# UNIVERSITY OF VAASA

## SCHOOL OF ACCOUNTING AND FINANCE

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## COMPANY KEY RATIOS AS EXPLANATORS OF RETURNS IN NASDAQ OMX HELSINKI

Master's Thesis in

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## ABSTRACT:

As investors have will to attain profits as big as possible there have been generated numerous strategies. Value investing is one of the most famous and widely known investment strategies. The strategy incorporates investing in stocks that are favorably priced in respect to their fundamental value.

The purpose of this study is to investigate how the value investing strategy has performed and can the commonly applied key ratios, price-to-earnings and price-to-book, as a criterion to derive stocks into value portfolios explain the returns in Finnish stock exchange NASDAQ OMX Helsinki during the time period from 2011 until 2019. In addition to pure numerical approach to value investing, behavioural finance viewpoint is taken to consideration as it is pointed out by previous studies that it plays a key role when choices about investing are made.

The companies included in this study were first divided into three categories. 25% of stocks with the lowest (highest) key ratios were bought to value (growth) portfolio and the remaining 50% is left out as they can be viewed neutral stocks. The descriptive analysis shows that value portfolios compiled using P/E ratio has outperformed comparably formed growth portfolio. For the P/B ratio results are opposite. Statistical analysis of explanatory power of these key ratios in relation to returns is examined using OLS regression and the results show that for stock returns in NASDAQ OMX Helsinki their explanatory power is weak.

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**KEYWORDS:** value investing, anomaly, NASDAQ OMX Helsinki

# 1. INTRODUCTION

Investors have had the perpetual desire to maximize their profits of invested capital across time. Investors' will to attain maximum profits has driven them to generate numerous investment strategies. Some of the strategies investors have created have been fairly successful and provided great returns to investors engaged in those strategies. Some of the most widely practiced investment strategies among investors are growth and value investing.

Traditional finance theory models have a tremendous role in academic literature in finance. However, the models have failed to explain significant amount of returns that some investment strategies have provided. This has drawn researchers' interest towards finance theory models' assumptions, especially to expectations of investors rational behaviour.

Behavioural finance is a field in finance that had not drawn significant interest of academics in finance until Kahneman and Tversky (1979) presented their survey of prospect theory. Behavioural finance attempts to explain events that occur in the markets addressing these events from psychological point of view.

## 1.1 Purpose of the study

This thesis will concentrate on two different investment strategies in the Finnish stock market. The two strategies examined are growth and value investing. The main idea in this thesis is whether the value investing has been profitable or not during the study period from 2011 until 2019 in Finnish stock market. Furthermore, the key ratios that are commonly used to divide stocks into value

and growth portfolios are tested if they really have explanatory power to stock returns and can these ratios be considered as statistically significant explanators of the returns.

Having study period of only eight years one could argue that the period should be lengthened but being such a small and somewhat peripheral stock market in the world, Finnish stock exchange has a limited amount of companies that have long histories being publicly listed companies which would leave us to test growth and value investing strategies only with a handful of companies as there would be a shortage from data regarding financial statements and price data. Therefore, the time period is cut to eight years which can also be seen as an advantage from the practitioners viewpoint as it correlates with the fact that investors are rather quick in their decisions and change their investment strategies promptly.

Value investing being such a popular and thoroughly studied investing strategy, the author of this thesis expects to find that the Finnish stock market has been propitious for it and the strategy has provided higher returns to investors exploiting it comparing to growth investing strategy.

The results attained in the empirical part are compared to the previous studies findings with some of the most remarkable research papers in the topic. Furthermore, results are evaluated from the behavioural finance studies point of view to give a nuance for this thesis compared to traditionally used purely numerical approaches in the field.

## 1.2 Structure of the paper

At first, the paper will go through the basic information of the finance theory and the role that capital markets have in economics. First section also includes efficient market hypothesis (Fama 1970) and models that are widely practiced to price assets. After the classic finance theory and its models, the paper proceeds on and explore anomalies in the markets and behavioural finance. Both of these topics are key factors in explaining value investing performance. From anomalies and behavioural finance, the paper will continue to compare previous studies on field of value investing. This will be followed by the description of the data and method of this thesis in section 6. Thereafter, the results of the portfolios studied are presented and explained in section 7 and finally the results of this study and previous studies will be summarized in section 8.

## 2. FINANCIAL THEORY

### 2.1 Role of The Capital Markets

Capital markets main purpose is to allocate ownership of capital stock where it can be exploited best way. In practice this means that the invested capital should be allocated to firms that have the most promising investment projects. To make this capital allocation possible markets have to be allocatively efficient. Markets can be allocatively efficient only when it is efficient internally and externally (Nikkinen, Rothovius & Sahlström 2002:80).

### 2.2 Efficient Capital Markets

To have a conversation about efficient markets it is recommendable to compare them with perfect capital markets. To have a perfect capital market it has to meet its requirements which are (Copeland, Weston & Shastri 2014:351-352):

- Markets are frictionless; i.e. there are no transaction cost or taxes, all assets are perfectly divisible and marketable, and there are no constraining regulations.
- There is a perfect competition in securities markets. Meaning that all market participants are price takers.
- Markets are informationally efficient; information is complimentary, and it is received simultaneously by all individuals.
- All individuals are expected to behave in a way that maximizes their utility.

Taking a view into real world markets we can effortlessly state with one accord, that there is not a single market that could be described perfect. Capital markets have transaction and information costs that are connected on selling and buying stocks, investors may not be rational at all, but the market can still be efficient nevertheless it is not perfect. (Copeland et al. 2014:352.)

Efficient Market Hypothesis

Fama has been a pioneer in the ground of efficient market studies. He takes efficient market studies a step forward and divides market efficiency into three subclasses: weak form, semi-strong and strong form efficiency (Fama 1970:383).

In markets where efficiency is in weak form market prices reflect all the historical information of prices and transactions. Technical analysis, which tries to locate regularity in price movements is futile even in weakly efficient market.

According to semi-strong prerequisites market prices contain all the information that is available for public. Such information is i.e. earnings announcements, dividends and future profit forecasts. Fundamental analysis is an essential part of the efficient market hypothesis. In fundamental analysis, analysts are attempting to identify information that is available for public but has not been priced in the market. Efficient market hypothesis anticipates that the majority of fundamental analysis is not likely to be successful since the analysts' appraisal of the firms' future profits is unlikely to be somewhat improved than those of other analysts. (Nikkinen et al. 2002:83; Bodie, Kane & Marcus 2014:356.)

Strong form of efficiency requirements, are fulfilled if market prices fully reflect all the relevant information including insider information. In markets that are in a strong form according the EMH, no corporate manager has the possibility to

attain abnormal returns by their knowledge of inside information since the strong form efficiency expects that all information is driven to prices. (Nikkinen et al. 2002:83; Bodie et al. 2014:354.)

Markets that conform the strong form of the efficient market hypothesis conform also the weak form and semi-strong hypotheses. This can be seen in figure 1.
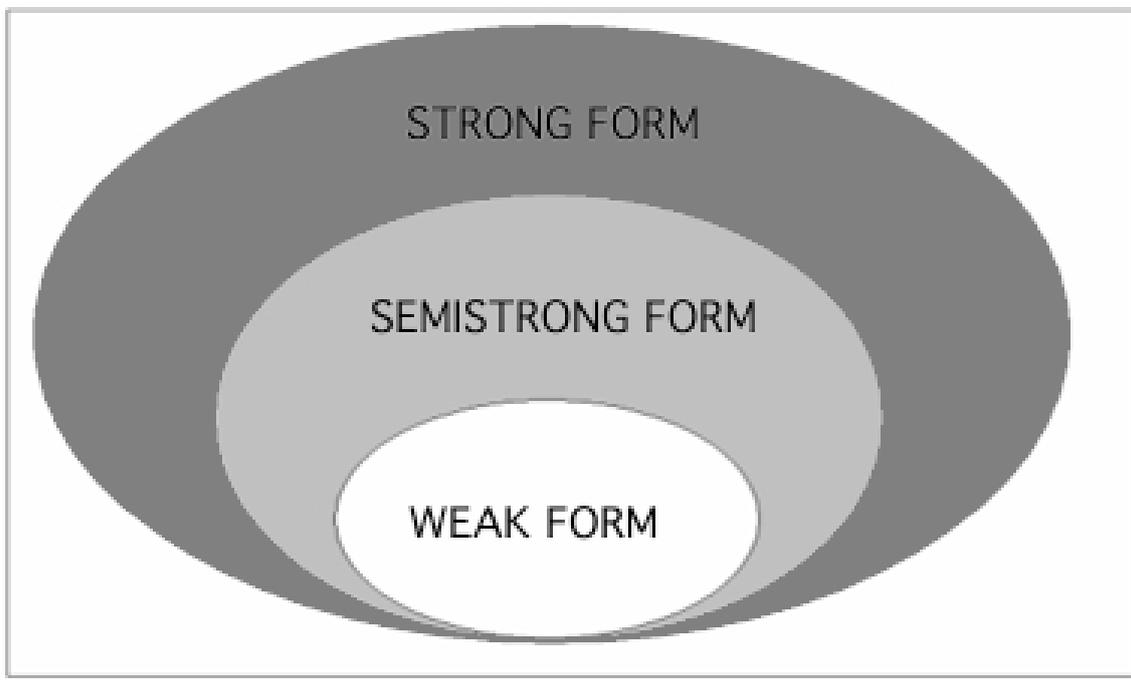


**Figure 1.** Three forms of market efficiency. (Nikkinen et al. 2002:84.)

2.3   Pricing of Securities

2.3.1   Capital Asset Pricing Model

One of the financial economics cornerstones is Capital Asset Pricing Model. The model was developed by Sharpe (1964), Lintner (1965) and Mossin (1966) simultaneously but independently (Haugen 1997: 196). According to CAPM, the expected return of the security is based to security's market risk since any other risk can be diversified away. Because of the diversification, CAPM suggests that the security's risk premium is derived only by the beta coefficient that displays the market risk of a stock. (Nikkinen et al. 2002: 68-71.)

According to CAPM, any asset's expected return can be calculated by multiplying market risk premium by the beta of the asset, and summarizing it with the risk-free rate (Kallunki et al. 2011: 75):

(1)          $E(R_i) = r_f + \beta_i[E(R_m) - r_f]$ ,

Where
$E(R_i)$ = expected return on the asset $i$
$r_f$ = risk-free rate
$\beta_i$ = the beta coefficient of the asset $i$
$E(R_m)$ = expected return on the market

To apply, capital asset pricing model requires following assumptions on the capital markets (Nikkinen et al.2002:68-69):

    1.   No transaction costs whether buying or selling assets.

2. Investments can be divided to infinite small portions. Therefore, any amount of money can be invested.

3. Investors pay no taxes.

4. Investors are price takers. No individual investor can affect market prices. Thus, perfect competition reigns.

5. Investors base their investment decisions on expected return and standard deviation of returns.

6. There are no restrictions on short selling.

7. Investors can lend or borrow any amount of money with a fixed risk-free rate.

8. All investors have homogenous expectations for holding period, expected returns, standard deviation of returns and covariance between stocks.

9. All capital goods, including human capital, can be bought or sold.

*Criticism of Capital Asset Pricing Model*

The assumptions that capital asset pricing model does, do not portray reality very well. The CAPM has some discernible shortages and therefore it has gone through a great deal of criticism. Roll's (1977) expressed critique against CAPM was directed to the CAPM's perception of the actual market portfolio, declaring it to be impossible. His critique has later been called *Roll's critique*.

Fama and French (2004) proof that CAPM leads erroneous valuations of the cost of equity since it results to estimate this cost too low for low beta stocks and vice versa for the stocks with high betas. They also state that using CAPM to assess the accomplishments of mutual funds is inefficient since funds, even if their managers do not have significant expertise for picking winning stocks, seem to

achieve abnormal returns with focusing on small caps, value stocks or low beta stocks. (Fama & French 2004.)

## 2.3.2 Arbitrage Pricing Theory

Another way to price assets is arbitrage pricing theory (APT), developed by Stephen Ross (1976). In contrast to CAPM, APT is straightforward and its assumptions are slightly easier to accept. Primary thought behind the theory is that investors are willing to gain their portfolio's expected return if that can be done without adding risk. According to theory, investors ignore the searching of efficient portfolios and aim their focus on arbitrage opportunities. Arbitrage means obtaining risk-free returns by utilizing price differences in the markets. For example, the price of the security can vary in two separate markets, which can be exploited by selling the security to market with higher price and buying the exact same security from the market with lower price. Theory presumes that stock prices are subject to macroeconomic factors and firm specific noise: (Nikkinen et al. 2002: 76-77.)

$$(2) \qquad Return = a + b_1\left(r_{factor\ 1}\right) + b_2\left(r_{factor\ 2}\right) + b_3\left(r_{factor\ 3}\right) + \cdots + e,$$

Where

$a$ = expected return on the asset

$b_i$ = the sensitivity of the asset to factor k

$r_k$ = macroeconomic factors

$e$ = firm specific noise

Comparing APT to CAPM, APT has some advantages e.g. the market portfolio is not in key role in APT like it is in the CAPM, meaning that investors have no need to be anxious about estimating the market portfolio (Brealey, Myers & Allen 2017: 208). Nevertheless, APT has its flaws, theory does not determine what the macroeconomic factors are that are priced by the market nor their amount. Due to this APT has not become significantly popular pricing tool in the financial markets. (Nikkinen et al. 2002: 79.)

### 2.3.3 Three-factor Model

Fama and French (1996) developed the three-factor model as a response for the CAPM failures to explain stock returns that are associated to firm characteristics. Banz (1981) presented that small firms' stocks have had greater average returns than stocks of bigger firms. Fama and French (1992) showed that firms' book-to-market ratio has relation to average stock returns. In Fama and French's (1996) model the factors from the arbitrage pricing theory are identified with size and book-to-market ratio and their model can be seen as an extension to arbitrage pricing theory of Ross (1976) that left the factors unspecified. The three factor model gauges portfolio's expected return in excess of the risk-free rate (Fama & French 1996):

(3) $$r_i - r_f = b_i(R_m - r_f) + s_i SMB + h_i HML ,$$

where
$r_i$ = expected return of asset $i$
$r_f$ = risk-free rate
$b_i, s_i, h_i$ = asset's sensitivity to the factor in question

$R_m$ = return on the market

$SMB$ = small minus big – the difference between the return on a portfolio of small stocks and a portfolio of large stocks

$HML$ = high minus low – the difference between the return on a portfolio of high-book-to-market stocks and a portfolio of low-book-to-market stocks

Later on, Fama and French (2015) have increased the amount of factors and created five-factor model. The factors they added to model are robust minus weak (RMW) and conservative minus aggressive (CMA). RMW indicates the difference between the return on portfolio of stocks with robust profitability and with weak profitability. CMA signifies the difference between the return on portfolio of stocks with low investments and with high investments. (Fama & French 2015.)

2.4   Risk Adjustments of Returns

Like there are various models to estimate security prices, there are also numerous ways to measure riskiness of returns they generate. Focusing purely on the exact return, e.g. arithmetic average or geometric average, of the asset or portfolio is not a worthwhile approach as we know that some investments involve more risk than others. Sharpe (1966), developed a model to measure mutual funds' performance, that takes the riskiness of the funds into account. As a risk measure, Sharpe ratio uses the standard deviation. Sharpe ratio illustrates how much return every unit of risk provides. (Nikkinen et al. 2002: 218-220.)

The Sharpe ratio is calculated as follows: (Nikkinen et al. 2002: 218):

$$(4) \qquad S = \frac{R_p - r_f}{\sigma_p} \, ,$$

where

$S$ = Sharpe ratio of the portfolio

$R_p$ = average return on portfolio

$r_f$ = risk-free rate

$\sigma_p$ = standard deviation of the return on portfolio

Other widely recognized measures for risk adjustments are the Treynor ratio and Jensen's alpha. The Treynor ratio evaluates the reward achieved by investment to volatility of it. The only thing that separates Treynor ratio from Sharpe ratio is in the denominator where it uses beta instead of standard deviation. Hence, the Treynor ratio gives the excess return per unit of risk but it uses market risk alternatively to total risk. (Bodie et al. 2014:840.)

Jensen's alpha is derived from the CAPM. The alpha specifies the average return on the portfolio over the return that is predicted by the CAPM. The equation 5 demonstrates how one can determine Jensen's alpha to portfolio: (Bodie et al. 2014: 840.)

$$(5) \qquad \alpha_p = R_p - [r_f + \beta_p(R_m - r_f)] \, ,$$

where

$\alpha_p$ = Jensen's alpha of the portfolio

$R_p$ = average return on the portfolio

$r_f$ = risk-free rate

$\beta_p$ = the beta coefficient of the portfolio

$R_m$ = expected return on the market

# 3.  MARKET ANOMALIES

## 3.1  Anomalies

Anomaly in generally means a deviation from the common rule. Anomaly in finance indicates inconsistency in the market efficiency that remains even over time examinations. Studies of stock market efficiency have made plentiful observations that challenge the efficient market hypothesis. Results in these surveys indicate that the levels of market efficiency do not hold, meaning that inefficiencies occur in the markets e.g. stocks mispricing. Utilizing markets inconsistencies provides opportunity to investors to form investment strategies that generate abnormal returns with relation to their risks. (Kallunki, Martikainen & Niemelä 2011: 200.)

Some of the most known anomalies deal with past prices, seasonalities and firms' financial statements and the ratios derived from those. The most widely recognized anomalies related to past prices are momentum effect and contrarian investment strategy. For stock markets' seasonal performance there have been found such anomalies as turn-of-the-year-effect, weekend effect and January effect. In many cases these are called calendar effects. Other well-known anomalies are based on firms' financial statements and their key ratios. These types of anomalies are the most relevant to this research since they are regularly used to characterize value stocks. Some of these anomalies will be introduced in this section.

3.2   P/E Anomaly

Price-Earnings ratio is commonly practiced among investors since it is effortlessly obtainable to them. Calculating price-earnings ratio is simple and person does not have to possess superior expertise in math since all that is needed to do is dividing stock's market price with company's earnings per share. P/E ratio indicates the number of years that it takes for stock to pay back its price assuming constant earnings. The ratio can also be seen as a forecast of company's growth expectations. Typically, firms that are expected to gain in the future, have higher P/E ratios. (Knüpfer & Puttonen 2014: 239-240.) By comparing ratios between two firms operating in the same industry investors can view if one of the firms is valued more aggressively than the other (Bodie et al. 2014:615-616).

According the P/E anomaly, stocks that have low P/E ratio generate higher returns to investors than stocks that have high P/E ratio. Nevertheless, in efficient markets there should not appear abnormal returns with strategies based in such ratios, numerous researches have not been able to explain these findings with their risk or anything else that would be in line with market efficiency. (Nikkinen et al. 2002: 86-87.)

Bodie et al. (2014) criticize the P/E ratio since its denominator is influenced by flexible accounting rules which allow firms' management teams to exploit those rules actively and enhance visible profitability of the firm. They think that giving too much latitude for companies to choose which rules it implements and which expenses it ignores, will make investors intentions to make comparisons between firms' P/E ratios challenging. Therefore, comparisons should be done with care and between firms that operate in the same industry since P/E ratios differ across industries. (Bodie et al. 2014: 612-616.)

3.3   Size effect

Firms can be divided in abundance ways into different groups. One way to separate firms is their market capitalization. Size effect anomaly proposes that stocks of firms with low market capitalization register higher returns than firms with high market capitalization even after the risk adjustments (Banz 1981). Haugen (1997: 173) points out that higher returns from the small caps may be caused by the fact that smaller firms tend to have greater risk or poor liquidity.

There is a great amount of explanations to firm size anomaly. Chan & Chen (1988) have come to a conclusion that size effect can be perceived when betas are estimated with using five years data, however if the data used for estimating betas is from a long period of time it results size effect to withdraw as an explanatory factor of abnormal returns.

Knez & Ready (1997) explain Banz' findings with the significance of extreme observations. In their research they claim that after 1 percent of the extreme observations are trimmed, size effect seems to disappear and therefore they present that size effect is only driven by the extreme values.

Wang (2000) has consistent findings in his survey as Knez & Ready (1997) and he shows that survival bias is a key factor in size effect. Smaller firms tend to have greater risk of bankruptcies and be more exposed to market turbulences, therefore, they are more likely to fail and be excluded of the tests. This biases results since only successful small firms are included in the tests. (Wang 2000.)

3.4   P/B Anomaly

Another ratio, investors can take in to consideration when making investment decisions is price-to-book ratio. As in P/E ratio, the share's market price is divided, but this time with the book value of the share. Book value is the difference of the firm's assets and its liabilities. Dividing this difference with the amount of outstanding shares investor can calculate the book value per share. Book value can be seen as a liquidation value that investors receive if the company stopped its business, sold all its assets and paid its debt. (Bodie et al. 2014: 592-593, 616, 652.)

One of the first studies of the relationship between average stock returns and P/B ratio was done by Fama and French (1992). They find that P/B ratio and average stock returns have relationship between them. Additionally, they state that even at that time the attention is mainly pointed in the direction of size effect, the P/B plays more robust role in average returns. In their study, they gather a large mixture of companies and constitute ten portfolios with P/B ratio as a determine factor. Fama and French end up with a conclusion that portfolio containing shares with the highest P/B ratios yield on average 0,30% monthly when the portfolio with the lowest P/B ratios accomplished average return of 1,83% monthly. Furthermore, Fama and French' findings do not reinforce CAPM's presumption that stock returns are primarily by the beta coefficient. (Fama & French 1992.)

3.5   Momentum

To identify trends in stock prices, past returns receive attention. The main purpose to examine past returns is to find serial correlation between them. If positive serial correlation is distinguished, it indicates that there is a tendency to positive returns follow past positive returns. In other words, stocks have a propensity to momentum in the short term either positive or negative (Bodie et al. 2014: 364.)

Jegadeesh and Titman (1993) find that strategy of going long on past winners (high past returns) and going short past losers (low past returns), produces significant excess returns on holding periods lasting 3 to 12 months. They report that strategy that uses past 6-month returns as a selection-criteria for stocks and holds them six months, generates a compounded excess return of 12,01%. (Jegadeesh & Titman 1993.)

3.6   Contrarian

Contrarian investment strategy is related to momentum. The difference between the two strategies is that in momentum, investors are focusing on exploring short term past performance, whereas in contrarian they focus on long term past performance. Furthermore, the length of the holding period varies between the two strategy being longer in contrarian strategy. The investor who exploits contrarian strategy takes a long position on recent losers and shorts recent winners (Bodie et al. 2014: 364-365).

Contrary to Jegadeesh and Titman's (1993) findings of positive short-term serial correlation, Fama and French (1988) identify returns' negative serial correlation on the longer time period. In case of negative serial correlation, past positive returns are likely to be followed by negative returns (Bodie et al. 20XX: 364).

# 4. BEHAVIOURAL FINANCE

*"At the most general level, behavioral finance is the study of human fallibility in competitive markets."* (Shleifer 2000: 23.)

Behavioural finance is a subject that had not drawn significant interest of academics in finance until Kahneman and Tversky (1979) presented prospect theory, where they criticized expected utility theory, that is widely endorsed normative model, for its assumptions of rationally behaving investors. The study was executed by questionnaires which students were asked to answer. The problems students faced, contained hypothetical choice problems with different probabilities and outcomes. Kahneman et al. (1979) find that choices made under risk are not done in accordance with utility theory, that expects investors to be rational and willing to maximize their utilities. They point out that the respondents have a tendency to underweight outcomes that are hardly plausible compared to outcomes that are achieved with certainty. Furthermore, they argue that this promote people's unwillingness to take risks when choices incorporate guaranteed gains and risk pursuing when comprised guaranteed losses. Therefore, they propose an alternative theory, in which they state that investors' decisions that are executed under risk are based on the value of gains and losses and not in the final outcome. (Kahneman & Tversky 1979.)

Later on, behavioural finance has gained ground in the academics of finance and it has been on the receiving end of acknowledgements such as Nobel prizes in economic science in 2002 (Kahneman) and 2017 (Thaler).

4.1   Noise

Finance theory assumes investors to be rational. Original purpose of trading has been to provide capital for new consumption or to exploit arbitrage opportunities when having information about asset that is expected to be unknown for large groups of people. But if every investor acted in accordance with finance theory assumptions and evaluated assets identical ways it would be hard to identify where vast arbitrage profits come. (Forbes 2009: 119.)

Black (1986) divides investors into two groups, those who trade basing their acts on information and others that trade on noise and who are not basing their acts on information. He defines information to be unexpected switches in preferences and technology within and across sectors. The reasoning, why investors have a tendency to trade on noise, Black (1986) offers that investors simply enjoy doing it and that they are surrounded by the noise so overwhelmingly that they do not understand they are trading on noise and not on information. The vast existence of noise in the world causes people to embrace rules of thumb in their decision-making processes even though the rules created, are excessively simple. He states that those noise traders empower trade in financial markets and increase markets liquidity since they offer circumstances to investors with information-based strategies to exploit their knowledge and trade profitably. (Black 1986.)

Another reason to noise traders' existence is the complexity of decision making. People's decisions are influenced by stress. Stress obstructs our capability to observe all the relevant factors we should to make good decisions. Furthermore, gathering all the information that is available is time-consuming process and people tend to rush in conclusions without spending time to evaluate information thoroughly. Saving time from the decision-making process can lead

poor decisions. (Elvin 2006.) Black (1986) announces that most of the time noise traders are seeming to lose money with trading while traders who are willing to put time and effort to draw smart decisions from the information available are gaining their profits.

## 4.2   Overreaction and Underreaction

In contrast to classical finance theories (CAPM, APT, EMH, etc.), empirical studies have pointed out that stock prices have a tendency to react information in a way that can lead to overreactions and underreactions. Results of these studies state that stock prices tend to underreact to news in periods of less than a year, meaning that the new information of news is flowing slowly on stock prices. In case of a good news announcements, empirical results suggest that there will be positive returns in future since it takes time for the news to adjust prices to a right level. (Barberis, Shleifer & Vishny 1998.)

For the short period underreactions, overreactions can be seen as a consequence. Studies have found that when news are steadily facing in the same direction, there is a tendency for stock prices to overreact the news within longer periods. This means that when the news related to securities are consistently looking in the unchanged direction i.e., are positive (negative), these securities are likely to become overpriced (underpriced). (Barberis et al. 1998.)

Even though normative finance theory assumes that arbitrageurs would come and take advantage of the arbitrage opportunities that underreactions and overreactions have created, Barberis et al. (1998) find that arbitrageurs' power is limited, since the investors' attitudes come even more extremes with time,

causing prices of the securities proceed even further away from the fundamental value. Barberis et al. (1998) argue that the limitation of arbitrageurs is caused by the existence of noise traders that generate risk to arbitrageurs to lose money in the short time period since the prices can fluctuate further and further away from the actual fundamental value. As arbitrageurs are risk averse, they decrease the size of their positions as there is a probability that prices could become even more mispriced. (Barberis et al. 1998.)

De Bondt and Thaler's (1985) research of over- and underreactions tests the results that experimental psychology suggests how people act when they face new information. They run their test by forming portfolios of stocks in New York Stock Exchange that have gone through either utmost gains in capital or losses over the past five years. The portfolio formation is done in December. To divide stocks into portfolios they calculate stocks' cumulative excess return for the previous three years and rank them from low to high. Stocks with the highest cumulative excess return were positioned to the winner portfolio and stocks with the lowest to loser portfolio. Test period in their study was 1932-1982. The results they got were significant in case of the overreaction hypothesis. Over the 46 year time period, three years after portfolio creation, portfolio of winners averaged cumulative average residual returns 5% less than the market while the loser portfolio surpassed market by 19,6% equaling 24,6% divergence between the two portfolio returns. Additionally, De Bondt and Thaler (1985) did some further findings. From the Figure 2, can be seen that they discovered that the overreaction was considerably lower for winners than losers. Furthermore, the results of their study revealed that most of the excess returns were harvested in January even after five years of portfolio construction. (De Bondt & Thaler 1985.)
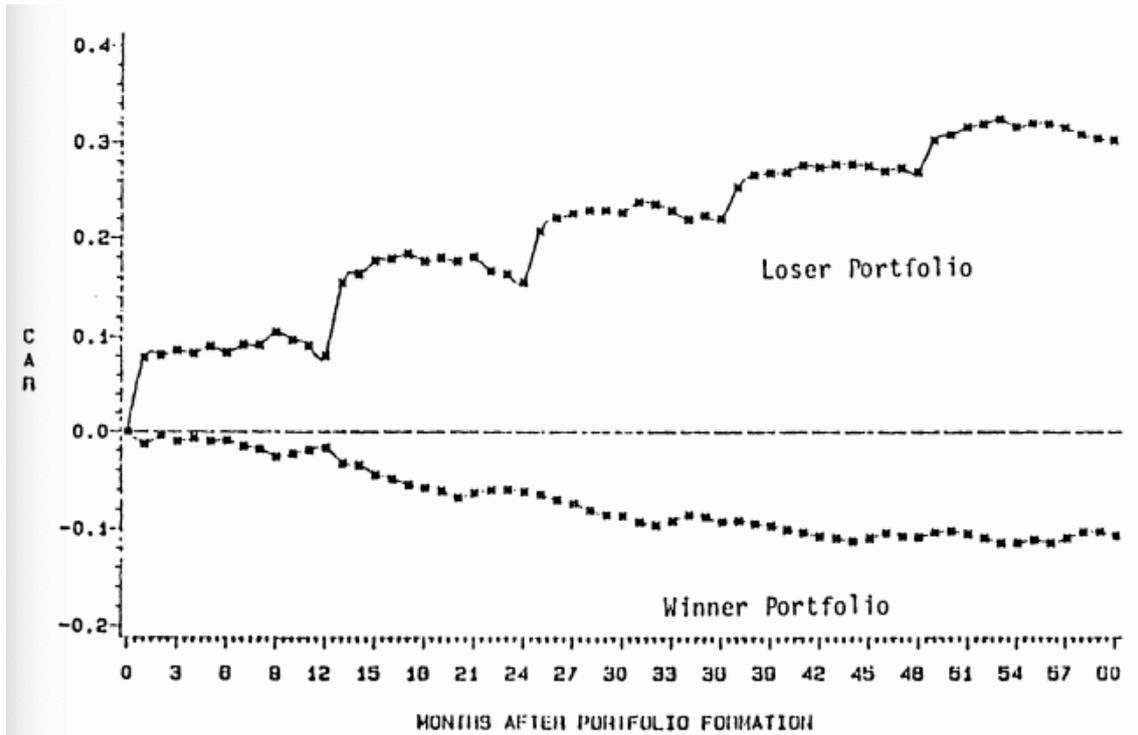
**Figure 2.** Cumulative Average Residuals for Winner and Loser Portfolios of 35 stocks. (DeBondt & Thaler 1985.)

Daniel, Hirshleifer & Subrahmanyam's (1997) study explains over- and underreactions to be consequences of investors' overconfidence and biased self-attribution. Their findings include that investors' reactions to information, depend on the type of the information. If the information is private, investors have a tendency to become overconfident and overreact and vice versa for the public information. (Daniel et al. 1997.)

In figure 3 solid line displays the average price path that tracks a positive and negative private signal obtained by the investor at date 1. It can be effortlessly point out that investors overreact to private information by comparing the actual price path (solid thick line) to path that is rationally expected to be in relation to information (thinner solid line). Furthermore, in the case of positive public signal

(dashed line), that confirms the actions, how investor reacted to private information, enhance their self-attribution bias and may cause price path to diverge even further from the level that can be viewed rational. In other words, the latter signal leads investor to credit themselves for the right decision they have made and hence, raises their confident level. (Daniel et al. 1997.)
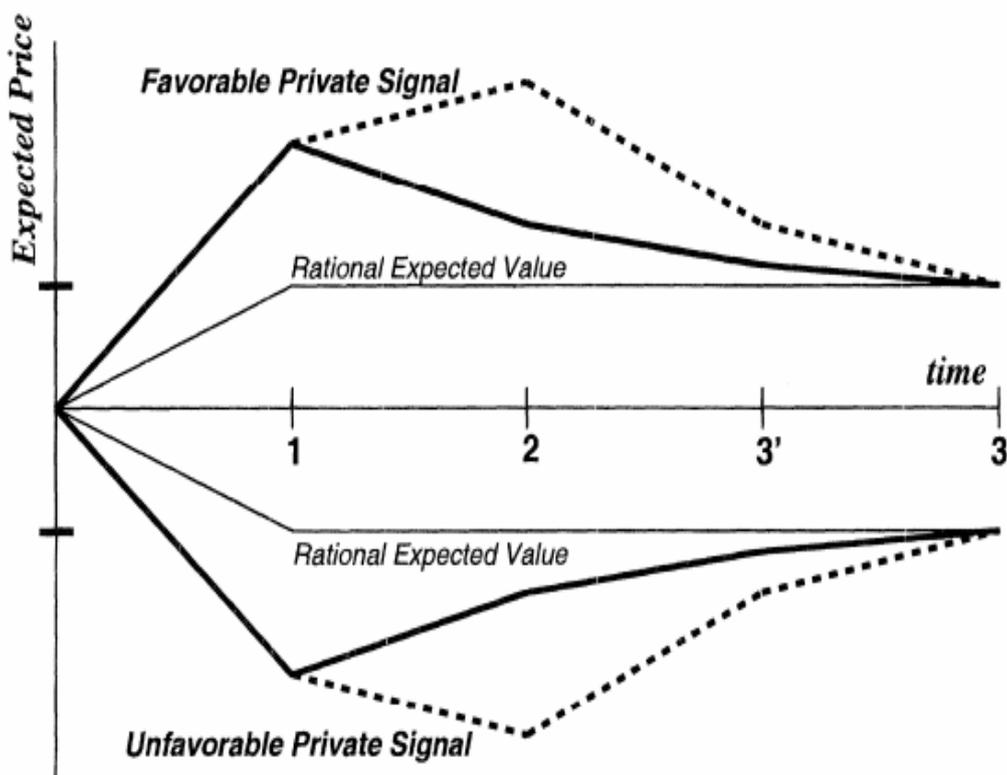


**Figure 3.** Average price as a function of time with overconfident investors. (Daniel, Hirshleifer & Subrahmanyam 1997.)

In their theory, overconfidence appears in investors' behaviour with their own view of their capabilities to make proper security valuations. Furthermore, the level of overconfidence of investors is enhanced by subsequent signals, i.e. public information, if the signal is supporting earlier decision made by the investor. This

overconfidence leads investors to miscalculate the error variance of their forecasts. (Daniel et al. 1997.)

Like Barberis et al. (1998), Daniel et al. (1997) findings of consecutive signals in the same direction causes overreaction. Their explanation to overreaction occurrence is the biased self-attribution investors suffer, which will result them to be overconfident. When investors have bought/sold a security they can mistakenly credit themselves when new information that confirms their decisions comes to market. This confirmation raises their level of confidence and if they get a consecutive confirmation signals to their decision, it will continue to enlarge their confidence that will enhance overreaction. (Daniel et al. 1997.)

Over- and underreactions cause mispricing of the stocks. According to arbitrage pricing theory, arbitrageurs should take care of the mispricing and restore prices to equilibrium, still they fail. One reason for APT to fail is the existence of noise traders (De Long, Shleifer, Summers & Waldmann 1990). Noise traders are unpredictable, and their beliefs are nebulous. This can lead security prices to deviate substantially more from their fundamental value. The unpredictable nature of noise traders prevents risk-averse arbitrageurs to make the most of their strategy since noise traders make it riskier. (De Long et al. 1990.) This uncertainty in security price movements causes arbitrageurs to decrease their positions (Barberis et al. 1998).

## 5. VALUE PREMIUM

5.1 Value Investing

Value investing has gained a notable amount of interest among investors as well as academic research in finance. Value investing is an investment strategy in which the purpose is to buy stocks that trade under their real value. The initiatory force for value investing strategy was the book *Security Analysis* by Graham and Dodd (1934) whom are recognized as the authors of the strategy. Graham and Dodd's interest was to discover stocks with low price-to-book and price-to-earnings ratios that were traded under their intrinsic value.

As a strategy, value investing is straightforward. Investor implementing the strategy has no need to be an expert in finance. In value investing the real value is often referred to *intrinsic value* of the stock which can differ significantly from the stock's market price. To determine the intrinsic value of the stock, it requires fundamental analysis. To recognize value stocks, investor can calculate different ratios between the price of a stock and its performance and accounting measures. Some of the most commonly used measures to calculate these ratios are cash-flow, earnings, dividends or book value (Bartov & Kim 2004).

What makes a firm's stock to trade below its intrinsic value? According to Fama and French (1995), firms with low price-to-book ratios are often distressed. Poor past performance of the low P/B firms causes these stocks to be neglected by the investors since their current view of the firms' future expectations is likely to be overly pessimistic (Lakonishok, Shleifer & Vishny 1994). Stickel (2007) finds that negative performance of low P/B firms leads them to have fewer

recommendations by analysts than growth or glamour stocks that have high P/B ratios and high forecasted earnings growth and have performed well. In other words, these glamour stocks have a strong positive momentum on their side, whereas low P/B stocks have not. This leads low P/B firms suffer from a scarcity of analyst coverage leading their financial statements to be, for the most part, the most thorough information that is available of them (Piotroski 2000). In addition, Piotroski (2000) argues that these kind of companies often times experience inadequate access to most informal information publication channels, and due to their substandard past performance, their voluntarily produced revelations can be viewed less reliable.

## 5.2 The Performance of Value Strategy

There is a large number of studies examining returns that value strategy generates. Basu (1977) finds that in 1957–1971 portfolios which were formed by low P/E ratios outperform portfolios with high P/E ratios on average even after the risk-adjustments. Jaffe, Keim and Westerfield (1989) claim that previous studies in size and P/E ratios are not well-defined since e.g. those have fairly short sample periods and may include survivor biases. Jaffe et al. (1989) improve these theories by taking a longer sample period to investigation (35 years) and also taking January effect into account. These improvements lead them to state that P/E and size effect is significant for the whole sample period. Additionally, Jaffe et al. (1989) find that taking January effect into account, only P/E effect is significant in other eleven months during the test period whereas size effect is eminent only in January.

Similar to studies made in the U.S., the prosperity of value investing receives support from international level. Chan, Hamao and Lakonishok (1991) study explores the relationships between expected returns and earnings yield, size, book to market ratio and cash flow yield in the Japanese stock market Tokyo Stock Exchange. Chan et al. (1991) point out that the book to market ratio has a substantial role in forecasting expected returns. Furthermore, they call attention to robust cash-flow/price ratio (CF/P) to predict high returns in the future.

# 6. DATA AND METHODOLOGY

## 6.1 Data

This thesis sifts through value and growth stock portfolios in Helsinki stock exchange. All the portfolios constructed for the empirical tests are consisted from stocks that have been listed in Helsinki stock exchange for the period from 2010 until 2019. The official name of the Helsinki stock exchange is NASDAQ OMX Helsinki. For the empirical testing, some of the companies are excluded in various reasons to avoid the risk of misleading results. First, companies that have been either listed or unlisted during the study period from 2010 to 2019 are excluded. Second, there is no data available for some of the companies leading this study to eliminate those companies from the tests. Third, if the company has a negative price-to-earnings or price-to-book ratio it will be excluded as negative ratios are not meaningful for the purposes of this study. Lastly, data is checked in order to spot possible outliers in the data. Outliers are checked each year before portfolio construction for both P/E and P/B multiples.

The initial amount of Helsinki stock exchange stocks that were collected was 145 but after excluding some of the companies from the data based on the aforementioned reasons the final sample was comprised of 101 companies. The total number of companies from which the portfolios are consisted varies between 64 and 76 for the P/E portfolios. The overall number of the companies for the P/B portfolios construction varies between 90 and 98.

6.2   Time Period

The time period that this thesis will cover the years between 2010 and 2019. The length of the time period will be adequately long to enable us to spot the possible trends in observations and the results of this study. The figure 4 illustrates the NASDAQ OMX Helsinki Capped Price Index performance during the study period of this thesis.



**Figure 4.** Finnish stock market performance 2010-2019. (FactSet Indices 2020)

In addition to data shortage from the publicly listed Finnish companies, the decision to start the time period from 2011 is due to financial markets' crisis that introduced themselves for the world during in 2007 beginning from the subprime mortgage lending crisis that was elevated into a global banking crisis. As all the major stock indices declined during the crisis it would have tremendous effects

on the results of this study and possibly bias them since the stock market has begun to recover from the crisis.

## 6.3 Data Collection

The data needed to study growth and value investing is derived from the FactSet database which is a popular and widely used among practitioners. The FactSet database is utilized to download stock prices for the last trading day of March and first trading day of April. Stock prices gathered from the FactSet database are official closing prices and adjusted to capital actions. This means that the stock prices are already taken splits and spinoffs into account for example, which helps in determining net returns for the stocks as in this study stock returns are used as a performance measure, these stock prices are converted to returns in the following way:

(6) $$R_t = \frac{P_t}{P_{t-1}} - 1.$$

As in this thesis we are interested on yearly returns of the stocks included in portfolios, the $R_t$ in the equation 6 denotes this. The $P_t$ stands for the stock price in the time $t$ and $P_{t-1}$ for the stock price in the time *t-1*.

FactSet's database is also utilized to derive the information about companies' financial key figures. At first, firms' earnings per share value and book value per share is downloaded. This is done in order to help to determine the firms' financial ratios of price-to-earnings and price-to-book. Equation 7 shows how

the price-to-earnings ratio is calculated for every company included in the sample:

$$(7) \qquad P/E = \frac{P_{c,t}}{E_{c,t}},$$

Where the $P_{c,t}$ is the closing stock price $P$ of the company $c$ at the time $t$. For the closing price of the stock of company $c$ the time $t$ is the last trading day of March in each year during the study period. In the equation $E$ denotes company $c$ earnings per share value. For the earnings per share $E$ of the company $c$ the time $t$ is the end of the previous calendar year.

The equation 8 hands out the function that is used to calculate companies' price-to-book values.

$$(8) \qquad P/B = \frac{P_{c,t}}{B_{c,t}},$$

where the $P_{c,t}$ is exactly the same as in the price-to-earnings formula. The difference between the two formulas comes from the denominator as in price-to-book formula there is a $B_{c,t}$ that denotes the book value per share of the company $c$ at the time $t$. As it is in the equation 7, the time $t$ for the book value per share in equation 7 is the end of the previous calendar year and for the stock price $P$ the time $t$ is the closing price of the last trading day of March.

In order to compare the performance of the portfolios, benchmark index is needed. In this thesis the benchmark that is used is the OMXHCAPPI which is a price index of all the stocks that are listed in the NASDAQ OMX Helsinki list. The benchmark index is a capped index meaning that the weight of the

individual stock is restricted to 10%. The reason to choose capped index is that it represents better the overall performance of the Finnish stock market than the OMX All Share Index which does not have any restrictive provisions on weights of the individual companies in it. The data for the OMXHCAPPI is also downloaded from the FactSet's database where the author of the thesis has an easy access.

In order to measure portfolios performance on the basis of risk adjustments the risk-free rate needs to be specified. A commonly accepted interest rate to use as a risk-free rate in the academic studies is the interest rates defined by the Federal Reserve of the United States that issues bonds of different maturities. The maturity of the risk-free rate in this thesis is the one year as the portfolios consisted are held one year from comprising. This 1-year Treasury Bill rate is downloaded from the United States Department of Treasury database. The rate will be the rate of the first trading day of April each year. The data for the risk-free interest rate is presented in the table below.

**Table 1.** The risk-free rate. (US Department of Treasury 2020)

| Year | Risk-free rate % |
|------|------------------|
| 2011-2012 | 0,27 % |
| 2012-2013 | 0,18 % |
| 2013-2014 | 0,14 % |
| 2014-2015 | 0,13 % |
| 2015-2016 | 0,27 % |
| 2016-2017 | 0,62 % |
| 2017-2018 | 1,02 % |
| 2018-2019 | 2,08 % |

These risk-free rates are used as we evaluate portfolios' performance throughout the years. The evaluation of the returns is done in accordance of the Sharpe ratio that is presented in the section 2.4 (equation 4).

6.4   Portfolio Formation

In order to measure value and growth in the Finnish stock market, stocks of the NASDAQ OMX Helsinki are divided to two portfolios with respect to their financial ratios defined in the way described in the previous section (equations 7 and 8). From all the stocks 25% of stocks with the highest P/E and P/B ratios will be bought to growth portfolio and 25% of stocks with the lowest P/E and P/B ratios will be bought to value portfolio after eliminating negative ratios and outliers. The remaining 50% of stocks each year are viewed here as neutral stocks and therefore left out of this study. Fama and French (1998) constructed the portfolios in a similar way in their study. For each year there will be two portfolios based on the P/E and P/B ratios. Portfolios are held one year as it has been the standard in various studies such as Lakonishok et al. (1994) and Fama and French (1998). This will yield us to have 32 different portfolios in 8 years. 18 of these portfolios will be growth portfolios and 18 value portfolios.

The number of stocks in portfolios varies between the years that is mainly due to excluding extreme outliers from the data. However, growth and value portfolios created from the same ratio for the same year will have a same number of stocks.

6.5 Statistical Testing

In this thesis, a simple OLS regression is used to explore statistical significance of the key ratios and their effect on portfolio returns. The formula for this is presented in the equation 9 below:

(9)
$$r_i = \beta_0 + \beta_1 (ratio_{ki}) + \varepsilon_i \, ,$$

where $r_i$ is the return of the the stock $i$ over the examination period. The $\beta_0$ represents the intercept and $\beta_1$ the slope coefficient of the regression line. Key ratio of the stock $i$ used for testing (P/E and P/B) is displayed by $ratio_{ki}$ and $\varepsilon_i$ is the error term. The significance level is set at $\alpha = 5\%$ to test significance of the key ratio.

Hypotheses are for the regression of this study. Two hypotheses are created to test if the key ratio (P/E or P/B) can explain the portfolio returns. If there does not exist statistically sufficient evidence that null hypothesis should be rejected then it will be remained in force. In case of statistically sufficient evidence against the null hypothesis, the alternative hypothesis is true and null hypothesis is rejected. The hypotheses for the regressions studying the strength of key ratios as explanators in returns are as follows:

> $H_0$ = *The key ratio examined does not explain stock returns.*
> $H_1$ = *The key ratio examined does explain stock returns.*

In the next section, empirical results are presented and it is stated which of the hypotheses should be accepted and which rejected.

# 7.  EMPIRICAL RESULTS

In this section, the empirical results of the study will be presented. The results will cover growth and value portfolios performance throughout the time period of this study. The performance of the portfolios based on P/E and P/B ratios are measured by portfolios' return, standard deviations and risk-reward relationships. Furthermore, the statistical significance of these findings will be analyzed.

## 7.1   Descriptive Statistics

The specific composition of the P/E and P/B portfolios in each year through the study period can be seen in the tables 2 and 3.

**Table 2.** Price-to-earnings portfolios from 2011 until 2019.

| P/E Portfolios | 2011-2012 | | 2012-2013 | | 2013-2014 | | 2014-2015 | | 2015-2016 | | 2016-2017 | | 2017-2018 | | 2018-2019 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Value / Growth | V | G | V | G | V | G | V | G | V | G | V | G | V | G | V | G |
| # of firms / portfolio | 18 | | 16 | | 17 | | 16 | | 17 | | 18 | | 19 | | 17 | |
| Mean P/E | 7,7 | 28,6 | 7,7 | 22,6 | 6,5 | 22,4 | 8,4 | 30,6 | 9,1 | 33,9 | 7,2 | 22,2 | 8,7 | 31,0 | 7,4 | 24,1 |
| Median P/E | 8,4 | 27,3 | 8,5 | 22,0 | 5,9 | 21,8 | 8,4 | 30,5 | 9,3 | 31,5 | 8,0 | 21,4 | 9,0 | 28,2 | 8,3 | 23,1 |

Table 2 presents the descriptive statistics for the P/E portfolios. The table reveals that the number of firms in portfolios differs moderately between the years which is a result of excluding some utmost outliers from the data. In addition, observing mean and median P/E ratios of the portfolios it is effortlessly pointed out that value portfolios are compiled from the stocks with low P/E ratios whereas growth portfolios from the stocks with high P/E ratios. Another observation from the

table is that the variation of the mean and median for the value portfolios is somewhat lower than for the growth portfolios through the study period.

**Table 3.** Price-to-book portfolios from 2011 until 2019.

| P/B Portfolios | 2011-2012 | | 2012-2013 | | 2013-2014 | | 2014-2015 | | 2015-2016 | | 2016-2017 | | 2017-2018 | | 2018-2019 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Value / Growth | V | G | V | G | V | G | V | G | V | G | V | G | V | G | V | G |
| # of firms / portfolio | 25 | | 24 | | 23 | | 23 | | 23 | | 23 | | 23 | | 23 | |
| Mean P/B | 0,8 | 3,8 | 0,6 | 3,2 | 0,6 | 3,0 | 0,6 | 3,2 | 0,8 | 3,8 | 0,7 | 3,4 | 0,8 | 3,8 | 0,8 | 4,1 |
| Median P/B | 0,9 | 3,8 | 0,7 | 3,2 | 0,6 | 3,0 | 0,6 | 3,1 | 0,7 | 3,5 | 0,7 | 3,4 | 0,8 | 3,6 | 0,8 | 3,8 |

In the Table 3 corresponding descriptive statistics are presented for the portfolios consisted using P/B ratio. Similarly to P/E portfolios it is easy to conclude that the value portfolios are created by using stocks with low P/B ratios and growth portfolios by stocks with high P/B ratios. The mean and median for the portfolios does not change much between the years of the study. Additionally, number of firms included in portfolios when they are created using P/B ratio is greater than when using P/E ratio as a criterion. This is mainly due to that when ranking firms with P/B ratio there exists less drastic outliers than when using P/E ratio.

7.2   Portfolio and Market Returns

Table 4 displays the yearly returns of value and growth portfolios when the stocks are placed in portfolios applying P/E ratio over the study period 2011-2019. From the table it is straightforwardly seen that the yearly returns differ broadly year to year for both portfolios. The highest return earned during test period is 40,5% and the lowest -22,5%. For the growth portfolio, the greatest performance was achieved during the 2013-2014 period whereas 2016-2017 was the most favourable for value portfolio. Further, notable is that the value portfolio has had

negative returns only in two years out of eight while growth portfolio has had negative returns in five out of eight years. In the table there is also calculated the difference between the two portfolios. This value minus growth shows that the value portfolio has performed better than growth portfolio in five years out of eight. On average, value portfolio has outperformed the growth portfolio by 1,8% in yearly returns.

In order to compare performance of value and growth portfolios against the overall market Table 4 shows the OMXHCAPPI returns for the study period. By comparing the mean and cumulative returns of portfolios and market index it can be seen that value portfolio has yielded better than growth or market portfolio during the test period. The difference in mean return between value and market index is 0,6% whereas it is -1,2% between growth portfolio and market index.

**Table 4.** Performance of P/E portfolios 2011-2019.

| Yearly Performance of P/E Portfolios | P/E Value | P/E Growth | Value minus Growth | OMXHCAPPI |
|---|---|---|---|---|
| 2011-2012 | -0,224750 | -0,217800 | -0,006950 | -0,187839 |
| 2012-2013 | 0,101204 | -0,020730 | 0,121934 | 0,020491 |
| 2013-2014 | 0,150797 | 0,404999 | -0,254202 | 0,184351 |
| 2014-2015 | 0,093167 | 0,167553 | -0,074385 | 0,206454 |
| 2015-2016 | 0,083061 | -0,012584 | 0,095644 | -0,086545 |
| 2016-2017 | 0,256389 | 0,148361 | 0,108028 | 0,187975 |
| 2017-2018 | 0,078147 | -0,042868 | 0,121015 | 0,058615 |
| 2018-2019 | -0,100471 | -0,137167 | 0,036696 | 0,006062 |
| | | | | |
| Mean | 0,054693 | 0,036220 | 0,018472 | 0,048695 |
| Cumulative | 0,437543 | 0,289763 | 0,147779 | 0,389563 |
| Standard Deviation | 0,149800 | 0,197227 | | 0,141239 |
| Max | 0,256389 | 0,404999 | 0,121934 | 0,206454 |
| Min | -0,224750 | -0,217800 | -0,254202 | -0,187839 |

The results of yearly performance of value and growth portfolios are presented in the Figure 5 together with market index to make it slightly easier for the reader to get a clear vision of how the portfolios performance has differed from each other during the period.
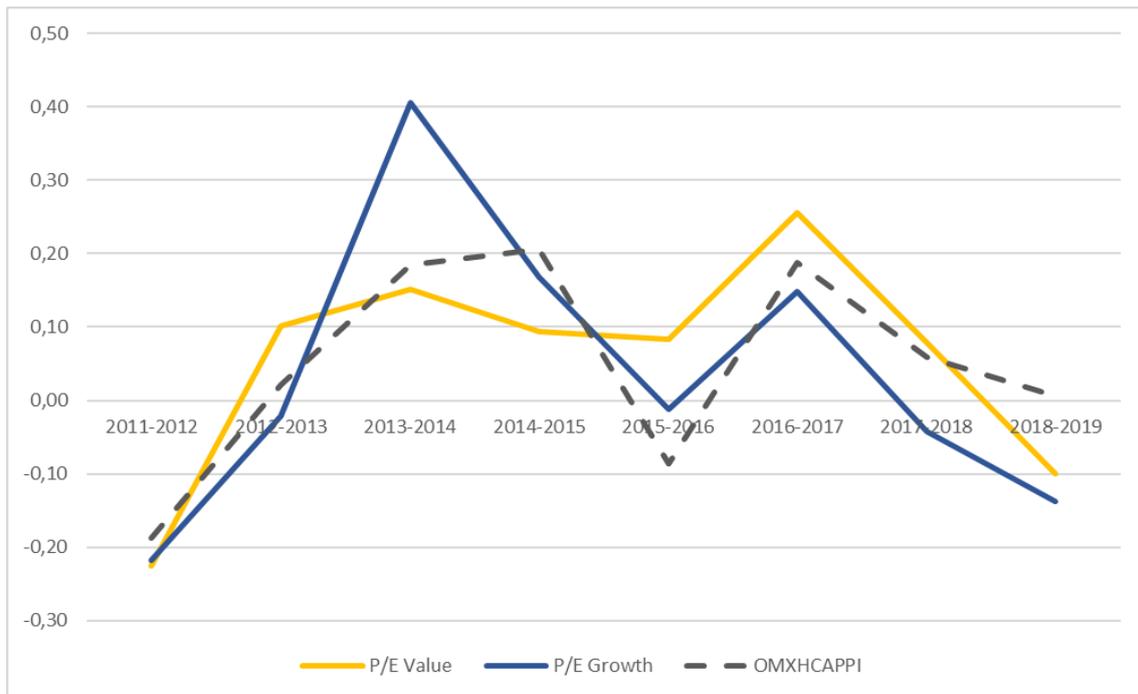


**Figure 5.** P/E portfolio returns against market index.

Table 5 presents the yearly returns for value portfolios and growth portfolios when the P/B ratio is used as a stock picking criterion over the time period 2011-2019. Similar to P/E portfolios' performance, returns of portfolios formed by P/B ratio vary substantially between the years. The highest return earned during the period is 36,1% and the lowest -22,5%, both by the value portfolio. From the table it can be seen that value portfolio has attained positive returns in half of the years studied whereas growth portfolio has been able to generate positive returns in five out of eight years. The difference between value and growth portfolio returns has been negative in five out of eight years ending value portfolio underperform growth portfolio by 1,8% on average. Furthermore, the market index'

performance is presented in the table to help reader to contrast portfolio returns to overall market. When comparing the mean returns of the value and growth portfolios against market index it can be pointed out that, on average, both portfolios have lost to market index as the difference between the value portfolio and market index is -2,4% and growth portfolio versus market index is -0,6%.

**Table 5.** Performance of P/B portfolios 2011-2019.

| Yearly Performance of P/B Portfolios | P/B Value | P/B Growth | Value minus Growth | OMXHCAPPI |
|---|---|---|---|---|
| 2011-2012 | -0,225383 | -0,153150 | -0,072233 | -0,187839 |
| 2012-2013 | -0,037859 | 0,038221 | -0,076080 | 0,020491 |
| 2013-2014 | 0,076290 | 0,185924 | -0,109633 | 0,184351 |
| 2014-2015 | 0,190444 | 0,134907 | 0,055536 | 0,206454 |
| 2015-2016 | 0,020234 | -0,027407 | 0,047641 | -0,086545 |
| 2016-2017 | 0,361439 | 0,141605 | 0,219834 | 0,187975 |
| 2017-2018 | -0,009215 | 0,050194 | -0,059409 | 0,058615 |
| 2018-2019 | -0,176509 | -0,028606 | -0,147903 | 0,006062 |
| | | | | |
| Mean | 0,024930 | 0,042711 | -0,017781 | 0,048695 |
| Cumulative | 0,199442 | 0,341688 | -0,142246 | 0,389563 |
| Standard Deviation | 0,189599 | 0,111631 | | 0,141239 |
| Max | 0,361439 | 0,185924 | 0,219834 | 0,206454 |
| Min | -0,225383 | -0,153150 | -0,147903 | -0,187839 |

For the convenience for the reader to get a better understanding of portfolios performance, the yearly returns of value, growth and market index are presented in the Figure 6. The figure illustrates clearly that the returns of for both portfolios and market index have had the same direction in each year throughout the time period.
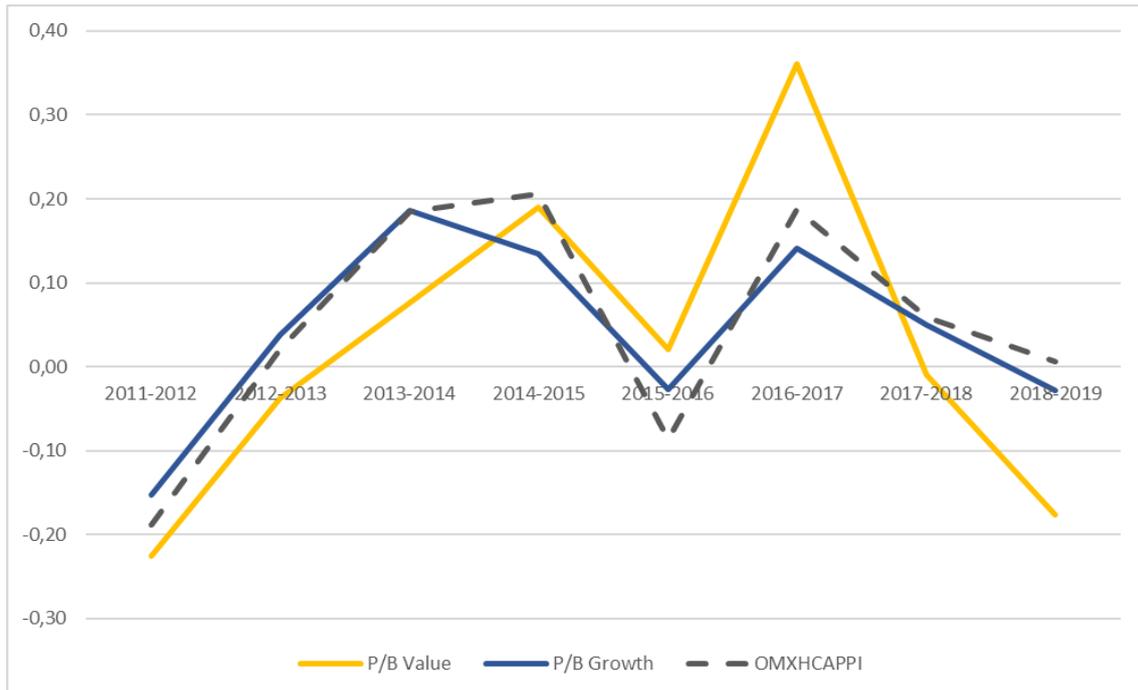
**Figure 6.** P/B portfolio returns against market index.

## 7.3 Risk Adjustments of Returns

In this section portfolios risk adjusted returns are presented. Taking portfolio risk into account is essential when comparing returns between e.g. two different portfolios as the better performance of one portfolio compared to other may have been a cause of excessive risk taking. Risk adjustment is done by using the Sharpe ratio that has been discussed in section 2.4 previously. Sharpe ratios are displayed separately for the value and growth portfolios compiled using P/E ratio and P/B ratio.

Table 6 presents the Sharpe ratios for value and growth portfolios created by using P/E ratio. Notable from the table is that the Sharpe ratios for both portfolios are low and only exceed 1 when the ratio is negative. The negative ratio can be stated to be a mark of a terrible performance as it indicates that the risk-free

investment has yielded better return than investing in the portfolio formed in this study. From the investor's perspective these kinds of investments are weak as the investor expects premium for taking more risk. Further, the value portfolio has suffered from negative Sharpe ratio in 2 years and growth portfolio in 5 years during the time period.

**Table 6.** Sharpe ratios for P/E portfolios 2011-2019.

| Sharpe ratios of P/E portfolios | | |
|---|---|---|
| Year | Value | Growth |
| 2011-2012 | -1,300235 | -1,262431 |
| 2012-2013 | 0,327493 | -0,122045 |
| 2013-2014 | 0,544407 | 0,662906 |
| 2014-2015 | 0,360476 | 0,466613 |
| 2015-2016 | 0,153659 | -0,074616 |
| 2016-2017 | 0,630267 | 0,526513 |
| 2017-2018 | 0,165575 | -0,222640 |
| 2018-2019 | -0,448089 | -1,097384 |

Table 7 shows corresponding ratios for P/B portfolios through the study period. The results for P/B portfolios are similar to P/E portfolios' results and the performance can be described as feeble since the ratios are somewhat close to zero and negativity has occured in four years for value portfolio and in three years for growth portfolio.

**Table 7.** Sharpe ratios for P/B portfolios 2011-2019.

| Sharpe ratios of P/B portfolios | | |
|---|---|---|
| Year | Value | Growth |
| 2011-2012 | -1,366335 | -0,801663 |
| 2012-2013 | -0,099238 | 0,134170 |
| 2013-2014 | 0,264186 | 0,430931 |
| 2014-2015 | 0,338311 | 0,483161 |
| 2015-2016 | 0,055037 | -0,107405 |
| 2016-2017 | 0,729855 | 0,473626 |
| 2017-2018 | -0,052556 | 0,185799 |
| 2018-2019 | -0,896203 | -0,137717 |

## 7.4   Regression Results

In table 8, regression results for the portfolios formed using P/E ratio as a criterion is presented. Here, the P/E represents the slope coefficient of the regression. For the P/E ratio the slope coefficient is negative meaning that stocks with greater P/E earn lower returns. In other words, stocks with lower ratio yield higher returns. This is in line with the finding that value stocks have outperformed growth stocks during the test period. While the slope of the regression is in line with the results achieved earlier, the coefficient of determination, R square, that demonstrates how well the returns can be explained by the key ratio which in this case is P/E ratio, appears to be very low. A low R square advocates that the returns are not explained by the P/B ratio but with some other factors. Further, the p-value is well above the limits where one could state the results to be statistically

significant so in the case of P/E ratio, the null hypothesis is accepted to stay in force.

**Table 8.** Results of P/E portfolio 2011-2019.

| Regression Results | |
|---|---|
| Intercept | 0,05988523 |
| P/E | -0,00093095 |
| P-value | 0,63900113 |
| R square | 0,00080425 |
| Observations | 276 |

For the portfolios consisted by the P/B ratio, regression results are handed out in table 9. Similarly to P/E portfolios results, the slope coefficient here is negative implying that there is negative relationship between the P/B ratio and return. To put differently, stocks with higher ratio earn returns below stocks that have lower ratio. The R square for the regression model is low indicating that the returns are not well explained by the P/B ratio. As it was the case for P/E ratio, the p-value for P/B ratio is high suggesting that the results achieved are not statistically significant and we end up accepting the null hypothesis that states that the returns cannot be explained by the P/B ratio neither.

**Table 9.** Results of P/B portfolio 2011-2019.

| Regression Results | |
|---|---|
| Intercept | 0,03539437 |
| P/B | -0,00194778 |
| P-value | 0,87172888 |
| R square | 0,00007017 |
| Observations | 374 |

## 8. SUMMARY & CONCLUSION

The purpose of this thesis has been to distinguish value investing as a strategy when investing in the Finnish stock markets. More precisely, how the value strategy can be formed and implemented in the markets by the investor that is willing to put time and effort in accordance to achieve returns that exceed market return. Further, the study has examined if the key ratios such as price-to-earnings or price-to-book, that are commonly exploited in value investing, have explanatory power in stock returns in the NASDAQ OMX Helsinki during the period from 2011 to 2019. In addition, it is brought out how traditional normative finance theory and behavioural finance describe markets from their viewpoints. Assessing value investing strategy from two viewpoints that are full of contradictions is interesting as these two points of views are often seen as mutually exclusive to one another.

Previous studies have found out that value investing has generated greater returns compared to growth investing and the key ratios used to consist these portfolios have had statistically significant explanatory power. To test whether the same has existed in the NASDAQ OMX Helsinki in period from 2011 to 2019 two hypotheses were created for the study:

H0 = The key ratio examined does not explain stock returns.
H1 = The key ratio examined does explain stock returns.

At first, portfolios were formed from the companies that had been listed in the NASDAQ OMX Helsinki throughout the years from 2011-2019. Formation of portfolios called value and growth portfolios was done in accordance of P/E and

P/B ratios. Then the descriptive analysis was conducted where several conclusions were made. In relation to P/E ratio, value portfolio has outperformed not only the market index (OMXHCAPPI) but also the growth portfolio. The average outperformance has been 1,8% yearly. When the portfolios were formed using P/B ratio, descriptive results are opposite to P/E portfolios results. Value portfolio has, on average, underperformed the growth portfolio by 1,8%. On risk adjusted basis, P/E portfolios have not performed in a way that could be considered as great performance. The average Sharpe ratios for these portfolios are low, even negative for growth portfolio. Same is true for P/B portfolios except that the value portfolio has generated negative Sharpe ratio on average and growth portfolio slightly positive, although low ratio throughout the years.

Next, the statistical analysis was used to explore whether the two key ratios show explanatory power for stock returns in Finnish stock exchange. Testing of the key ratios as explanators was done by using OLS regression. Test results show that there is a negative relation between both of the variables and stock return. This implies that when the key ratio decreases, returns increase slightly. Although the same kind of relationship of key ratios and returns has been distinguished in previous studies, here the results show that it is a very minor relationship and explains the returns poorly as R square appears to be very small for the both key ratios.

After this empirical analysis it can be concluded that the results shown in this study claim that the returns in NASDAQ OMX Helsinki cannot be explained by the two key ratios of the Finnish companies, calculated using stock prices and financial statement information, as the ratios do not appear to have explanatory power in returns. This leads to acceptance of the null hypothesis of this thesis.

As Fama and French (1995) suggest, companies with low key ratios are often in distressed position. Being in such a position tends to lead investors to neglect these firms even if they could possibly have a chance to turn the performance of the company around. This can be seen as overreaction to negative performance. In relation to results of this study, firms with low key ratios may have been either distressed with slender chances to successfully turn around their business or the turnaround process have just been started and it have not come to awareness of investors in general. A reason for weak explanatory power of price-to-earnings and price-to-book ratios may have been a cause of market recovering after financial crisis that started from the U.S. and spread around globally. As the crisis had lived down, global stock markets begun to recover and have showed an upward trend with only minor downturns throughout the test period meaning that majority of stocks have moved in the same direction as economies have overcome the issues of crisis. Another possibility to weak explanatory power of the key ratios may be that the NASDAQ OMX Helsinki is a somewhat peripheral market globally where liquidity is considerably low. Poor liquidity can cause stock prices to lag from their fair value as, for example, there may not be enough buyers in the market to drive prices up when good news from the company hit the market.

Since here the explanatory power of the key ratios of NASDAQ OMX Helsinki companies has not been recognized when market as a whole has been in an upward trend, it would be interesting to find out if the key ratios could explain returns in the current situation of Covid-19 that has arose after the time period used in this thesis. One could for example investigate the importance of key ratios in relation to return direction and the power of key ratios explaining the returns in global pandemic.

Another way to test the explanatory power of key ratios could be conducted by increasing the holding period of portfolios. Here, the holding period was only one year which may have affected the results since value firms often times seem to be in distressed positions and looking ways to turn around their businesses. It would be interesting to see if the results achieved here fluctuate when allowing these value firms take more time to change their course. Further, the time period of future research may be lengthened as it would point out if the key ratios used here have had explanatory power of returns in longer run.

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