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PERFORMANCE OF A DEEP VALUE INVESTING STRATEGY IN FINLAND DURING 2015-2021

Bachelor's thesis

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I hereby declare that I have compiled the thesis independently
and all works, important standpoints and data by other authors
have been properly referenced and the same paper
has not been previously presented for grading.
The document length is 7 845 words from the introduction to the end of conclusion.

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ABSTRACT

The purpose of this thesis is to study whether excess risk-adjusted returns can be generated by using a net-net investment strategy and to whether these returns are explainable by value and size premiums. This study focuses on the Finnish markets and more specifically the First North Helsinki alternative exchange. The net-net portfolio is constructed from all stocks trading in said exchange during 2015 to 2021. Stocks in the sample are screened to be trading below their NCAVPS (Net Current Asset Value Per Share) with a margin of safety.

This thesis uses quantitative methods. The performance of the portfolio is evaluated using three different risk adjustment methods: Sharpe ratio, Sortino ratio and Jensen's Alpha with respect to the benchmark index OMX Helsinki GI. The explainability of value and size anomalies is tested using the Fama-French three-factor model.

The study finds that statistically significant excess risk-adjusted returns were generated using the net-net investment strategy during the research period. The excess returns generated were not explainable by value and size anomalies.

Keywords: Net-net, Deep value, Finland, Excess returns

INTRODUCTION

The financial markets' function and efficiency has been studied extensively for many decades. The topic is interesting since much of the population can partake in trading. Many people have some interest in doing so and that interest is mainly to generate profits. The research done on the subject is often focused on finding the most efficient ways to allocate capital in the financial markets and in essence that is also the goal of this thesis. The stock exchange which this study focuses in is an alternative one and thus experiences some lack of liquidity. For this reason, the findings from this study are more useful to individual investors with smaller amounts of capital than institutional investors.

The inspiration for this thesis was a previous study published by Oxman et al. (2011) that studies the reasons for excess returns generated by the net-net strategy. The study describes the strategy as buying stocks trading below their liquidation value. When this is the case, the downside is quite limited with high up-side potential. This investing strategy falls under the broader category of value investing characterized by buying stocks when they are trading below their fundamental value, so called "net-nets". It could be argued that the net-net strategy takes a step further and for this reason the term Oxman et al. (2011) used, "deep value" seems quite fitting. There is some research about value investing strategies in the Finnish markets the results of which indicate that implementing these strategies can lead to excess returns (Panula 2009; Haavistola 2010). There is significantly less research focusing specifically on the First North exchange or the net-net strategy. The published research seems to indicate that value investing strategies perform in line with research done on the main stock exchange (Mulari 2017). The lack of research on this topic in the Finnish alternative markets provides justification for this thesis. Thus the focus is on testing these two hypothesis.

H1: Risk-adjusted returns of the net-net portfolio are greater than the returns of the benchmark index.

H2: Excess returns are explainable by the size and value anomalies

This thesis will use historical data from the Finnish stock market to simulate a portfolio using the net-net method to evaluate historical performance. All stocks traded on the First North Helsinki exchange during the research period of 2015-2021 were included in the sample. The portfolio returns are then calculated using equal weighing for all stocks. These returns will then be risk-adjusted with three methods: Sortino ratio, Sharpe ratio and Jensen’s Alpha. These results can then be compared to the benchmark index. Using the results the first hypothesis will be tested.

For future research, it would be valuable to know if the returns are simply explained by the value and size anomalies or are they not as was the case in the study by Oxman et al. (2011). To investigate this the thesis will use the Fama-French three-factor model. The second hypothesis will be tested with this model. Based on the results from the model the net-net strategy can possibly be optimized further.

The results of this thesis are in line with previous research regarding value investment strategies on international markets. Significant risk-adjusted excess returns compared to the benchmark index are found when using the net-net strategy. The Fama-French three-factor model did not provide statistically significant results. The coefficient values are roughly in line with the study done by Oxman et al. (2011), but he model seemed to be a poor fit for this data set and thus it did not explain excess returns with statistical significance.

The structure of the thesis is divided into three main parts. Firstly, relevant previous research and literature will be covered. This includes Modern Portfolio Theory, the Efficient Market Hypothesis and different anomalies found in the hypothesis as well as value investing in general. Hypothesis will be deriving from previous literature are presented and will be explored from chapter two onwards. Secondly, the data used in the thesis will be presented along with the methods and metrics used to analyze data. Thirdly, the empirical section in chapter three reviews the net-net portfolio performance in relation to the benchmark index, after which the suggestions are presented alongside with the limitations of this study. Finally, the thesis is concluded in chapter four.

1. REVIEW OF PREVIOUS LITERATURE

In this section the previously published literature that presents a framework with which the topic of the study can be understood will be presented. First, Modern Portfolio theory is presented since it is the basis for the following theories. Second, the Efficient Market Hypothesis will be covered along with the anomalies that are found in the markets. Third, value investing in general is discussed in a global scale and specifically in the Finnish markets. Furthermore, Post Modern Portfolio Theory and the qualities of the exchange in question are discussed.

1.1. Modern portfolio theory

The basis for the modern portfolio theory was created by Harry Markowitz in his 1953 paper “Portfolio Selection”. His thoughts about the relationship between risk and returns as well as the importance of diversification still form the basis for rational investment behavior.

The first point that Markowitz makes is that a rational investor should not base their investment decisions in a way that only maximizes expected returns. He suggests that the investor should consider expected returns as beneficial and the variance or risk of said returns as negative. This leads to the idea that the investor should diversify their investments since that lowers variance and is thus desirable. Based on this the expected returns – variance (E-V) rule is formed. It presents functions that can be used to calculate the efficient E-V combinations that exist within all of the possible ones. He elaborates that the rule does not only suggest that diversification is beneficial, it also implies that the way in which we go about diversifying is extremely important. These assumptions can be considered the foundation of mean-variance theory in portfolio management. In addition, it is important to note that Markowitz does not claim that there are not situations where one asset could be desirable to a diversified portfolio, just that in the majority of situations this is not the case.

The second point Markowitz makes is the importance of manufacturing a portfolio with assets that respond to economic situations differently. A good example of this is the example of a riskless portfolio composed of two risky assets presented by Kim et al., (2013) in their book "Modern Portfolio Theory: Foundations, Analysis and New Developments". In this example two assets A and B are examined during a four-year time period. It is demonstrated that they both have substantial variability i.e., risk in their returns. When they both are considered together in a portfolio with an equal weighing, they produce equal returns yearly, so they appear to have zero risk. This is due to them having returns that perfectly correlate negatively.

As is stated by Markowitz his paper does not consider how the investors should construct their assumptions with the risks and returns associated with different securities. It is vital for the investor to be accurate with these assumptions regarding risks and returns in order to properly evaluate their investment decisions. The paper also rules out short selling which is an important part of financial markets. Furthermore, it does not include the correlation of different assets' returns when diversifying unlike the earlier example from Kim et al., describes.

The work of Nobel Laureate Harry Markowitz has had a monumental impact on the way asset returns and risk is measured, understood, and studied. He pioneered the idea of using statistics to study investment behavior. Most if not all of the theoretical and statistical framework used in this thesis have their roots in Markowitz's work. This includes the various risk-adjustment ratios and regression models.

1.2. Efficient Market Hypothesis

According to the Efficient Market Hypothesis (EMH) it should be impossible for entities that do not possess information that is not available for the public to generate excess returns consistently (Fama 1970). This is elaborated with the Submartingale Model that first implies a scenario with a set of rules: one security, cash and the options to hold, short or hold cash. Based on these rules Fama derives the conclusion that buying and holding leads to better returns.

Fama proposed three groups of markets based on the availability of information: The *weak form* that assumes only information about the historical prices is available and it is not possible to predict future prices based on historical ones, rendering technical analysis useless. The *semi-strong form* includes clearly publicly available information such as company announcements like stock splits and annual earnings reports. The markets adapt rapidly to this information when it is published.

Consequently fundamental analysis is rendered useless as all of the data gathered from public financial statements has been priced in. Finally, the *strong form* implies that all investors have all information required to accurately price the stock, including insider information. Most of the research focusing on market efficiency is done inspecting the weak form (Fama 1991)

The Random Walk Hypothesis states that it is not possible to predict the returns of assets since the current price and the future price are independent meaning that the returns on period *t* do not have any influence on returns on period *t+1* – in other words it is not possible to predict prices. Rather, the price of the asset is determined by all of the information available on the markets thus reflecting its intrinsic value (Fama, 1970). According to the hypothesis it is inadvisable to try to use technical analysis to generate excess returns i.e trying to "beat the market" since future prices can not be predicted by historical ones. In other words it is linked to EMH by abiding by the weak form rules. Some researches argue that picking ten stocks at random yields on average similar returns as ten stocks picked by a professional (malkiel). Fama suggests that this is only true when stocks are picked based on solely technical analysis. He states that financial professionals that use fundamental analysis to base their investment decisions will outperform investors who follow a buy and hold strategy, as long as they are quicker and more accurate in determening the fundamental price of the asset than other players in the markets (Fama, 1995)

Next, we will go over different situations or anomalies that represent discrepancies in the EMH and are supposedly a way of generating excess returns by utilizing these pricing errors. In his article "The Efficient Market Hypothesis and Its Critics" (2003) Burton Malkiel goes through possible situations in which the markets are predictable and lead to the possibility of market outperformance. These situations highlight some possible flaws in the EMH and can at times be used to create a source of excess returns by exploiting these market imperfections.

Makiel (2003) calls one of these anomalies Long-Run Return Reversals which depicts the situation in which the return of a stock correlates negatively with future returns. This means that if the stock has had a history of lousy returns the probability of good ones in future periods is high. Possible reasons for this effect might be the investors overreacting to good and bad news alike, which drives the stock price away from their true value (De Bondt and Thaler 1985). Due to this, stocks might be momentarily over or undervalued but they return to their true value in the long run, hence the name. Although Makiel does cite the study by Fluck, Malkiel and Quandt (1997) in which statistical evidence was found for the phenomenon. The problem was that the stocks that produced excess returns in the first period fail to outperform in subsequent periods, leaving investors unable to harness these excess returns.

Another anomaly relevant for this thesis is the value anomaly, according to which the stocks with low Price-to-Earnings (P/E) ratios i.e., stocks that are cheaper with respect to their ability to generate profits have been historically shown to generate higher returns compared to other stocks. Up to 40 percent of the variance of future returns can be explained using a price-smoothed P/E ratio Campbell and Shiller (1998). In addition, the Price-to-Book (P/B) ratio is also used often to identify value stocks.

The size effect is the effect of small company stocks having favorable returns when compared to large company stocks (Malkiel 2003). Historically, in the United States market it was thought that smaller companies had clearly higher monthly returns when compared to large companies (Fama and French 1993). The small firm size effect is also present outside the United States, and it affects returns significantly in developed markets globally (Hou et al 2019).

One explanation for this phenomenon might be the fact that small companies are often associated with liquidity risk, since the trading volumes are considerably lower compared to bigger companies (Crain 2011). This is supported by a study conducted by Ashparova et al. (2010) found that although microstructure noise explained a significant amount of the excess returns associated with illiquid stocks during 1926 to 2006, it did not fully explain the phenomenon. The aforementioned study found the illiquidity premium to be 0,18% monthly after correcting for microstructure biases. In addition, as suggested by Crain (2011), the size of the market might influence the financial conditions of a company, making them more vulnerable to external shocks that may lead to higher financial distress events and bankruptcy rates in smaller firms than in larger ones. Another possible explanation has to do with the greater concentration risk in smaller firms because they tend to rely on fewer sources of financing than large corporations (Crain 2011). Alternatively, some studies have presented evidence that, at least in the United States, the effect is only present in very small companies with under $5 million market values (Horowitz et al, 2000)

The paper written by Arbet et al (1983) describes The Neglected Firm Effect as behavior of investment institutions and their preference for concentrating on large companies on the market leaving some – usually smaller companies neglected. This leaves some companies with low or no analyst coverage which in turn results in information about said companies spreading slower

(Hong, Lim, and Stein, 2000). In addition, the low liquidity and company size impose structural difficulties for institutions such as requirements for insider reports for the Securities and Exchange Commission and possible requirements for managerial input. The aforementioned study found significant evidence about the effect and that neglected companies produced excess returns during 1970 to 1979. More recent studies have also found that even after correcting for risk and the size effect, neglected companies with low liquidity and price produce excess returns (Oxman et al 2011).

1.3. Value investing

Value investing as a strategy is based on purchasing stocks that are cheap relative to earnings, dividends, book value or other fundamental measures of value. There is no universally accepted formula for defining value stocks and usually many financial ratios are used to identify value stocks. And although the strategy has faced substantial academic criticism, strategies that are based on the fundamental idea of value investing have outperformed the market on many occasions (Lakonishok et al, 1994). This study identifies value stocks based on the Net Current Asset Value Per Share (NCAVPS) as suggested by Oxman et al (2011) to construct a net-net portfolio. The formula for NCAVPS is presented below:

$$NCAVPS = \frac{(CA - TL)}{TSO} \tag{1}$$

where

$NCAVPS -$ net current asset value per share,
$CA -$ current assets,
$TL -$ total liabilities,
$TSO -$ total shares outstanding.

The formula is slightly modified to exclude preferred shares. This modification was done due to the inconsistency of data availability and to keep the sample size at a reasonable level.

Since the strategy is based on finding stocks that are cheap, and the market price of stock is reflective of the consensus of the collective agents that take part in said market, this leads to the conclusion that investors following the strategy often swim against the current. This is called contrarianism and it might be one of the reasons for the higher returns associated with value investing. One benefit of this is that it leaves the followers of this strategy on the winning side of the trade as the wider markets overreact to either positive or negative information that leads to mispricing. (De Bondt and Thaler 1985). Value investors use this mispricing as an advantage when they effectively bet against the market consensus that the value stocks will continue to do badly (Lakonishok et al, 1994).

There is some research regarding value investing in Finland specifically (Dadydov et al. 2016; Haavistola 2010; Pätäri et al. 2010; Panula 2009;). These have a focus on more well known value investing strategies as studies regarding the net-net method were not found. The research done in the Finnish markets suggests that the results are roughly in line with research done globally in the sense that they have historically outperformed the market and glamour stocks. These studies have focused on the main list of the Helsinki stock exchange.

1.4. Post-Modern Portfolio Theory

One major critisism for the MPT is that it considers both downside and upside variations as negative, when using factors like the Sharpe ratio. Assumably for many investors upside variatios i.e. returns that deviate largely form the mean positively are not undesirable. This was acknowledged by Markowitz and Sharpe and the use of semi-variance was proposed to address the problem (Sharpe 1964). Post-Modern Portfolio Theory (PMPT) attempts to address these problems using the methods proposed by Markowitz. PMPT measures risk by downside volatility (semi-variance) which is undesireable for investors. In accordance Rom et al. (1993) argue that upside volatility is desirable. It is in fact hard to think of a reason why investors would view large returns as undesirable or as risk. Furthermore, MPT requires normally distributed retruns, however, often the case is that the returns not normally distributed. PMPT method provide better analysis of skewed returns.

1.5. First North stock exchange

Since the OMX First North is an alternative exchange the properties and differences to the main OMX exchange will be discussed in this part. Like the main list, it is operated by Nasdaq since 2007. Exchanges with a similar name and function operate in other nordic countries as well. It serves as a marketplace for smaller companies to raise capital, grow and prepare for moving to the main list. Regulations also differ from the main lists since it is treated as a Multilateral Trading Facility (MTF). Main differences being lower free-floating stock, no market cap requirements, no corporate governance code and the ability to use local accounting standards instead of IFRS when compared to the main list. The alternative list did not gain much attraction at first in Finland, with its first listing being in 2012 five years after the launch with Siili Solutions Oyj. In other countries such as Sweden the exchange has seen more interest and as of today 519 companies are listed compared to the 59 in the Finnish list.

Intuitively it could be assumed that companies on this alternative list, that are smaller and for this reason often left with less analyst coverage in comparison to the main list be attractive to investors due to the neglected firm and size effects discussed previously. Another potentially quite significant factor might be illiquidity as smaller firms are associated with more liquidity risk (Crain 2011). It widely known that large institutions provide liquidity to the markets and although the share of small cap stocks in institutional portfolio allocations has increased at least in the United States (Blume et al 2012) it continues to capture less of the institutional capital globally compared to large cap stocks (Roach 2022). Since these institutions handle large amounts of capital, investing in companies with low volume might not be feasible and this leads to lower liquidity in these assets. The impacts of institutions on the liquidity of stocks traded in the First North exchange is not researched, but it can be assumed that this affect First North as well.

2. DATA AND METHODOLOGY

In this section the data collection and methods used in the empirical part of the study will be presented. The sample contains all companies in the OMXH First North list during January 2015 to January 2022. Thus the research period is seven years long during which one year was a time of economic contraction in Finland.

This thesis is inspired by a previous study done by Oxman et al. (2011), which examined the reasons for the performance of the net-net strategy with the Fama-French three-factor model. The net-net portfolio is created using a similar, although simplified, method that is used in said study. The simplification is due to the considerably smaller sample size which was the result of the geographical scope of this thesis. The risk-adjusted returns are examined with similar methods that are used exceedingly in previous research.

2.1. Data gathering

Data was mainly gathered using the Thomas Reuters EIKON software. The sample contained 36 companies and 126 firm years of data with the timeframe of January 2015 to January 2022. The number of companies increased over the timeframe. In addition, the Finnish 10 year government bond yield data was collected. Price data of the benchmark index was collected from the Nasdaq web sources. In addition, the SMB and HML values for the Fama-French three-factor model were gathered online from the Kenneth R. French data library. The European 3 Factors was used since there was no more specific geographical cropping available. A Microsoft Excel file composed of this data was compiled for further calculations.

First, the Net Current Asset Value Per Share (NCAVPS) was calculated for each company with the formula 2 presented below. Normally preferred stock would be subtracted from Total Current Assets as well but this was not possible since software available to the author for data collection did not provide adequate data on this variable.

Second, a dummy variable was created to identify the stocks that were trading at ⅔ of their NCAVPS. This was done in Excel with an "=IF" function that returned the value of 1 if the function was true.

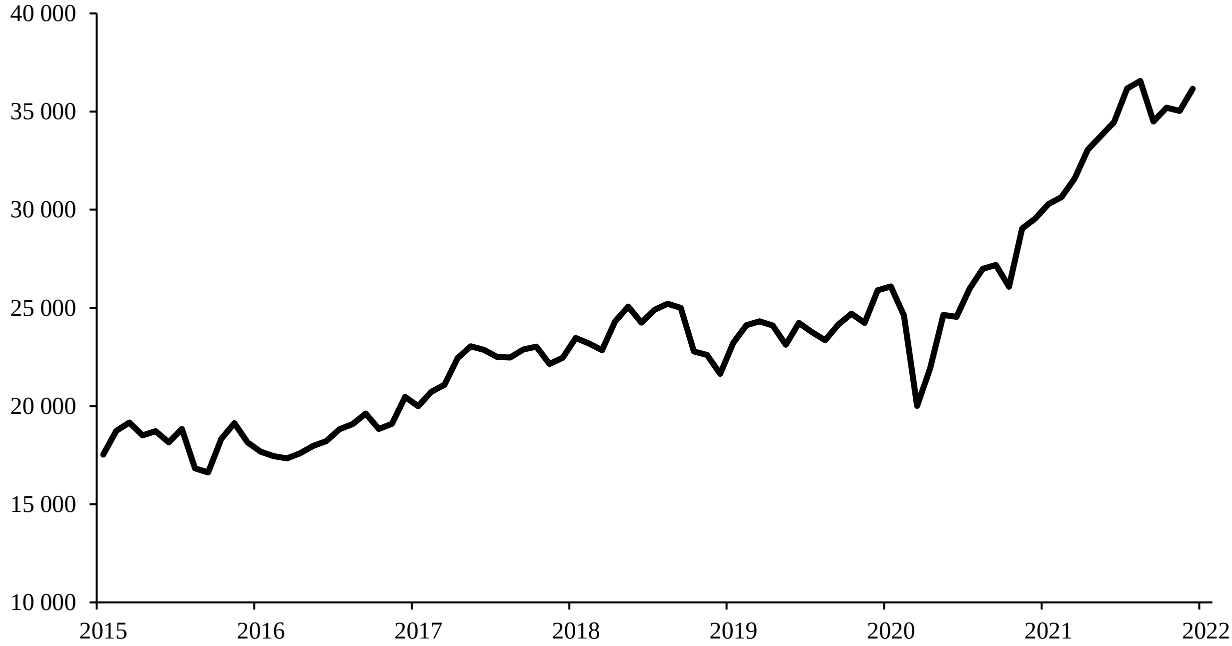
$$Price\ close * 0{,}67 < NCAVPS \quad (2)$$

This was calculated for each stock, each year to filter out the stocks that did not meet the criteria for that specific year. Third, the holdings of the portfolio were composed. This was done separately for each year since annual rebalancing was used. All stocks were given an equal weight in the portfolio for each year. Yearly returns for the stocks and the portfolio were calculated along with the yearly betas for each company and the portfolio, with respect to the First North All-Share index as described earlier. Finally, the excess returns of the portfolio were calculated by subtracting the geometric average annual yield of the 10 year Finnish government bond from the portfolio returns.

2.2. Benchmark index and risk-free return

The returns of the net-net portfolio will be compared to the OMX Helsinki Growth Index (OMXHGI). This index was chosen since it represents the overall Finnish market and takes dividends into account. The companies on the index are weighed by market cap. A weight capped version of this index is also available, but the OMXHGI gives a more accurate picture on the actual state of the market and was thus chosen. Figure 1 below presents the price development of the index in the research period.

Figure 1. OMXHGI price development



Source: Nissinen (2022), author's calculations based on data gathered from Nasdaq (2022)

From figure 1 it can be seen that the research period is charecterized mainly by growing markets. Until the beginning of 2020 a trend of quite stable modest growth can be seen, after which a sharp decline caused by the Covid-19 pandemic followed by rapid growth. The cumulative returns of the net-net portfolio and the benchmark index were calculated using formula 4.

$$[(1 + r1) \cdot (1 + r2)(1 + r3) \cdot \ldots \cdot (1 + r(n))]^{\frac{1}{n}} - 1 \tag{4}$$

where

$r -$ annual returns,

$n -$ number of years.

The Finnish 10 year government bond yields were chosen to represent the risk-free rate. They are used by the Finnish government to fund the national debt. The reason for choosing these bonds for the risk-free rate is that they are backed by the Finnish government it is extremely unlikely that they will default on their payments. This yield also reflects the overall sentiment on the Finnish economy.

2.3. Research methods

In order to properly review the performance of the portfolio the returns will need to be risk adjusted. The reason for risk-adjusting is that given similar returns between two portfolios, it is reasonable to prefer the one with lower volatility (Bacon, 2012). Among the different types of risk this thesis is intrested in market risk, since it can be measured using statistical methods. The reasons for possible excess returns will be tested using regression analysis with the Fama-French three-factor model.

2.3.1. Sortino ratio

Sortino ratio follows the PMPT's assumption that only negative risk i.e., downside risk should be adjusted for. The practicality of using risk-adjustmets that focus on downside risk is apparent when the sample data contains significant upside volatility. This upside volatility can make the strategies risk-adjusted returns appear unfavorable when more traditional risk measures such as the Sharpe measure is used. For the aims of this thesis there are not any reasons to avoid upside volatility. Therefore, this thesis will use the Sortino ratio to statistically evaluate the net-net portfolio performance in relation to the benchmark. Formula 3 that is used to calculate Sortino ratio is presented below (Dadydov et al 2016).

$$SR_p = \frac{R_p - MAR}{\sqrt{\frac{1}{n}\sum_{R_p<MAR}\left(R_p - MAR\right)^2}} \quad (4)$$

where

$R_p -$ portfolio returns,

$MAR -$ minimum accepted return,

$n -$ number of samples.

MAR is described by being the rate of return that has to be achieved in order not to fail reaching an important financial goal (Rom et al 1993). For the purposes of this thesis the MAR is set as the geometric average yield of the Finnish 10 year government bond. This is the risk-free return that an investor could have achieved in this period and thus returns lower than it can be considered unsatisfactory. The first hypothesis will be tested with the Sortino ratio.

2.3.2. Sharpe ratio

Using the Sharpe ratio is one of the most common ways of evaluating portfolio performance. It is essentially the ratio with which the portfolio generates returns with regards to its risk level; the higher the ratio the higher the returns per unit of risk (Bacon, 2012). Despite its popularity, there are numerous problems with the Sharpe ratio. Since it is based on the mean-variance theory covered in section 1.1 it will not apply well to sample data that does not follow normal distribution or has high excess returns (Maclean et al. 2010). This description, however, describes the sample data very well. The ratio will be included in this thesis due to its frequent use is similar studies as an additional way to evaluate performance. The formula used to calculate Sharpe ratio is presented below.

$$Sharpe\ Ratio = \frac{(R_p - R_f)}{\sigma_p} \quad (5)$$

where

$R_p -$ portfolio returns,
$R_f -$ risk free rate,
$\sigma_p -$ standard deviation of excess portfolio return.

2.3.3. Jensen's Alpha

Jensen's measure was created by Michael Jensen in 1968. It is one of the oldest methods of risk-adjusting returns predated only by the Treynor Ratio that was created in 1967. Based on the Capital Asset Pricing Model (CAPM) it is used to risk-adjusted excess returns (Bacon, 2012). Formula used to calculate Jensen's Alpha is presented below

$$Jensen's\ Alpha = R_p - (R_f + \beta(R_m - R_f)) \quad (6)$$

where

$R_i -$ portfolio returns,
$R_f -$ risk free rate,
$R_m -$ benchmark returns,
$\beta -$ portfolio beta.

Jensen's alpha is also used often to risk-adjust portfolios. The measure simple to interpret since it tells the risk-adjusted excess returns with respect to the benchmark index (OMXHGI). In other words, with a negative alpha the investor would have been better off investing in a market portfolio. However, it does not account for market anomalies, and is thus susceptible to exacerbating returns on portfolios that take advantage of market anomalies.

2.3.4. Fama-French three-factor model

The Fama-French three-factor model adds to the CAPM in the form of two extra variables: small minus big (SMB) and high minus low (HML). These two variables are added to the formula in order to account for the value anomaly and the small firm size effect discussed previously. It is used rather than CAPM since it explains the returns more accurately. An Ordinary Least Square (OLS) regression analysis will be used to evaluate excess returns and to test H2. Formula that will be used is presented below.

$$R_{it} - R_{ft} = a_{it} + \beta_1(R_{Mt} - R_{ft}) + \beta_2 SMB_t + \beta_3 HML_t \quad (7)$$

where

R_{it} − Total portfolio returns,
R_{ft} − Risk free rate,
a_{it} − Excess returns,
R_{Mt} − Market returns,
SMB_t − Size premium (small minus big),
HML_t − Value premium (high minus low),
$\beta_{1,2,3}$ − Factor coefficients.

The values for the size and value premium coefficients were acquired from Dr. French's website. Unfortunately the data obtained to calculate the model is meant for the broad European markets, but it will be used in the lack of more specific data. The coefficients for the three different variables describe the sensitivity with which the excess returns of the net-net porfolio are effected. The market returns coefficient tells the beta of the excess returns as CAPM would. The size premium coefficient gives us insight on the relationship between the net-net portfolio and the overall performance of small cap stocks in the European markets. The case is similar with the value premium coefficient, but it instead is used to evaluate the relationship between the portfolio and the relationship between growth and value stocks. The value for these coefficients is calculated by first constructing large cap, small cap, value and growth portfolios from stocks traded in European markets. The indicator for value stocks is the P/B ratio. The returns derived from these portfolios is used to calculate the coefficient values. For the size premium it is the average returns of three small cap portfolios minus three big portfolios. As for the value premium it is calculated in a similar manner. Thus, these values give an indicator of how differents kinds of stocks are performing in the European markets. As with all of the previous formulas, the risk-free rate is derived from the geometric mean of Finnish 10 year government bond yields.

3. FINDINGS AND DISCUSSION

In this chapter the key results of the empirical part will be examined along with their statistical significance. The goals of this study were to research wheter it is possible to generate excess returns with a net-net investment strategy and to research to what extent the value and size anomalies explained these returns. The research period was from 1.1.2015 to 1.1.2022 and the relevant data was obtained for stocks trading in the OMX Helsinki First North exchange. For context this period contained one year of negative GDP growth in Finland with -2.3 percent in 2020 (Statistics Finland, 2022). The returns will be compared to the OMXHGI that reflects the overall returns of the Finnish market.

3.1. Performance of a net-net portfolio

Table 1 below contains the annualized geometric means of the returns for the portfolio and the benchmark index along with key descriptive statistics and the risk measures used to evaluate performance. All of the returns are calculated using geometric mean as is appropriate.

Table 1. Overview of risk-adjustment measures

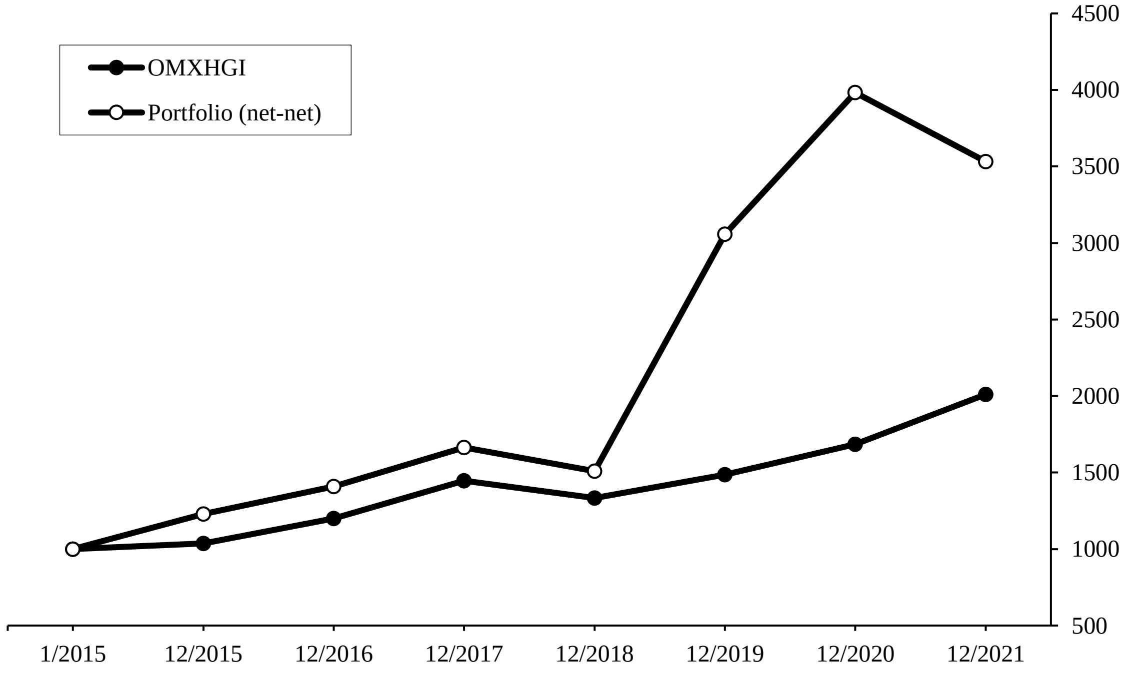
	Net-net portfolio	OMXHGI
Returns p.a (%)	19.75	10.49
Volatility p.a (%)	38.12	9.99
Skewness	1.66	-1.24
Kurtosis	3.18	1.15
Sharpe ratio	2.14	2.14
Sortino ratio	0.63	0.57
Jensen’s Alpha (%)	13.47	–

Source: Nissinen (2022), author’s calculations based on data gathered from Thomson Reuters Datastream (2022) and Nasdaq (2022)

From table 1 we can see that the annualized returns for the net-net portfolio were almost double of compared to the benchmark's with the annualized volatility being close to four times larger. During the research period, the net-net portfolio had two years of negative returns in 2018 and 2021 while the benchmark had only one year of negative returns in 2018, this negative return was also slightly smaller compared to the net-net portfolio. Out of the seven years the net-net porfolio returns exceeded the benchmarks in three years 2015, 2019 and 2020. However, during these periods the amount with which the benchmark returns were exceeded was quite large. Returns of the net-net portfilio are skewed and have extremely high kurtosis. In comparison the benchmark index is left skewed and has little kurtosis. Jensen's Alpha of 13.47 percent per annum indicates that excess returns were achieved when assessing using the CAP model.

Figure 2 illustrates the returns with a graph of cumulative of the benchmark and the net-net portfolio. These cumulative returns are calculated using an initial investment of 1000€ in the beginning of the research period.

Figure 2. Cumulative returns of net-net portfilio and benchmark index



Source: Nissinen (2022), author's calculations based on data gathered from Thomson Reuters Datastream (2022) and Nasdaq (2022)

The cumulative returns remained higher for the net-net portfolio during the research period. We can see from figure 2 that returns on the net-net portfolio moved quite similarly to the benchmark index until 2019 when the difference in returns significantly increased. This difference was largely driven by two stocks generating significant returns during 2019 and 2020.

Of course, these returns have risk-adjusted to properly evaluate their performance in relation to the risk taken. Perhaps surprisingly, the Sharpe ratios for the portfolio and the benchmark are quite similar at 2.139 and 2.145 respectively. This suggests that the net-net portfolio does not achieve returns in excess of its risk level when compared to the benchmark index. Sharpe ratio, however, takes into account the upside risk, in other words, abnormally high returns can result in lower Sharpe ratios. As stated previously the Sharpe ratio will not be used to confirm hypothesis but rather as an additional complementing measure.

The measure with which the statistical analysis of hypothesis 1 is conducted is the Sortino ratio. There are two main reasons why Sortino ratio was chosen to test the hypothesis. Firstly, it is suggested by Sharpe and Markowitz that a measurement of this kind would be better in risk-adjusting than the Sharpe ratio and that computational limitations restricted them creating one (Sharpe 1964). Secondly, the net-net portfolio has periods with quite substantial upside volatility, a fact that distorts the Sharpe ratio. These reasons can also be seen in the results of the two ratios. The net-net portfolio has a higher ratio of 0.63 compared to the benchmark index's 0.57, but as discussed the Sharpe ratios are remarkably similar. This suggests that the downside-risk of the net-net portfolio is lower than that of the benchmark index. The results for the Sortino ratio were statistically significant with the critical value of $p<0.05$. Thus we can reject the null hypothesis and confirm hypothesis 1 to be correct.

In the next section, the results of the regression analysis used to test the second hypothesis will be discussed. As previously mentioned, the Fama-French three-factor model was used to evaluate wheter possible excess returns would be explainable by the value and size anomalies. The values for the SMB and HML variables that were acquired from Dr. French's website. Other variables were calculated using the monthly price data obtained from Thomson Reuters databank. Figure 4 below contains the results of the OLS-regression analysis.

Table 2. Results of Fama-French three-factor model

	Net-net portfolio
Alpha p.a (%)	9.557
t-value	0.773
p-value	0.441
Market	-0.208
t-value	-0.981
p-value	0.329
SMB	0.003
t-value	0.640
p-value	0.524
HML	0.000
t-value	-0.059
p-value	0.953
R^2 (%)	1.658

Source: Nissinen (2022), author's calculations based on data gathered from Thomson Reuters Datastream (2022), Nasdaq (2022) and Kenneth R. French data library (2022).

The results of the regression analysis could be described as counterintuitive. Fistly, the R^2 is very low at 1.658 percent. This indicates that only that percentage of the variation in the net-net portfolios monthly excess returns can be explained by the three factors. Furthermore, it could be assumed that this type of portfolio would perform well when value stocks and small cap stocks are performing well in the markets, however, the coefficients seem to indicate that those factors have negligible impact on the excess returns of the net-net portfolio. The beta for these excess returns is also slightly negative indicating that the net-net portfolio generates less excess returns when markets are experiencing growth. The alpha is smaller with the three-factor model in comparison to the CAPM as is to be expected. None of the variables in the model were statistically significant. For this reason we can conclude that the model could not explain these excess returns and thus we reject hypothesis 1. These results were calculated using monthly data, but the alpha was annualized for easier interpretation.

3.2. Discussion

The risk-adjusted returns indicate that a portfolio generated with a net-net strategy was able to create risk-adjusted excess returns. This finding is in line with the broader field of studies done with different value investing strategies in that excess risk-adjusted returns have been found (Oxman 2011, Lakonishok, Shleifer and Vishny 1994). Similar results have also been found in studies researching the Finnish main stock exchange (Olin, 2011, Mulari 2017, Haavistola, P. 2010 & Panula, M. 2009). Since there is not any previous studies researching the returns of the net-net strategy in Finnish alternative markets, comparisons are done with the broader spectrum of value investing strategies.

The results for the regression analysis are partly in line with previous research. Oxman et al. (2011) notes that SMB and HML coefficients did not have significant relation to the excess returns for the most part. But in contrast to this thesis, the previous study had statistically significant alpha and the beta remained positive and statistically significant. The R^2 also remained under 5% in the previous study. It appears that the properties of excess returns generated with the net-net strategy differ from those gained from a P/E or P/B portfolio for example. The negative beta on excess returns can be interpreted as the net-net portfolio losing excess returns when the markets are experiencing growth. Further research is needed in order to indentify the reasons for excess returns obtained using the net-net strategy. This is contradictory to the betas achieved from CAPM, but it is important to note that none of these values are statistically significant, and thus the second hypothesis was rejected.

When comparing the Sortino ratios, we find that the net-net portfolio produced statistically significant risk-adjusted excess returns during the research period. This implies that the net-net portfolio was able to generate better returns after downside risk was accounted for. The Sharpe ratio is higher for the benchmark index albeit the difference is very slight. The difference in the results of the two seems quite intuitive since the net-net portfolio has large upside volatility which affects Sharpe ratio negatively. The positive Sortino ratio is in line with some previously done research (Dadydov et al 2016). The similar Sharpe ratios between the net-net portfolio and the benchmark seems to be different compared to previous research in the Finnish markets that focuses on different value strategies (Dadydov et al 2016). In addition to the net-net strategy, factors like research period and thus risk-free rate and the different benchmark index have an impact on this result. Other explanation for this result could be the increased volatility of small cap stocks that were used in this study compared to the main list stocks that have inherently larger capitalizations in previous studies on the subject. All of these factors have an impact on the comparability between this thesis and previous studies done on value investing.

From these results we can derive the conclusion that implementing a net-net investment strategy seems to be a more efficient way of allocating capital when compared to investing in the overall markets. Altough the net-net strategy significantly more volatile than the benchmark it yields better risk-adjusted returns when downside risk is considered. These returns were not explainable with value and size anomalies according to the Fama-French three-factor model.

3.3. Limitations of the study

Sample size is significantly smaller compared to the previous studies since the activity in the Finnish alternative exchange is understandably lower when compared to bigger economies, based on which the studies such as Oxman et al (2011) are made. The relatively low sample size affects the reliability in a negative manner. Due to this the recommendations that will be made won't be as robust and might not have the same impact as the findings of the studies that have larger sample sizes. In order to rectify these issues the model could be adjusted more specifically for Finnish markets. This might include recalculating the coefficients in the model.

Another limitation is the geographical cropping of this study, focusing only on the Finnish stock market. It is likely that if a study would be done in a similar manner in other countries and exchanges the results would vary. As an example, a study by Chen & Chang (1998) found that the prevalence of value anomalies differs when comparing stable markets and mature markets to rapidly growing ones. The Finnish stock market can be considered quite stable and mature in contrast to the rapidly growing ones mentioned in the study like Thailand and Taiwan and should thus contain companies that are affected by the anomaly. For the purposes of this study, however, the scope seems adequate.

For the data, the Thomson Reuters database provided good data on price. When it comes to the other values such as total current assets, total liabilities, and preferred stock outstanding there were large deficiencies that inevitably affected the sample size. In addition, as previously mentioned the coefficients for the Fama-French three-factor model provided by Kenneth R. French database were calculated for the broader European markets and not specifically for Finland. These two factors might affect the robustness of the data and the subsequent recommendations.

To conclude this section, all of the limitations of this study stem from its scope and cropping. There is not much research done on the Helsinki First North market and the net-net strategy. This poses a challenge since comparing this study to previous ones might not lead to accurate conclusions since the topic and scope varies slightly. However, comparisons are done on a more broad scale as was necessary. In essence this meant that the net-net portfolio was compared to other value strategies that are usually more simple in their implementation. In addition most of the research done on the Finnish markets focuses on the main OMX Helsinki list.

CONCLUSION

This thesis evaluated the performance of a deep value investment strategy in the Finnish alternative stock exchange OMXH First North during the period 2015-2021. The goal of this research was to test wheter it was possible to generate excess risk-adjusted returns in comparison to the OMXHGI benchmark index and wheter or not excess returns were explainable by value and size anomalies. The portfolio was constructed using a net-net investing strategy and its risk-adjusted returns were compared to the benchmark by using the Sortino ratio, the Sharpe ratio and Jensen's Alpha. The explainability of the value and size anomalies on the excess returns of the net-net portfolio was tested with Fama-French three-factor model.

There has been extensive research on the subject of value investment strategies outperforming the markets in North America and in other developed countries. This research is, however, usually based around strategies that involve buying stocks based on financial ratios like P/E, P/B, P/CF et cetera and there is less research considering the net-net method. There is not surprisingly less research done on value investing in the Finnish markets and it is mainly focused on the main exchange and the previously mentioned methods of value investing. Since there is no previous research covering the net-net method on the Finnish alternative exchange the research is not directly compareable. Previous research does provide a framework that can be used to reflect the results of this study to, since it considers strategies that are charecterized as value investing as is the case with this thesis. Previous findings indicate that different value investing strategies have been able to generate excess risk-adjusted returns rather consistently throughout modern stock market history. These excess rerturns have been explained using the value and size anomalies in some previous research, while others have found that they only in partly explained the returns. Thus research suggests that there are situations in which other factors need to be added to fully explain excess returns.

This study finds statistically significant risk-adjusted excess returns with respect to the benchmark index when using the net-net investment method. The annual results of the net-net portfolio were higher along with the annual volatility in comparison to the benchmark. Jensen's Alpha indicated excess annual returns of 13.47 percent for the net-net portfolio. Sharpe ratio indicated that the risk-adjusted returns were more favourable for the benchmark index by a small margin. The Sortino ratio which takes into account only the downside risk indicated that statistically significant excess returns were achieved using the net-net method, cofirming the first hypothesis. These results seem to suggest that the upside volatility of the net-net portfolio affected its Sharpe ratio negatively. The Fama-French three-factor model had results that were in line with the study that insipired this thesis. These results showed that unlike might be expected, the value and size premium coefficients had very minimal effects on the excess returns of the net-net porfolio. Contrary to previous research, the excess returns seem to have a negative beta, meaning that they decrease when the market is experiencing growth. The coefficients of the value and size variables in the three-factor model had no statistical significanse and thus the second hypothesis was rejected. The model also indicated a 9.5 percent annual alpha, but as with the other coefficients this result was not statistically significant. These results could be a result of the coefficient data being calculated for broader European markets and the limited sample size.

Investment behaviour that is based around finding undervalued assets is crucial to price discovery and in making the markets efficient. This thesis focused on the alternative First North exchange that has lower trading volumes than the main list in part due to institutional investors being less likely to invest in these assets. Therefore, research that studies the strategies that can be implemented by retail investors is important to make the markets more liquid and efficient. As stated before, the amount of research focusing on alternative exchanges is scarce and more is needed in order for investors to allocate their capital in the most effective way. Future research could focus on the performance of different strategies in these exchanges and the reasons explaining that performance. In addition, better fitting models could be used to identify the reasons for excess returns, since understanding these reasons might assist in creating more efficient strategies for capital allocation. Different variables could be added to the model in an effor to find the reason for excess returns. The coefficients for the value and size anomalies could be calculated for Finnish markets specifically and additional coefficients could include analyst coverage and stock price, as this has been found to explain the results in previous studies.

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APPENDIXES

Appendix 1. Descriptive statistics for dataset

	Net-net portfolio	OMXHGI
Risk-free rate p.a.	0.27%	0.27%
Returns p.a	0.19750	0.10491
Number of downside periods	37	32
Semivariance	0.0080	0.0027
Semideviation	0.3090	0.1798
Mean	0.0104	0.0106
Standard Error	0.0100	0.0051
Median	0.0120	0.0141
Standard Deviation	0.0913	0.0470
Sample Variance	0.0083	0.0022
Kurtosis	-0.094	3.261
Skewness	-0.002	-0.764
Range	0.449	0.310
Minimum	-0.235	-0.187
Maximum	0.214	0.123
Sum	0.873	0.890
Count	84	84
Risk-free rate p.a.	0.00619	0.00619

Source: Nissinen (2022), author's calculations

Appendix 2. Portfolio composition and returns

Year	Company	Weight	Returns p.a	β
2015	Nextim Oyj	50%	23%	0.51
	Total	100%	23%	0.51
2016	Nextim Oyj	50%	-89%	5.95
	Detection Technology Oyj	50%	118%	-1.21
	Total	100%	14.5%	2.36
2017	Nextim Oyj	33.3%	11.8%	1.2
	Detection Technology Oyj	33.3%	33%	-0.04
	Piippo Oyj	33.3%	9.3%	0.34
	Total	100%	18.1%	0.50
2018	Detection Technology Oyj	33.3%	-11.7%	0.01
	Piippo Oyj	33.3%	-33.9%	-1.34
	Fondia Oyj	33.3%	-45.8%	0.06
	Total	100%	-30.5%	-0.43
2019	Detection Technology Oyj	50%	56.2%	0,43
	Admicom Oyj	50%	149%	1,75
	Total	100%	102.7%	1.09
2020	Detection Technology Oyj	33.3%	24.3%	0.17
	Admicom Oyj	33.3%	48.2%	-0.07
	Fodelia Oyj	33.3%	18.2%	-0.27
	Total	100%	30.2%	-0.06
2021	Detection Technology Oyj	33.3%	0.7%	0.55
	Remedy Entertainment Oyj	33.3%	-14.7%	0.33
	Admicom Oyj	33.3%	-26%	-0.5
	Total	100%	-11.3 %	0.13

Source: Nissinen (2022), author’s calculations

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