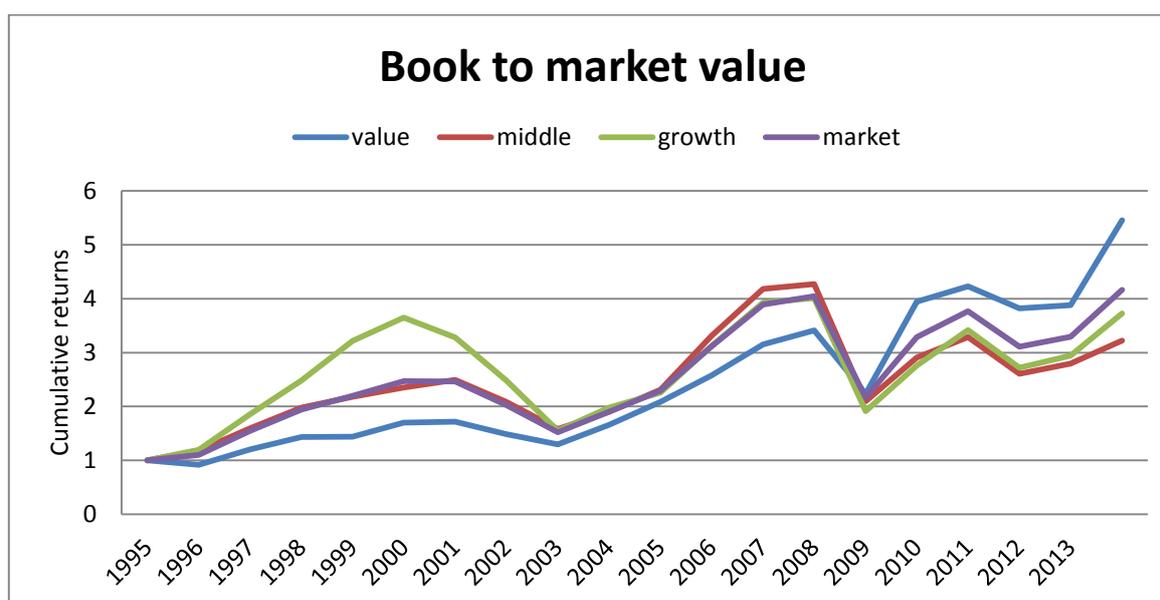
Graph 3: *Cumulative return of portfolios ranked on the book to market value*

Year	Value portfolio return	Market return	Risk free rate (10 year bond yield)
1995	-8,13%	10,51%	6,90%
1996	30,67%	39,93%	6,15%
1997	19,27%	25,56%	5,58%
1998	0,47%	13,15%	4,62%
1999	18,10%	12,52%	4,65%
2000	1,03%	-0,24%	5,41%
2001	-13,34%	-17,84%	4,96%
2002	-12,77%	-24,76%	4,89%
2003	27,88%	24,77%	4,12%
2004	25,84%	20,67%	4,09%
2005	23,52%	35,76%	3,37%
2006	22,28%	24,93%	3,78%
2007	8,27%	3,97%	4,29%
2008	-34,49%	-46,40%	4,23%
2009	76,47%	51,57%	3,69%
2010	7,25%	14,54%	2,99%
2011	-9,66%	-17,37%	2,98%
2012	1,46%	5,90%	1,93%
2013	40,57%	26,37%	1,96%
Geometrical Average	**9,34%**	**7,80%**	**4,23%**
		Beta of the value portfolio(6)	0,9242
		Risk free return (Er)	4,23%
		Required return for value portfolio	**7,53%**

Table 7: *Average annual rate of return and volatility of the value portfolio*

Using the CAPM formula, the value portfolio should have a geometrical average annual return which compensates the investor for risk, measured as the β (beta) of the value portfolio between 1995 and 2013. Using the results from the portfolio based on the book to market value indicator, we get the following result:

$$4,23 + 0,9242(7,80 - 4,23) = \mathbf{7,53}\%$$

This leads to the conclusion that the value stock portfolio based on the book to market ratio delivers superior returns, while being less volatile than the market. It is important to note that growth stocks (based on this financial ratio) did substantially better in the stock market boom during the late nineties. However, after the 2008 financial crisis, the value stocks started to outperform the growth stocks.

4.4   Return on assets

Return on assets has rarely been mentioned in research on value investing. The purpose of this research is to find out whether this indicator has any predictive value.

Year	Number of stocks	Value	Middle	Growth	Market	Value premium
1995	62	17,32%	10,76%	9,90%	11,59%	10,42%
1996	67	58,21%	29,40%	28,26%	37,66%	29,95%
1997	70	43,21%	15,94%	25,42%	26,97%	17,79%
1998	83	22,74%	7,55%	10,55%	13,03%	12,19%
1999	92	16,14%	20,10%	27,07%	21,02%	-10,93%
2000	97	4,43%	0,92%	4,64%	3,08%	-0,22%
2001	108	-9,72%	-15,98%	-27,55%	-17,56%	17,84%
2002	114	-26,56%	-21,06%	-27,31%	-24,57%	0,76%
2003	115	22,24%	17,87%	41,16%	26,29%	-18,92%
2004	115	21,70%	22,25%	9,78%	18,29%	11,92%
2005	118	34,58%	36,20%	23,56%	31,97%	11,02%
2006	124	25,31%	26,75%	18,30%	23,80%	7,00%
2007	127	1,55%	5,85%	6,67%	4,81%	-5,12%
2008	124	-46,33%	-44,16%	-47,65%	-45,85%	1,32%
2009	122	50,69%	49,14%	53,20%	50,84%	-2,51%
2010	125	14,86%	16,14%	9,42%	13,71%	5,43%
2011	131	3,79%	-16,47%	-24,26%	-12,76%	28,05%
2012	129	10,04%	3,26%	-3,85%	3,16%	13,90%
2013	84	27,35%	28,96%	17,19%	24,98%	10,16%

Table 8: *Return of portfolios based on their return on assets*

From 1995 till 2013, the value stocks outperformed the growth stocks in 14 years. In 5 years, the value stocks produced lower returns than growth stocks. The value portfolio had a substantially higher compounding return, as shown in graph 4 below.
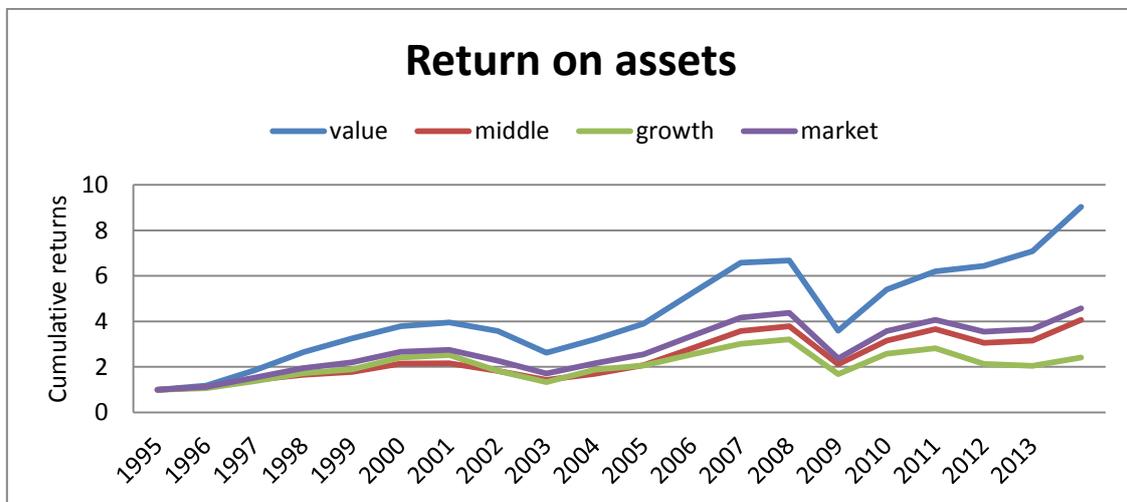
Graph 4: *Cumulative return of portfolios ranked on return on assets*

Year	Value portfolio return	Market return	Risk free rate (10 year bond yield)
1995	17,32%	11,59%	6,90%
1996	58,21%	37,66%	6,15%
1997	43,21%	26,97%	5,58%
1998	22,74%	13,03%	4,62%
1999	16,14%	21,02%	4,65%
2000	4,43%	3,08%	5,41%
2001	-9,72%	-17,56%	4,96%
2002	-26,56%	-24,57%	4,89%
2003	22,24%	26,29%	4,12%
2004	21,70%	18,29%	4,09%
2005	34,58%	31,97%	3,37%
2006	25,31%	23,80%	3,78%
2007	1,55%	4,81%	4,29%
2008	-46,33%	-45,85%	4,23%
2009	50,69%	50,84%	3,69%
2010	14,86%	13,71%	2,99%
2011	3,79%	-12,76%	2,98%
2012	10,04%	3,16%	1,93%
2013	27,35%	24,98%	1,96%
Geometrical Average	**12,28%**	**8,33%**	**4,23%**
		Beta of the value portfolio (β)	1,0246
		Risk free return (Er)	4,23%
		Required return for value portfolio	**8,43%**

Table 9: *Average annual rate of return and volatility of the value portfolio*

Using the CAPM formula, the value portfolio should have a geometrical average annual return which compensates the investor for risk, measured as the β (beta) of the value portfolio between 1995 and 2013. Using the results from the portfolio based on Book to market value, we get the following result:

$$4,23 + 1,0246(8,33 - 4,23) = \mathbf{8,43}\%$$

Which leads to the conclusion that the value portfolio based on the return on assets value ratio delivers superior returns, while being less volatile than the market. Looking at the results of graph 4, we see that the performance of growth stocks is falling behind value stocks in the entire 19 year period. The outperformance increases when the overall stock market is rising.

4.5   Return on Invested Capital

Selecting stock portfolios based on the return on invested capital (ROIC) indicator, we get the following results.

Year	Number of stocks	Value	Middle	Growth	Market	Value premium
1995	64	16,89%	11,23%	6,55%	11,52%	10,35%
1996	68	62,52%	29,44%	25,52%	38,02%	36,99%
1997	71	39,72%	24,12%	17,05%	27,53%	22,67%
1998	84	23,46%	15,06%	2,99%	13,97%	20,47%
1999	93	7,59%	20,24%	33,12%	20,31%	-25,53%
2000	98	-0,60%	7,21%	1,05%	3,08%	-1,65%
2001	108	-5,65%	-21,04%	-25,09%	-17,71%	19,43%
2002	114	-25,77%	-21,76%	-27,74%	-24,74%	1,97%
2003	115	19,63%	18,01%	41,16%	25,55%	-21,53%
2004	115	26,68%	18,22%	14,20%	19,57%	12,48%
2005	117	35,39%	42,53%	21,17%	34,01%	14,22%
2006	121	29,35%	26,35%	18,70%	24,97%	10,64%
2007	125	5,06%	-0,86%	10,78%	4,48%	-5,73%
2008	122	-45,60%	-48,19%	-46,60%	-46,92%	1,00%
2009	118	50,20%	48,71%	56,30%	51,41%	-6,10%
2010	121	18,06%	14,53%	8,51%	13,79%	9,54%
2011	129	-11,89%	-15,43%	-24,98%	-17,24%	13,09%
2012	127	13,43%	0,88%	-2,31%	3,68%	15,75%
2013	82	32,48%	27,88%	19,50%	26,73%	12,98%

Table 10: *Return of portfolios based on their return on invested capital*

From 1995 till 2013, the value stocks outperformed the growth stocks in 14 years. In 5 years, the value stocks produced lower returns than growth stocks. The cumulative returns of the value portfolio are the highest, as is shown in graph 5.
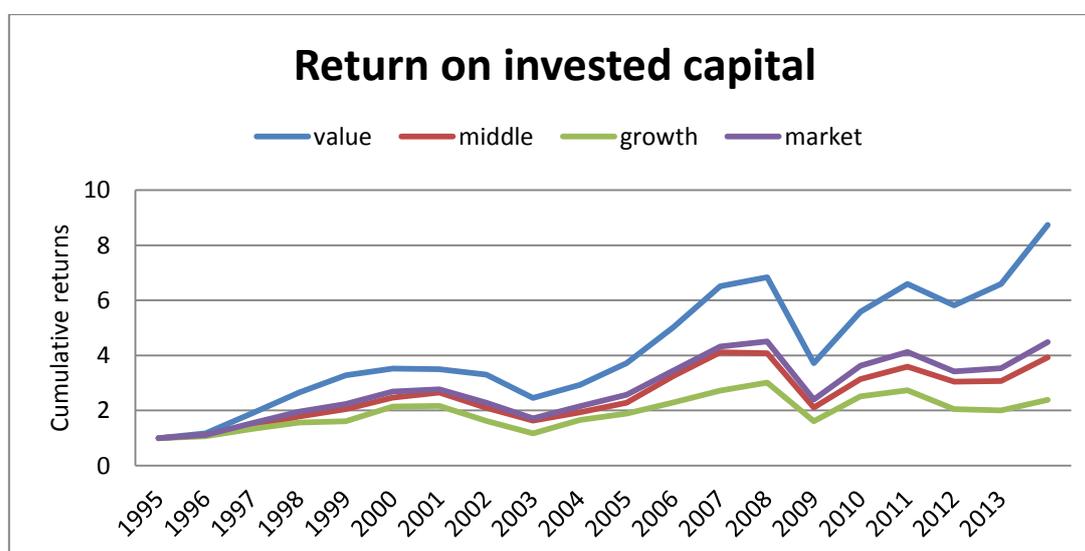
Graph 5: *Cumulative return of portfolios ranked on return on invested capital*

Year	Value portfolio return	Market return	Risk free rate (10 year bond yield)
1995	16,89%	11,52%	6,90%
1996	62,52%	38,02%	6,15%
1997	39,72%	27,53%	5,58%
1998	23,46%	13,97%	4,62%
1999	7,59%	20,31%	4,65%
2000	-0,60%	3,08%	5,41%
2001	-5,65%	-17,71%	4,96%
2002	-25,77%	-24,74%	4,89%
2003	19,63%	25,55%	4,12%
2004	26,68%	19,57%	4,09%
2005	35,39%	34,01%	3,37%
2006	29,35%	24,97%	3,78%
2007	5,06%	4,48%	4,29%
2008	-45,60%	-46,92%	4,23%
2009	50,20%	51,41%	3,69%
2010	18,06%	13,79%	2,99%
2011	-11,89%	-17,24%	2,98%
2012	13,43%	3,68%	1,93%
2013	32,48%	26,73%	1,96%
	12,09%	**8,22%**	**4,23%**
	Beta of the value portfolio (β)		1,0261
	Risk free return (Er)		4,23%
	Required return for value portfolio		8,32%

Table 11: *Average annual rate of return and volatility of the value portfolio*

Using the CAPM formula, the value portfolio should have a geometrical average annual return which compensates the investor for risk, measured as the β (beta) of the value portfolio between 1995 and 2013. Using the results from the portfolio based on book to market value, we get the following result:

$$4,23 + 1,0261(8,22 - 4,23) = \mathbf{8,32}\%$$

Which leads to the conclusion that the value portfolio based on the return on invested capital delivers superior returns, while being slightly less volatile than the market as well. Again, the performance of growth stocks is falling behind value stocks in the entire 19 year period. The outperformance increases when the overall stock market is rising. Stocks with a high RIOC rewarded investors with better returns.

4.6 Dividend yield

A common value indicator is the dividend yield. When we sort stocks based on this indicator, we get the following results.

Year	Number of stocks	Value	Growth	Market	Value premium
1995	57	1,14%	11,72%	7,25%	-10,58%
1996	57	37,66%	43,52%	40,72%	-5,87%
1997	59	24,16%	25,11%	24,81%	-0,96%
1998	67	1,75%	19,70%	10,53%	-17,96%
1999	73	0,82%	8,16%	4,11%	-7,35%
2000	77	11,69%	2,36%	7,06%	9,33%
2001	79	-7,37%	-18,86%	-12,99%	11,50%
2002	81	-17,70%	-28,08%	-22,67%	10,38%
2003	76	19,15%	13,04%	16,09%	6,11%
2004	78	27,10%	13,51%	20,31%	13,60%
2005	15	26,41%	23,08%	23,30%	3,32%
2006	66	23,02%	24,20%	23,61%	-1,18%
2007	74	0,21%	-1,62%	-0,70%	1,83%
2008	68	-48,41%	-41,62%	-45,02%	-6,78%
2009	60	53,66%	33,19%	43,42%	20,47%
2010	28	15,57%	29,74%	22,66%	-14,17%
2011	56	-8,89%	-20,00%	-14,45%	11,11%
2012	63	-0,05%	9,96%	5,13%	-10,00%
2013	16	32,55%	39,71%	36,13%	-7,15%

Table 12: *Return of portfolios based on their dividend yield*

From 1995 till 2013, the value stocks outperformed the growth stocks in 8 years. In 11 years, the value stocks produced lower returns than growth stocks. From the results we have, there appears to be little correlation between dividend yield and return.
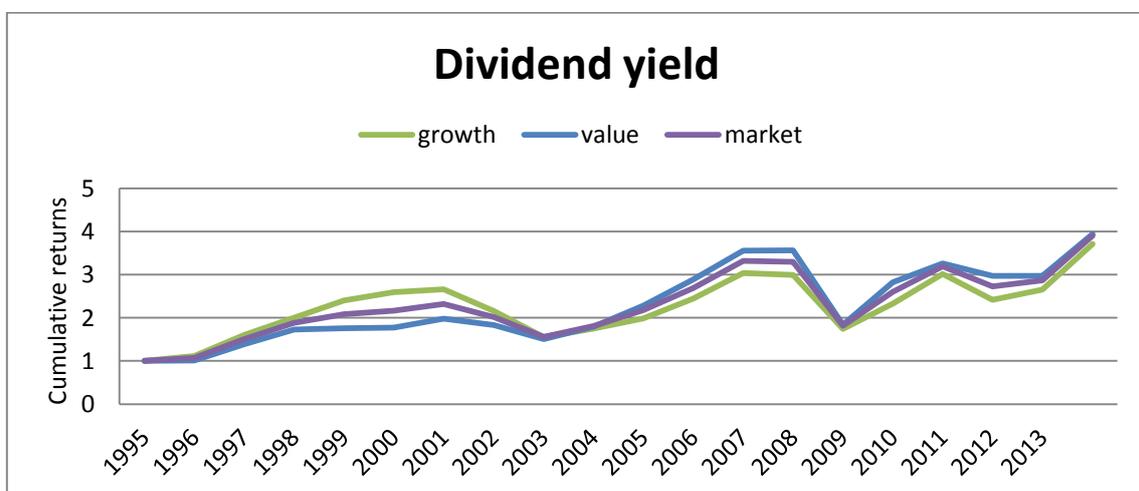
Graph 6: *Cumulative return of portfolios ranked on dividend yield*

Year	Value portfolio return	Market return	Risk free rate (10 year bond yield)
1995	1,14%	7,25%	6,90%
1996	37,66%	40,72%	6,15%
1997	24,16%	24,81%	5,58%
1998	1,75%	10,53%	4,62%
1999	0,82%	4,11%	4,65%
2000	11,69%	7,06%	5,41%
2001	-7,37%	-12,99%	4,96%
2002	-17,70%	-22,67%	4,89%
2003	19,15%	16,09%	4,12%
2004	27,10%	20,31%	4,09%
2005	26,41%	23,30%	3,37%
2006	23,02%	23,61%	3,78%
2007	0,21%	-0,70%	4,29%
2008	-48,41%	-45,02%	4,23%
2009	53,66%	43,42%	3,69%
2010	15,57%	22,66%	2,99%
2011	-8,89%	-14,45%	2,98%
2012	-0,05%	5,13%	1,93%
2013	32,55%	36,13%	1,96%
	7,49%	**7,44%**	**4,23%**
		Beta of the value portfolio	0,9969
		Risk free return	4,23%
		Required return for value portfolio	**7,43%**

Table 13: *Average annual rate of return and volatility of the value portfolio*

Using the CAPM formula, the value portfolio should have a geometrical average annual return which compensates the investor for risk, measured as the β (beta) of the value portfolio between 1995 and 2013. Using the results from the portfolio based on dividend yield, we get the following result:

$$4,23 + 0,9969(7,44 - 4,23) = \mathbf{7,43}\%$$

Which leads to the conclusion that the value portfolio based on the dividend yield delivers nearly identical returns with near identical volatility. Based on the limited stock market data from the Worldscope database, we can't find a clear relationship between dividend yield and the performance of a stock.

4.7 Size effect

As mentioned in chapter 2.2 there are studies in which the value premium could be explained by the firm size effect, rather than the price-to-earnings or the book-to-market value ratio. To find out whether this is the case in our dataset, we ranked stocks based on size and put them in three different portfolios named 'small', 'medium' and 'large' using a 30% / 40% / 30% divider. Table 14 shows the annual return for each portfolio, as well as the premium of small companies compared to the bigger ones.

Year	# of stocks	Small	Medium	Big	Size premium (SMB)
1995	65	17,32%	-1,64%	20,30%	-2,97%
1996	68	34,70%	44,08%	32,84%	1,85%
1997	77	19,02%	27,43%	35,44%	-16,42%
1998	85	20,81%	1,38%	22,18%	-1,36%
1999	96	7,08%	17,51%	38,63%	-31,55%
2000	104	-13,15%	15,66%	3,82%	-16,96%
2001	115	-19,80%	-15,23%	-17,64%	-2,16%
2002	116	-18,97%	-28,38%	-26,27%	7,29%
2003	116	31,90%	30,86%	13,32%	18,58%
2004	119	19,63%	28,80%	6,17%	13,46%
2005	120	22,19%	47,64%	25,57%	-3,38%
2006	124	24,71%	26,75%	18,90%	5,81%
2007	127	8,28%	1,01%	6,44%	1,84%
2008	125	-40,40%	-52,83%	-43,46%	3,06%
2009	124	51,12%	53,09%	44,23%	6,89%
2010	126	9,21%	20,51%	16,80%	-7,59%
2011	132	-0,15%	-21,39%	-14,51%	14,36%
2012	130	-3,23%	0,09%	15,65%	-18,88%
2013	88	31,09%	22,93%	23,90%	7,19%

Table 14: *Performance of small versus big stocks*

The results show that small stocks outperform the big stocks in only 10 out of 19 years. When we calculate the cumulative return of the small, medium and big portfolio, we cannot find a strong relationship between size and return (see graph 7). When comparing the return of portfolios with small cap and large cap firms, we cannot find a substantial difference in the return from 1995 till 2013. When stocks are ranked based on their P/E, ROIC or ROA, we get a much bigger difference in performance. Therefore, we can conclude that the value premium on the Dutch stock market between 1995 and 2013 cannot be explained by size.
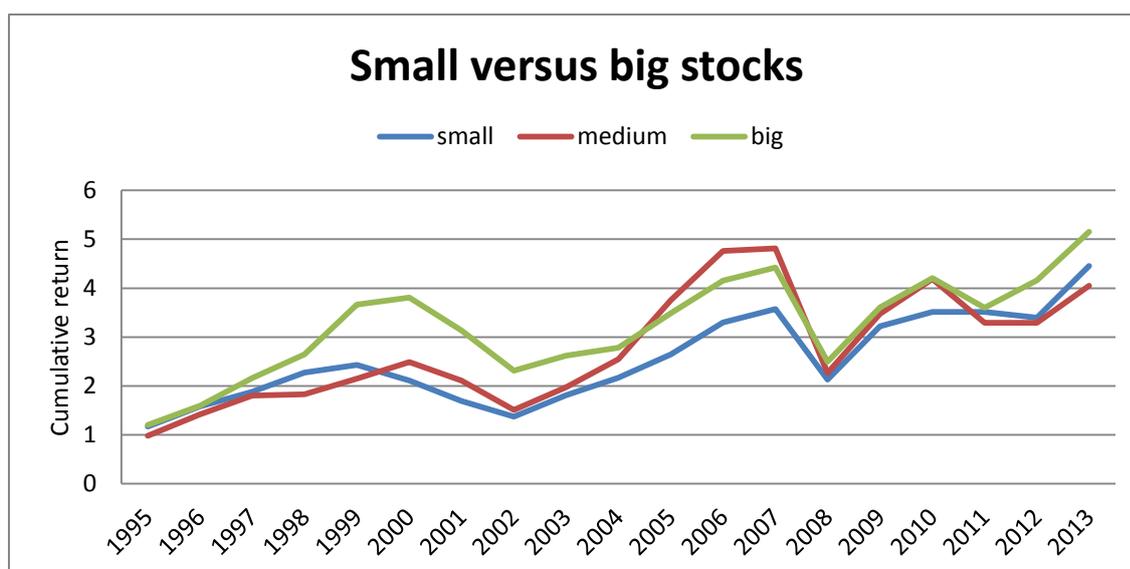
Graph 7: *Cumulative return of portfolios ranked on market capitalization*

Selecting stocks of companies with a small market cap year after year does not provide higher returns than selecting stocks of companies with a medium or large market cap. Fama & French (2012) found a larger value premium in small cap than in large-cap or mid-cap companies. The same conclusion was drawn earlier by Chan & Lakonishok (2004) and by Arshanapalli & Nelson (2007).

4.8 Summary

After analyzing the results for each indicator, we summarize the findings in the table below. The P/E ratio, return on assets and return on invested capital appear to be the most suitable indicators. The value premium, defined as the difference in return between value and growth stocks, is the greatest using the popular P/E ratio. The ROA and ROIC also showed a great value premium on the Dutch stock market, as well as the price to cash flow ratio (P/CF).

Indicator	Annual return of value stocks	Annual return of growth stocks	Value premium
Price / earnings ratio	12,61%	3,58%	9,03%
Price / cash flow ratio	8,85%	2,47%	6,38%
Book to market value ratio	9,34%	7,17%	2,17%
Return on Assets	12,28%	4,74%	7,54%
Return on Invested Capital	12,09%	4,70%	7,39%
Dividend yield	7,49%	7,15%	0,34%

Table 15: *Annual return for value and growth stocks*

5. Conclusion

After analyzing the stock market data for all companies listed on the Euronext Amsterdam, we can conclude there is indeed a value premium on the Dutch stock market. The portfolio analysis points to the superior performance of some of the value investing strategies for the period between 1995 and 2013. The value premium was highest for portfolios based on stocks with a low price to earnings ratio. Selecting the cheapest stocks year after year using this indicator rewarded the investor with an annual return of 12,61%, compared to 8,46% for the market. After nineteen years, the portfolio would grow by a factor of **9,55x**, compare to just **1,95x** for the portfolio of stocks with a high valuation in relation to the earnings of a company.

Other indicators which provided a substantial value premium were return on assets (ROA) and return on invested capital (ROIC). While these indicators are not so popular in scientific research on the value premium, they do provide a substantial value premium in the Netherlands. Selecting stocks with the highest return on assets will reward the investor with an annual return of 12,28%, compared to 8,33% for the market. Over the entire period from 1995 till 2013, a portfolio based on stocks with the highest return on assets would grow by a factor of **9,03x**, compared to **2,41x** for growth stocks.

Selecting stocks with the highest Return on Invested Capital would reward the value investor with an annual return of 12,09%, compared to 8,22% for the market. When selecting the stocks with the highest ROIC year after year, the portfolio would grow by a factor of **8,74x**. The growth portfolio with the lowest ROIC would reward the investor with **2,39x** the initial investment.

Selecting stocks based on their book-to-market value or the price to cash flow ratio would reward the investor with a value premium as well. The difference in return between stock portfolios with a high or low price to cash flow ratio is substantial. Selecting stocks based on the dividend yield does not lead to a substantial value premium. This could also be related to the limited availability of data in the Worldscope database.

By now, the strongest value indicator for the Dutch stock market has been identified as the P/E ratio, followed by the ROA and the ROIC. Across most of the tested indicators, the growth stocks end up at the bottom in cumulative return. This shows there is a structural value premium, which doesn't diminish over time. On the contrary, most of the outperformance has been made in the years after the stock market crash of 2008. Value stocks have recovered much better than the growth stocks.

The good results of value stocks cannot be explained by risk using the CAPM model. The volatility of the portfolio based on value stocks doesn't differ a lot from the market, while the return is much better.

A quick assessment of the impact of firm size does not weaken the results of this research. From 1995 till 2013, there was no substantial difference in return between small, medium and large companies in the Worldscope database for the Euronext Amsterdam.

Value stocks do substantially outperform growth stocks on the Euronext Amsterdam stock market between 1995 and 2013. While the value premium is different for each indicator, this analysis confirms that the value investor can improve returns by selecting value stocks.

5.1   Limitations

While this research confirms the existence of a value premium on the Dutch stock market using a wide variety of financial indicators, there are some limitations to consider. One of them is the Worldscope database, which is far from complete. Before the year 2000, the number of samples with missing data is substantial. While the effect of the dividend yield has been measured, the sample rate is too low to effectively measure the value premium of this indicator.

Another factor not included in this portfolio analysis is the impact of transaction costs. While the hypothetical value investing strategies used for this research could be profitable on paper, it could be unprofitable when applied in real life. Rebalancing a portfolio of many stocks brings about high transaction costs. An investor could consider reducing the transaction costs by increasing the holding period from one year to two years.

5.2   Implications for further research

This study shows that return on assets (ROA) and return on invested capital (ROIC) are very useful value indicators in other stock markets around the world. However, most research on the topic of value investing is focused on the book-to-market value ratio and the price/earnings ratio. Future research could help us learn more about the effectiveness of the ROA and ROIC as value indicators.

Further research can also help us to learn more about the most optimal holding period for a value portfolio. For this research, a one year holding period is used. It could be that a longer (or shorter) holding period delivers even better returns. The relationship between the holding period of a portfolio and the return has not extensively been researched.

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