Aalto University
School of Economics

The Activity and Performance of Finnish Equity Funds - Applying the Active Share Method

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Department of Economics
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ABSTRACT
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THE ACTIVITY AND PERFORMANCE OF FINNISH EQUITY FUNDS

Applying the Active Share method

Purpose of the study

This thesis concentrates on Finnish equity funds investing in Finland, Nordic Countries and Europe. The objective is to determine the level of active management in the Finnish equity market and the performance and expenses related to different activity levels. The objective is also to examine closet indexing in the Finnish equity market.

Data and methodology

The data in this thesis is from the first quarter of 2008 to the third quarter of 2010. Mutual fund holdings are from Investment Research Finland Ltd. and funds' annual and quarterly reports. Benchmark index holdings are from MSCI Barra and NASDAQ OMX. All the net asset values for the funds and benchmark indices are from Investment Research Finland Ltd. Total Expense Ratios are from the Finnish Mutual Fund Reports.

The level of active management is determined by using Active Share and tracking error. Active Share measures the amount of fund holdings that differ from the benchmark index holdings and tracking error calculates how much the fund's daily returns deviate from the benchmark index returns.

Results

The Finnish equity funds are quite active since less than 40% of the fund assets are on average invested according to benchmark indices. The equity funds investing in Finland are clearly the most passive compared to the funds investing in Nordic Countries and Europe.

The average performance of the Finnish equity funds increases as the level of activity increases. In addition, the most active funds performed the best within every fund group with different investment scopes.

There exist several closet indexing funds in the Finnish equity fund market. These funds also charge substantial fees compared to their activity levels.

The average Total Expense Ratio increases with the level of active management i.e. more active funds charge higher fees.

Keywords

Equity fund, Active Share, tracking error, active management, closet indexing

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1. Introduction

The basic idea between mutual funds is that they pool investments from a large number of investors and then invest the money in different types of instruments such as stocks, bonds and short-term money market instruments. In Finland the mutual funds are divided into five categories; equity funds, bond funds, money market funds, asset allocation funds and alternative funds. Mutual fund's operation is guided by the investment policy of the fund which determines the guidelines for the investments available for the fund. Eventually, it is the fund manager who is responsible for following the investment policy when making investment and diversification decisions.

Fund managers have two different ways to exercise their business. They can apply very active fund management policy or on the other hand they may be more passive. Passive fund management can be considered as replicating the benchmark index whereas active fund management is determined as the deviations from the passive indexing approach. Passively managed funds are often a cheap way to invest in mutual funds and they also offer the advantage of diversification. Actively managed funds are more expensive in terms of administration fees and therefore they are also expected to add value relative to the benchmark index. This will be done by exploring the markets and actively trying to differentiate the fund holdings from the benchmark index holdings.

Investors investing in funds seek diversification but those investing in actively managed funds also seek expertise from the fund managers who are assumed to have a more comprehensive view of the current market situation than investors themselves. Investors assume that fund managers can generate higher returns by finding attractive investment opportunities. This is the most important reason why investors decide to invest in mutual funds.

1.1 Background

The Finnish mutual fund market was created in 1987 when the law of Finnish mutual funds was introduced. In the early stages the development of the market was slow but the growth accelerated in the late 1990s. The development of the Finnish mutual fund market was rapid for a decade until the global financial crisis hit the markets in year 2007. After the massive drop the markets started to recover and at the end of 2010 the markets were almost at the same level than before the financial crisis. (Finnish Mutual Fund Report, 12/2010)

According to Finnish Mutual Fund Report, the distribution of total assets under management in Finnish mutual funds i.e. funds registered in Finland at the end of 2010 was as follows; equity funds represented 39,7% (24.4 billion euros) of total assets, bond funds 29,0% (17.8 billion euros), money market funds 16,7% (10.2 billion euros), asset allocation funds 13,1% (8.1 billion euros) and alternative funds 1,5% (944 million euros). From the fund classes that are included in this thesis, equity funds investing in Finland represents 19,9% (4.9 billion euros) of the total assets in all equity funds, equity funds investing in Nordic Countries 24,9% (6.1 billion euros) and equity funds investing in Europe 24,4% (6.0 billion euros). The total assets under management in Finnish funds were 61.5 billion euros at the end of 2010. All in all, the Finnish mutual fund industry covers considerable amount of assets and therefore it is convenient to study the action of this industry in more detail.

1.2 Motivation of the study

Even though the studies concerning the mutual funds have increased as the mutual funds have become more popular, the number of mutual fund holdings studies has still remained on a low level due to the lack of data. Nowadays, however, there exists a database in U.S. that consists of mutual fund holdings data which has enabled researchers to examine the mutual fund sector more comprehensively. For instance, the invention of Active Share (Cremers & Petäjistö, 2006) was possible due to this new data. Active Share describes the fund's level of active management by comparing the holdings of the fund and the benchmark index. Unfortunately there exists no collective database for Finnish mutual fund holdings data and therefore Active Share has remained as a rather unknown concept in Finland.

The previous studies (see e.g. Hendricks, Patel & Zeckhauser, 1993 and Blake & Timmermann, 1998) have applied mainly two methods when trying to measure level of active management in mutual funds. One is the tracking error which has also been the most traditional method. It measures how closely the fund return follows the benchmark index return and it is calculated as the time-series standard deviation of the difference between a fund return and its benchmark index return. However, it is inadequate to use only tracking error (see e.g. Israelsen & Cogswell, 2007 and Cremers & Petäjistö, 2009) since very actively managed funds can in fact generate rather low tracking error figures which in turn may lead to misclassification of funds. Therefore judging the activity level of fund management based only on tracking error can be misleading.

Another method applied when dividing the funds into actively and passively managed has simply been the notification of the fund management companies. In this classification passively managed funds contain only the index funds whereas all the other funds are considered to be actively managed. This approach also has a fundamental problem since several studies have shown that there exists plenty of "closet indexing" among these so called actively managed funds. Closet indexing is referred to when a fund that is claimed to be actively managed by the fund management company, and therefore charges high management fees, in fact acts like an index fund by closely replicating some benchmark index.

As mentioned above, the previous studies have applied methods that actually don't divide the funds into actively and passively management funds based on the real activity level of fund. Because of the closet indexing, the category of actively managed funds has contained funds that have only replicated the benchmark indices. These funds have generated gross returns close to benchmark indices but due to the higher management fees the net returns have naturally been lower than the benchmark returns. Since the closet indexing funds have yielded less than the benchmark indices, it is easy to see that these funds have actually lowered the average return of the truly actively managed funds and therefore also lowered their chances to outperform the index funds. Therefore it is justified to question whether the previous results stating that the actively managed funds can't add value relative to index funds are valid.

Since Active Share is a rather new invention, it hasn't been applied to Finnish mutual funds. Therefore it is interesting to see whether the outcome of this thesis will be similar to the results that Cremers and Petäjistö (2009) obtained from the U.S. market.

1.3 The objective and limitations of the study

Actively and passively managed funds have been examined a lot and the majority of the studies have concentrated to find if actively managed funds are able to beat the index funds. For example, Liljeblom and Löflund (2000) studied this using Finnish data. The most common result has been that the actively managed funds can't outperform the benchmark indices.

However, the studies have applied inadequate methods in measuring the level of active management of the funds. In this thesis I will classify the funds depending on their real activity level. The main focus in measuring the level of active management is on the Active Share method which was introduced by Cremers and Petäjistö in 2006. The method indicates how much the fund holdings differ from the benchmark index holdings. For example, Active Share of 60% indicates that 40% of assets are invested following the benchmark index and 60% are invested by taking bets against the index. I will also apply tracking error because it is the most traditional method applied and together with Active Share it can create a more comprehensive picture of the level of active management in the studied funds.

The main question in the discussion of actively and passively managed funds is whether the actively managed fund can beat the index fund. Are the actively managed funds able to yield higher returns than the index funds? This new classification of funds based on Active Share method will divide funds differently into active and passive categories. Therefore it is interesting to see if this classification yields the same results as the previous studies that the passively managed funds outperform the actively managed funds. On the other hand, the results may show that the truly actively managed funds can in fact outperform the index funds and therefore add value relative to the index.

I will also study how closely the level of active management and the Total Expense Ratio (TER) are related in the sample applied in this thesis. The activeness of the management should determine the amount of fees charged and therefore I will compare the funds' Total Expense Ratios to the levels of Active Shares and tracking errors in order to clarify whether the investors are getting what they are paying for.

In addition, I will search for fund categories that contain closet indexing funds and determine whether these funds have underperformed the benchmark indices as assumed by the theory. The closet indexing funds are very inefficient for investors and therefore I will determine whether these kinds of funds exist in the Finnish mutual fund market.

This thesis concentrates on Finnish equity fund market, and more specifically on the equity funds investing in Finland, Nordic Countries and Europe. The sample in my thesis consists of 64 equity funds from which 25 invest in Finland, 14 in Nordic Countries and 25 in Europe. My sample represents the vast majority of the Finnish funds investing in Finland, Nordic Countries and Europe. However, the period applied in this thesis is only three years and therefore the results should be interpreted with some caution.

1.4 Research methodology

In this thesis I will apply quantitative methods in order to measure the activity and performance levels of the funds included in my sample. The levels will be determined with different key ratios and finally these figures will be used to categorize the funds.

The categorization into different classes based on the level of activity will be accomplished in two ways. First, I will use only Active Share and classify the funds in four categories. The first category contains the funds with Active Share of 0-25%, second 25-50%, third 50-75% and fourth 75-100%. The funds in the first category represent the most passive part of the funds, whereas the fourth category contains the most active funds. In the second categorization method Active Share is combined with tracking error. Active Share applies the same categories and tracking error divides the funds into five categories in which the boundaries of tracking error of are 3 – 6%, 6 – 9%, 9 – 12%, 12 – 15% and 15 – 18%. The level of active management is higher when Active Share and tracking error increase.

After the categorization I will study the average fund performance between different categories. The objective is to study whether the level of active management determines the fund performance. The methods applied in this thesis to determine level of active management divide the funds into different categories based on the real level of active

management and therefore the categorization differs from the previous studies. Therefore the thesis will be able to answer the fundamental question; Are the truly actively managed funds able to outperform the index funds?

All the fund performances are compared to benchmark indices and therefore all the figures are presented relative to the index. The performance of the funds will be determined by applying two risk-adjusted performance measures; Sharpe and Treynor ratio. The period applied in this thesis is from the first quarter of 2008 to the third quarter of 2010 and therefore I will use three-year annualized Sharpe and Treynor figures. Per annum figures make all the funds and benchmark indices comparable and indicate how the investments have performed on a yearly basis.

1.5 Structure of the study

The remaining part of this thesis is structured as follows. In chapter 2 I will introduce the theoretical background for portfolio management. Chapter 3 describes the fund management including both active and passive fund management. Data and research methodology are introduced in chapter 4. In chapter 5 I will present the empirical results of the study. Finally, in chapter 6 I will draw the conclusions and give some suggestions for further studies.

2 Theoretical framework for portfolio management

This chapter introduces the theoretical background for portfolio management. First, I will discuss the mean-variance theory and the applications of the theory. Next, I will introduce the concept of portfolio analysis and the common problems concerning the mean-variance theory. Then, I will go through the efficient market hypothesis and the Carhart's four factor model.

2.1 Mean-variance theory

Modern Portfolio Theory is an investment theory originally introduced by Harry Markowitz (1952). Markowitz argued that there are only two relevant elements when selecting portfolios; the expected or average rate of return and the risk. Markowitz proposed to measure the risk of a security by the variance (standard deviation) of its returns and he formulated the portfolio problem as a choice of the mean and variance of a portfolio of assets. The basic concept in this mean-variance theory was to maximize the expected return of the portfolio for a given amount of risk or consequently minimize the risk for a given level of expected return. These combinations of assets are called efficient portfolios which construct the efficient frontier.

The theory also states that by investing in more than one stock, an investor can diversify the risk of the portfolio on a level that is lower than any individual security in the portfolio. The fundamental idea is that the assets should not be selected into the portfolio based on their individual characteristics. Rather, an investor needs to estimate how each security co-moves with all the other securities. This way it is possible to construct a portfolio with the same expected return and less risk than a portfolio constructed by ignoring the interactions between the securities. (Markowitz, 1952)

2.2 The applications of mean-variance theory

Markowitz's ideas have been applied both in theory and in practice of financial markets. However, the Modern Portfolio Theory has rarely been implemented and Elton, Gruber and Padberg (1976) state that there are three main reasons for that. First, it is difficult to estimate the type of input data necessary. Second, the risk-return tradeoffs are challenging for portfolio managers to understand. Third, generating efficient portfolios requires both time and money.

Many researchers have attempted to improve the model of modern portfolio theory. The mean and variance of return of a portfolio is a simplification and therefore Elton and Gruber (1999) included additional moments in order to describe more comprehensively the distribution of returns of the portfolio. Tobin (1958) developed necessary conditions on the utility function of investors and on the return distribution of assets that would result in mean-variance theory being optimal. Lee (1977) and Kraus and Litzenberger (1976) offered alternative portfolio theories that included skewness of the distribution of return. Elton and Gruber (1974) constructed theories which were accurate for more realistic descriptions of the distribution of return.

Nevertheless, mean-variance theory has remained the cornerstone of modern portfolio theory despite these other alternatives. This persistence is not due to the realism of the utility or return distribution assumptions that are necessary for it to be correct. Rather, it is generally believed that there are two reasons for its persistence. First, mean-variance theory itself places large data requirements on the investor, and there is no evidence that adding additional moments improves the desirability of the portfolio selected. Second, the implications of mean-variance portfolio theory are well developed, widely known and have great intuitive appeal. (Elton & Gruber, 1997)

As the above discussion shows, the mean-variance theory has retained its position as the leading application of modern portfolio theory, and this is why it will also be applied as a theoretical framework of this thesis.

2.3 Portfolio analysis

In relation to his earlier ideas, Markowitz (1959) stated that a good portfolio is more than a long list of stocks and bonds. The idea was that portfolio is a balanced whole providing protection and opportunities to the investor. Therefore the investor should build toward an integrated portfolio that best suits his needs. First step in portfolio analysis is to analyze the information concerning the individual securities. This information includes the past performance of individual securities as well as the beliefs of security analysts concerning the future performances. Portfolio analysis leads to conclusions concerning the constructed

portfolio as a whole. The main purpose of this analysis is to find the portfolio that best meets the objectives of the investor.

Investors try to maximize the expected returns and minimize the return variance. Therefore they are only interested in efficient portfolios. Markowitz (1952) indicated that efficient portfolios take the form of a parabola in the mean-variance space. All the efficient portfolios lie on the efficient frontier and therefore the investor should choose a portfolio on the efficient frontier based on one's individual risk and return preferences. The portfolio with the lowest variance on the efficient frontier is called the minimum variance portfolio. Furthermore, the minimum variance frontier contains the set of portfolios that offers the lowest risk at any level of return.

The efficient frontier line has two end-points: the one with lower variance is called the global minimum variance portfolio and the other is the maximum return portfolio. The efficient frontier consists of the envelope curve of all portfolios that lie between these two points. The efficient frontier is a concave function because it is a combination of several securities or portfolios. (Markowitz, 1952)

2.4 Common problems with mean-variance theory

Even though mean-variance theory is widely acknowledged, there are still some problems involved with the theory. In this chapter I will introduce the main problems discussed in the academic literature.

The mean-variance portfolio theory was developed to find the optimal portfolio for an investor concerned with return distribution over one period. The mean return and the variance of return are estimated for each asset in the portfolio over the single period. The correlations between all pairs of assets are also estimated for this same decision period. Therefore one of the major theoretical problems that has been analyzed is how the single-period problem should be handled if the investor's true problem includes several periods. (Elton & Gruber, 1997)

Mossin (1968), Fama (1970b), Hakansson (1970, 1974) and Merton (1990) have focused on this particular problem. They found that the multi-period problem can be solved as a sequence

of single-period problems under various assumptions. However, they also found that the optimal portfolio would be different from that selected if only one period was examined. The reason is that the multi-period utility function differs from the single-period utility function.

One assumption underlying most multi-period portfolio analyses is the independence of returns between periods. However, there is a significant amount of research (see e.g. Campbell & Shiller, 1988 and Fama & French, 1989) that indicates the connection between different periods for mean returns and variances. They also show that mean returns and variances are functions of easily observable variables.

Some problems have also been associated with the portfolio optimization. Jorion (1985) argues that the optimal portfolio based on the sample performs quite often much poorer outside the sample. He points out that the sample period optimal portfolio is sometimes dominated even by very simple methods, like equally weighted index. In addition, Jorion states that the optimal portfolio is very volatile because the asset weightings are extremely sensitive to variations in expected returns. Moreover, optimal portfolios are not necessarily well diversified since the solution of the optimization problem is often a corner solution. This means that most of the investment weightings are zero and large proposition of assets are allocated to countries with relatively small capital markets and high average returns.

2.5 Efficient market hypothesis

Efficient market hypothesis is closely related to Modern Portfolio Theory. Efficient market hypothesis was originally developed by Eugene Fama in 1970. Efficient market hypothesis states that it is impossible to beat the market regularly because stock market efficiency causes existing stock prices to always incorporate and reflect all available information. This means that securities are always traded at fair values and investors aren't able to purchase undervalued or sell overvalued securities. Consequently, the efficient market hypothesis states that it is impossible to outperform the market using expert stock selection or market timing. Investor can gain higher returns than the market by investing in riskier securities but it can't beat the market on risk-adjusted basis.

As mentioned above, the efficient market hypothesis states that stock prices reflect all available information. Fama (1970a) classified market efficiency into three categories by the notion of what is meant by the term "all available information":

The weak-form hypothesis asserts that stock prices reflect all information that can be derived by examining market trading data such as the history of past prices, trading volume or short interest. Past stock price data are publicly available and virtually costless to obtain.

The semistrong-form hypothesis states that stock prices reflect all publicly available information regarding the prospects of a firm. Such information includes, in addition to past prices, for example balance sheet composition and earnings forecasts.

The strong-form hypothesis states that stock prices reflect all information relevant to the firm. This includes also the insider information of the company.

According to Efficient Market Hypothesis, actively managed funds can't create value for investors because markets are working perfectly. This suggests that all the research done by the active managers is simply waste of resources and just lowers the funds' returns after fees. The basic implication from Efficient Market Hypothesis is that instead of using investing in actively managed funds the investors should invest in passive index funds since they will generate higher risk-adjusted returns after fees. However, several studies (e.g. Dreman & Berry, 1995 and Lo & MacKinlay, 2001) have argued that the markets aren't perfect and suggested that it is possible for actively managed funds to obtain higher returns than the passive index funds by actively researching the markets. In this thesis I will also try to contribute to this discussion from my behalf.

As mentioned earlier, Efficient Market Hypothesis states that it is impossible to outperform the market using expert stock selection. There are several models which try to explain the behavior in mutual fund performance. Next, I will introduce probably the most widely accepted model trying to determine whether the fund manager has been able to generate risk-adjusted returns by having the skill to pick right stocks.

2.6 Carhart's four-factor model

The behavior of mutual fund performance is widely studied in the academic world. There are several different models trying to find the factors that explain the behavior in mutual fund returns. Capital Asset Pricing Model (CAPM) applies only beta that describes the relationship between the returns of the fund and the market. Fama and French developed the three-factor model which takes into account the size and book-to-market factors in addition to the market beta introduced by CAPM. This chapter introduces the four-factor model developed by Mark Carhart in 1997. The model is derived as follows:

$$R_i - R_f = \alpha_i + \beta_m (R_m - R_f) + \beta_s R_s + \beta_b R_b + \beta_o R_o$$

where

$R_i - R_f$ is the fund's excess return

$R_m - R_f$ is the market factor return

R_s is the size factor return

R_b is the book-to-market factor return

R_o is the momentum factor return

α_i is the fund's risk-adjusted return

β_m is the fund's market beta

β_s is the fund's size beta

β_b is the fund's book-to-market beta

β_o is the fund's momentum beta

Fund's excess return is the fund return minus the risk-free return and the market factor return is the average market return in excess to the risk-free return. The size factor return means the return to a fund of small-cap stocks less the return of large-cap stocks. This comes from the observation that small-cap stocks have performed better than the market as a whole. The book-to-market factor return is defined as the return to a fund of the stocks with a high ratio

of book-to-market value minus the return of the stocks with a low ratio of book-to-market value. The reason for applying the book-to-market factor is that the stocks with high book-to-market ratio i.e. the value stocks have also outperformed the market. The momentum factor return means the return to a fund of the stocks that outperformed the market in the past less the return of the stocks that underperformed the market in the past. This comes from the observation that the stocks that have outperformed the market in the previous period tend to outperform the market in the next period also.

The betas for market, size, book-to-market and momentum factors define the sensitivities of how much the factor returns have generated excess return for the fund. For example, the momentum beta of 2 has twice as large effect on the fund than the beta of 1. After the returns attributable to different factors have been determined, the alpha accounts for the rest of the fund's excess return. Alpha measures how well the fund manager has performed beyond the investment strategies involved in the model and therefore the alpha determines whether the fund manager have had the skill to pick the right stocks.

For example, if a fund manager invests in value stocks and returns 10% when benchmark index returns 5%, it seems that the fund manager has performed very well. But if the value stocks in general returned 15% then the fund manager has underperformed the value stocks on average. Four-factor model explores this phenomenon and determines whether the fund manager really has exceptional skills in picking stocks and this way can generate alpha.

The four-factor model interprets how the fund manager has generated the excess returns. Has the fund manager taken extra risk which can be seen in the high market beta or has he employed investment strategy where the amount of value stocks is increased which leads to higher book-to-market beta?

3 Portfolio management

In this chapter I will introduce portfolio management. First I will go through the main studies concerning the concept of portfolio management and then I will describe individually both active and passive styles of portfolio management. Finally I will introduce the different measures of active management.

3.1 Previous studies on portfolio management

Portfolio management is divided into two separate categories: active portfolio management and passive portfolio management. The conversation around active and passive portfolio management has continued for decades. The main question has been whether the actively managed funds are able to produce higher returns than their benchmark indices?

The vast majority of studies concerning the performance of active and passive portfolio management suggest that active funds on average underperform their benchmark indices after fees. Even the earliest researchers (see e.g. Sharpe, 1966 and Jensen, 1968) reported underperformance on a risk-adjusted basis of actively managed funds against the benchmark. Sharpe (1991) also states that active funds must generate average returns equal to those derived from passive strategies. He argues that the market return must equal a weighted average of the returns on both active and passive segments of the market. Since overall market and passive returns should be the same, Sharpe notes that the active returns before fees must be the same too. Therefore the return of active management should be lower after fees.

Blake and Timmermann (1998) found evidence on underperformance of actively managed funds during 1972-1995, while Hendricks, Patel and Zeckhauser (1993) reported same kind of underperformance for active equity funds during 1974-1988. Elton, Gruber and Blake (1993) studied funds' alphas, which are generated with successful stock picking, i.e. the amount of fund return that exceeds the benchmark index return after the different factor returns are excluded from the fund excess return. They found that there was no evidence on positive alphas for actively managed funds against the benchmark indices. Davis (2001) compared different investment styles among active equity funds and found that none of these styles were able to generate positive abnormal returns during 1965-1998. He also wondered why most of the funds were reluctant to own value stocks when these stocks had higher average returns.

Swedroe (1998) states that the research and trading expenses together with tax consequences make it too hard for active managers to constantly beat the benchmark index. Gruber (1996) agrees this by reporting that even though active management can add value, the expenses more than offset the value added and therefore the actively managed funds have negative performances compared to a set of indices. Carhart (1997) also argues that only the best actively managed funds earn back the fees they charge, while the most funds underperform on average by the magnitude of their investment expenses. Elton and Gruber (2003) are a bit more optimistic stating that in order for active management to be effective it has to overcome the following higher costs: costs of forecasting, costs of transactions and costs of diversifiable risk because investors must be compensated for taking higher risk.

There has also been lot of studies concerning the performance of well-known indices and index funds. For example, Shefrin (2000) studied the performance of Vanguard 500 index fund, which tracks the S&P 500 index, during 1977-1997. He discovered that the Vanguard 500 index outperformed over 83 percent of all funds during this twenty-year period. Malkiel and Radisich (2001) support this evidence by stating that S&P 500 index outperformed almost 90 percent of all actively managed equity funds.

There are also studies that have explored the active fund management in Finnish market. Kasanen and Kinnunen (1990) found evidence that also in Finland the actively managed funds underperformed the benchmark indices during 1988-1989. Another research with Finnish data by Liljeblom and Löflund (2000) stated that only few funds were able to generate statistically significant positive abnormal returns during 1991-1995. Furthermore, according to the Finnish Mutual Fund Report representing the situation on 31.12.2010, the Finnish equity funds investing in Finland underperformed the OMX Helsinki CAP GI index on average when measured with 12 month return.

There has also been a lot of discussion about the activity level of the funds that are supposed to be actively managed. Funds that are claimed to be actively managed by fund management companies and charge high management fees but in reality follow closely some index are called closet indexers. Petäjistö (2010) studied closet indexing and argued that it accounts for about one third of all mutual fund assets. He also found that closet indexing has become more popular after the market volatility started to increase in 2007. Petäjistö suggests that the

reasons for increased interest in closet indexing are the recent market volatility and negative returns. He argues that these reasons also explain the previous peak in closet indexing in 1999-2002.

Petäjistö (2010) studied also the performance of the closet indexer funds. He found that closet indexers performed poorly against their benchmark indices. As one could predict based on the nature of closet indexers, they largely just matched their benchmark index returns before fees. Consequently, closet indexers underperformed the benchmark indices on average by the amount of their fees.

As we can see from above discussion, almost all of the studies suggest that active fund management is only waste of money since actively managed funds can't beat the benchmark indices on a regular basis. Even though Elton and Gruber (2003) are a bit more optimistic towards the actively managed funds, the general opinion strongly favors the passively managed funds.

Despite the fact that the majority of the previous studies suggest that passive fund management contributes better results than active fund management, it is noteworthy that the active managers still control the vast majority of the total mutual fund assets. The main reason for this is that the actively managed funds charge higher management fees and therefore fund management companies are more willing to offer these funds than cheaper index funds.

The following chapters will concentrate on both active and passive fund management respectively.

3.2 Active fund management

Active fund management refers to a portfolio management strategy where the fund manager seeks to outperform the benchmark index by deviating from it. Consequently, active management can be defined as any deviation from passive management. To measure the active management, one needs to calculate the amount of deviation from passive management.

Active fund management is generally understood to concern all investment-related activities of the clients' investment assets. It involves active monitoring and professional decision making in the best interest of the clients. The whole process of active fund management can be divided into input and output activities. The process begins with comprehensive research in order to obtain economic and investment data. Based on the data, the fund manager formulates an investment strategy for the fund. Based on this investment strategy, the fund manager determines asset allocations and applies them to the fund by purchasing and selling securities. This way the fund manager obtains the desired exposures. After the fund manager has constructed the portfolio, he needs to start reporting the performance of the fund for the client. This consists of performance measures, performance analyses and reporting statement. (Ehlern, 1997)

Fund managers apply either a top-down or bottom-up approach to the investment process. A top-down approach begins with an asset allocation and then moves to a selection of individual securities to meet these allocations. The most important decision in a top-down approach is the choice of markets and currencies. Therefore the macroeconomic conditions and trends are researched and the choice of markets and currencies are made based on the obtained data. After the choice of markets and currencies, the best available securities will be selected. Another alternative is the bottom-up approach which refers to the qualitative analysis solely on individual securities. This analysis produces a selection of superior stocks from which the fund manager selects the best securities irrespective of their national origin or currency denomination to build a portfolio. As a result, the bottom-up approach constructs a fund with a market and currency allocations that are random results of the securities selected. (Solnik, 1996)

An active fund manager tries to beat the fund's benchmark one way or another. Nevertheless, the main point for active manager is to take positions that are different from the benchmark. There are two ways how fund holdings can differ from the benchmark: stock selection or factor timing. Stock selection simply involves picking individual stocks that the fund manager expects to outperform the benchmark index without changing the level of systematic risk. Factor timing concentrates on time-varying bets on systematic risk factors such as entire industries, sectors of the economy or more generally any systematic risk relative to the benchmark index. (Fama, 1972)

Elton and Gruber (2003) divides active fund managers into three categories: market timers, security selectors and sector selectors. Market timers change the beta on the portfolio according to the forecasts of how the market will perform. Beta measures the fund's risk relative to the benchmark index. The fund managers vary the percentage of fund's assets in equity securities depending on their view of right timing on the stock market. Security selectors concentrate on individual securities and aim to increase the weight of undervalued and decrease the weight of overvalued securities. They usually apply fundamental analysis on choosing the superior stocks. Sector selectors aim to take advantage of market trends during different economic cycles. They try to forecast expected market developments and determine which sectors and industries are under- and overvalued, and based on this data they rotate their portfolios by over- and underweighting the particular sectors and industries.

As mentioned earlier, the actively managed funds attempt to outperform the benchmark index by actively researching financial markets. This research, as well as all transactions made, generates costs for fund management companies and therefore actively managed funds charge higher management fees. However, dilemma arises when a fund management company claims the fund to be actively managed but the fund manager decides to act like an index fund manager and closely replicates the benchmark index. As mentioned earlier, these kinds of funds are often referred as closet indexer funds.

Closet indexer funds don't try to outperform the benchmark index but they still charge high management fees. This is naturally the opposite of what investors are paying active managers to do. Investors could get the same kind of portfolio but pay much less by investing separately in a low-cost index fund and in a truly active fund. Fund managers' performance is usually compared to the benchmark index, so the manager has an incentive to gain at least the same returns than the benchmark. Closet index funds generally exist because their managers believe it is safer to track index rather than take greater risks with more active management. Petäjistö (2010) found that closet indexing increases with market volatility and also when market goes down. The manager's career risk for underperformance is also greater in highly volatile markets and down markets. Therefore Petäjistö suggests that career risk for underperformance explains the increase in closet indexing in highly volatile markets and down markets. (Petäjistö, 2010)

In this thesis I will explore whether the Finnish mutual fund market contains closet indexing funds. I will also determine whether these funds charge too large fees compared to their levels of active management.

3.3 Passive fund management

Fund management is called passive when the fund manager decides to track the benchmark index instead of attempting to outperform the benchmark index. Benchmark index tracking is also called indexing. The idea of an index fund was first presented by John Bogle in 1976. He proposed that there should be an extremely low-cost fund available that wouldn't attempt to beat the average returns of the stock market. Instead Bogle suggested that the low-cost fund should replicate the S&P 500 index.

According to the efficient market theory, stock prices are at fair levels given all available information. Therefore buying and selling securities frequently would generate large brokerage fees without increasing portfolio's expected performance. In passive management the fund is supposed to track the movements of the entire market. Passive funds consider the current market price to be the best estimate of security's value. Hence, passive funds don't try to pick undervalued securities. (Frino & Gallagher, 2001)

The management of passive funds is rather straightforward. It consists of replicating the return of the benchmark index with a strategy of buying and holding the index stocks in the official index proportions. The holdings of the passively managed funds are usually rebalanced every six months or once a year. The passive fund management aims to establish a well-diversified portfolio of securities with least possible costs. Buying and holding strategy doesn't require research considering the future market developments and therefore the administrative costs of passive funds are significantly lower than those of actively managed funds. (Frino & Gallagher, 2001)

From the investor's point of view, the benefit from indexing is that by investing in one index fund, it is possible to track the movements of much larger capital market. Even though the indexing fund needs to maintain the relative weight of the individual stock in the fund reflecting the index composition, it is less expensive than the active fund management. (Frino & Gallagher, 2001)

3.4 Measures of active management

The level of active management has historically been measured with many different methods. Tracking error has traditionally been the most used technique but the others have also been applied on a regular basis. For instance, Active Share is a very recent method but has already aroused interest in academic world. The most frequently applied measures are introduced more comprehensively in the following sections.

3.4.1 Tracking error

Tracking error has traditionally been the most common way to measure active management of a fund and therefore it has also been widely studied. It measures how closely the fund return follows the benchmark index return. Deviations in these returns indicate how actively the fund is managed. Tracking error is defined as the time-series standard deviation of the difference between a fund return and its benchmark index return:

$$Tracking\ Error = Stdev\ [R_{\mathrm{i}} - R_{\mathrm{bm}}]\ ,$$

where

R_i is the return of the fund

R_{bm} is the return of the benchmark index

High tracking error indicates that the fund returns have deviated a lot from the returns of the benchmark index. For instance, a tracking error of 5% means that the fund returns deviate 5% from the benchmark index returns. If the fund contains exactly the same securities than the benchmark, then the tracking error for the fund is 0%. Tracking error increases when the fund holdings start to differ from the benchmark index holdings.

Ammann and Tobler (2000) claim that there are two main reasons why tracking error occurs. Those are the attempt to outperform the benchmark index by active fund management and the

passive replication of the benchmark index. In active fund management the tracking error signals how much risk the fund has taken relative to benchmark index when trying to beat the benchmark. In passive management it evaluates the success of the benchmark index replication.

For the investor, the tracking error figure reveals the conscious and active risk the fund is taking and the potential to add value. High tracking error indicates that the portfolio return has varied a lot in relation to benchmark return. Correspondingly, low tracking error tells that the portfolio and benchmark returns have been close to each other. Actively managed funds tend to generate higher tracking errors than those of passively managed. This is due to the fact that active fund managers try to beat the benchmark index by constructing a fund that differs from the benchmark index, whereas passively managed funds simply replicate the benchmark index.

Tracking error and passive fund management

Indexing is often considered to be rather simple investment strategy since it only has to replicate the benchmark index. However, Chiang (1998) disagrees and argues that the concept of index fund is not as straightforward as it looks like. Even though in theory the tracking error of the index fund should equal zero, in practice it rarely is the case. Chiang points out that even index funds can experience so called tracking problem where they are unable to perfectly track the movements of the benchmark index. He finds several reasons for why passively managed funds generate tracking errors, such as transaction costs, fund cash flows, the volatility of the benchmark, the treatment of dividends by the index and the index composition changes. Consequently, index fund managers adopting an indexing approach can't guarantee that their portfolios' performance will be identical to the benchmark index. Keim (1999) states that the liquidity of the underlying index will also have implications for transaction costs and hence the tracking error incurred by index funds.

Frino and Gallagher (2001) argue that given the market frictions, tracking error is unavoidable even in passively managed funds. Many benchmark indices are market capitalization weighted, which means that the amount of each security held in the index fluctuates depending on the proportion of the market capitalization of the security relative to total market capitalization of the index. Market capitalization is the market price times the shares outstanding and therefore fluctuations in security prices cause the composition of these

indices to change constantly. Even though the passively managed index funds trade automatically, the trades are often executed with slightly different timing depending on the speed of the exchange and the trading volume in each security. Consequently, the passively managed funds will generate tracking error.

Frino and Gallagher (2001) also point out that index funds' replication strategy generates transaction expenses, whereas the benchmark index is balanced without taking costs into account. In addition, the daily values for fund and benchmark index are calculated at different time of the day. Whereas index values are normally calculated at market close, the funds' calculation times vary, and are ordinarily earlier during the day.

Despite these frictions, Frino and Gallagher (2001) state that tracking error is a natural way to manage passive funds. However, the managers of passively managed funds face the dual objective of minimizing tracking error as well as minimizing the costs incurred in tracking the index as closely as possible. Consequently, there exists a trade-off between tracking error minimization and transaction costs.

Fund managers usually aim for an expected return higher than the benchmark index. They also want to have a low tracking error volatility to minimize the risk of considerably underperforming the index. The ideal situation for fund manager is when the fund outperforms the benchmark index every time by the same fixed amount. This way the fund manager would be adding value over an index and the tracking error would be zero. This method is called mean/variance analysis of tracking error and it is a common tool for evaluating active management. (Roll, 1992)

As Roll (1992) studied the mean-variance analysis he found that it is not possible to reach more efficient portfolio by minimizing the volatility of tracking error. Jorion (2003) also used the mean-variance analysis when he studied active portfolios subject to a constraint on tracking error volatility. Jorion recommended to abandon tracking error volatility optimization and to concentrate on the total risk instead. The simplest constraint is to keep portfolio volatility no greater than that of the benchmark.

Problems with the term "tracking error"

Although tracking error seems to give us good information about the fund's management activity, there are some problems related to this term "tracking error" since some people may find the word "error" a bit confusing. When studying passively managed funds "error" is a good term since the passive funds should replicate the benchmark indices and therefore generate low tracking error figures. The term "error" then describes the error generated between the returns of the passively managed fund and the benchmark index. On the other hand, the term "error" is very misleading when exploring the differences in daily returns between actively managed funds and benchmark indices. Actively managed funds try to outperform the benchmark indices and therefore the tracking error is significantly higher than zero. Consequently, the term "error" is not suitable to describe these daily return differences between actively managed funds and benchmark indices.

Israelsen and Cogswell (2007) consider "differential from benchmark" to be more instructive and constructive term than "error". They criticize the term "error" claiming that it is natural for high tracking error portfolios to have higher alpha than the lower tracking error portfolios. Israelsen and Cogswell also claim that ranking portfolios by tracking error alone emphasizes business risk. Therefore they suggest that to make portfolio rankings more sensible one should combine alpha and tracking error into information ratio and use it with tracking error. The concept of information ratio will be discussed later on.

Tracking error and active fund management

Cremers and Petäjistö (2009) argue that two distinct approaches to active management can produce significantly different tracking errors. Pure stock picker fund generates alpha with the stock selection within industries but diversifies by investing across industries. In contrast, sector rotator fund picks entire sectors and industries that outperform the average market while holding mostly diversified positions within those sectors. The outcome is such that the sector rotator fund has significantly higher tracking error than the stock picker fund indicating that the sector rotator fund is much more active. But the lower tracking error for the stock picker comes actually from the greater diversification available.

Instead of using tracking error alone, Cremers and Petäjistö (2009) suggest that a more comprehensive picture of active management can be achieved by including Active Share into

the calculations. The concept of Active Share will be discussed in more detail in the following.

3.4.2 Active Share

Active Share is a rather new way of expressing the level of active management of a fund since it was introduced on 2006 by Cremers and Petäjistö. Therefore Active Share has not yet been widely studied at least in Finland. Whereas tracking error measures the active management by calculating the daily deviations between fund and benchmark index returns, Active Share focuses on comparing the holdings of the fund and the benchmark. The basic idea of Active Share is to determine the amount of active management by measuring how closely the holdings of the fund replicate the holdings of the benchmark index. Active Share can be calculated as follows:

$$Active\ Share\ = \frac{1}{2}\sum_{i=1}^{N} | w_{fund,\,i} - w_{benchmark,\,i} | ,$$

where

$w_{fund,\,i}$ describes the fund weights of asset *i* in the fund

$w_{benchmark,\,i}$ describes the fund weights of asset *i* in the benchmark index

Active Share describes the percentage of stock holdings in a fund that differ from those in the index. The Active Share formula calculates the weight differences of each security between the fund and benchmark index. Some of the securities are included in both the fund and the benchmark index and then the difference is calculated simply by deducting the security weight in benchmark index from the weight in the fund. However, the fund and the benchmark index rarely contain exactly the same securities. For instance, if a security is included only in the benchmark index then the security's relative weight in the fund is assumed to be zero and the difference between the fund and index is the weight of the index. The sum of weight differences is taken over the universe of all assets and the sum is divided by 2 to ensure that Active Share takes on a value between zero and 100%.

If the fund fully replicates the benchmark index then the Active Share is 0%. This means that the level of active management in the fund is 0% i.e. the fund is totally passive. Correspondingly, if the fund's holdings differ completely from the benchmark index the Active Share equals 100% signaling that the fund is totally active. Active Share is always between 0% and 100% for a fund that never shorts a stock or buys on margin. (Cremers & Petäjistö, 2009)

Table 1, which is presented in appendix 1, shows an example of the data that is required to calculate fund's Active Share. In the table there are all the relative weights of the securities for both the fund and the benchmark index. In Active Share calculations all the differences in relative weights between the fund and the benchmark index are calculated together and then multiplied by 0,5. Using the Active Share equation above we can calculate that the Active Share for the example fund is 9,70%.

Another way to describe Active Share is to assume that there is a fund with a €10 million portfolio and an index that contains 100 stocks. The fund manager decides to invest €10 million in the index and thereby having a pure index fund with 100 stocks. Assume the manager eliminates half of the stocks and invests this €5 million to some other stocks. Now the fund has an Active Share of 50% (i.e. 50% overlap with the index). If the manager decides to invest in only 10 out of 100 stocks in the index, the fund's Active Share will be 90% (i.e. 10% overlap with the index). According to Active Share, it is equally active to pick 10 out of 100 stocks in the index or 50 out of 500 stocks because in both cases you have an Active Share of 90% and you choose to exclude 90% of stocks in the index from your portfolio.

Benefits of Active Share measure

Cremers and Petäjistö (2009) argue that there are two main reasons why Active Share is a useful method to measure fund's active management. First, since an active manager can only add value relative to the index by deviating from it, Active Share can provide information about fund's potential for beating the benchmark index. A positive level of Active Share is necessary in order for fund manager to outperform the benchmark index. Second, Active Share can also be combined with more traditional method of measuring the active management of a fund, tracking error. These two methods complement each other and together they form more comprehensive way to measure active management.

Cremers and Petäjistö (2009) applied Active Share method to measure the active management for all-equity funds in the U.S. They found that funds with highest Active Share exhibited some skill and picked portfolios which outperformed their benchmarks by 2.40% per year. After fees and transaction costs this outperformance decreased to 1.13% per year. In contrast, funds with the lowest Active Share had poor benchmark-adjusted returns before expenses, 0.11%, and they did even worse after expenses, underperforming by -1.42%. These results indicate that the most actively managed funds are able to beat the benchmark indices by exploring the markets. On the other hand, the funds that replicate the benchmark indices generate quite similar returns than the benchmarks before fees but the after fees returns are lower than the benchmarks.

3.4.3 Other measures

Although Active Share and tracking error are the methods by which the activity of funds will be described in my thesis, I will also present here few commonly used alternative methods.

R-Squared

R-squared is a statistical measure that measures the proportion of the variability in one series that can be explained by the variability of one or more other series. This means, for instance, that R-squared can represent the fund movements that can be explained by movements in the benchmark index. The measure describes the level of association between the fund's volatility and market risk i.e. the degree to which a fund's volatility is a result of the day-to-day fluctuations experienced by the overall market. R-squared is also called the coefficient of determination. When the fund movements are tried to be explained by the market movements, R-squared can be calculated as follows:

$$R - squared = \frac{\beta^2 \, \sigma^2_{\mathrm{m}}}{\sigma^2} \, ,$$

where

$\beta^2\sigma^2_m$ is the part of the total variance that is explained by market returns

σ^2 is the variance of the rate of return on an asset

R-squared measures the correlation between a fund and benchmark index. It is calculated by regressing the fund returns against its benchmark index returns over time. The values of R-squared are always between 0 and 1 and the higher the value is, the greater the correlation between the fund and the benchmark index. R-squared of 1 indicates that all movements of a fund are completely explained by movements in the index. Correspondingly, a low R-squared states that very few of the fund's movements are explained by the benchmark index. For instance, if the fund's R-squared is measured to be 0.8, then the benchmark index explains 80% of the fund's movements i.e. the manager correlates with the benchmark index by a factor 80% over time. (Bodie, Kane & Marcus, 2005)

Beta Coefficient

Beta coefficient is used to describe the relation between the movements of a fund and the market as a whole. Beta coefficient measures the risk of a fund in comparison to the risk of the benchmark index and the risk is described by the volatility of the returns. Beta can be calculated as follows:

$$\beta_i = \frac{Cov\ (R_i, R_{bm})}{Var\ (R_{bm})},$$

where

β_i	is the beta coefficient of the fund
$Cov\ (R_i, R_{bm})$	is the covariance between the fund and benchmark index returns
$Var\ (R_{bm})$	is the variance of benchmark index returns

The beta coefficient above is the same as the beta obtained from the linear regression analysis that is used in the Capital Asset Pricing Model. CAPM determines the asset's required rate of return and the beta coefficient represents the asset's sensitivity to the market risk.

Positive beta coefficient indicates the fund and benchmark index generally move to the same direction whereas negative beta means that the fund returns tend to move in the opposite

direction of the market's returns. Beta coefficient close to 1.0 indicates that the fund has about the same risk profile as the benchmark index and the fund performance matches closely the benchmark index. A beta higher than 1.0 anticipates greater volatility than the overall market and correspondingly a beta lower than 1.0 less volatility than the benchmark index. For example, a fund with beta of 1.5 has returns that change on average 50% more than the benchmark index. Consequently, if the benchmark index return increases by 10% then the fund increases by 15%. On the other hand, if a fund has a beta of -0.5 then the fund returns change 50% less and to the opposite direction than the benchmark index returns. Therefore a benchmark index return increase of 10% would mean -5% changes in the fund returns.

The biggest advantage of beta is that the method is easy to interpret. If the beta is higher than 1.0 it is simple to understand that the fund is riskier than the benchmark index. On the contrary, beta is calculated from the historical data and therefore the method informs only the historical riskiness of the fund. Consequently, the disadvantage of beta is the fact that it tells very little about the attractiveness or the value of the fund in the future.

Information ratio

Information ratio represents how efficiently the fund generates active return relative to the amount of risk taken. Information ratio measures a fund manager's ability to generate excess returns relative to a benchmark index. Information ratio the fund's excess return is measured against the tracking error i.e. the standard deviation between the fund and the benchmark index returns. The method also attempts to identify the consistency of the manager by indicating whether the manager has beaten the benchmark by a lot in few periods or a little in every period. Information ratio can be calculated as follows:

$$IR_i = \frac{(R_i - R_{\mathrm{bm}})}{TE\ (i, bm)},$$

where

IR_i	is the Information ratio for the fund
R_i	is the return for the fund
R_{bm}	is the benchmark index return
TE (i, bm)	is the tracking error between the fund and the benchmark index

The higher the Information ratio, the more consistent the manager has been in outperforming the benchmark index. Since active fund managers attempt to beat the benchmark every time, high information ratio means that the manager has been successful in managing the fund. A high information ratio also indicates that the manager can achieve higher returns more efficiently than the manager with lower Information ratio by taking additional risk. For instance, let's assume there are two funds; Fund A has returns of 10% and tracking error of 8%, whereas Fund B has returns of 5% and tracking error of 3%. The benchmark index return has returns of 1%. These assumptions imply that the Information ratio for Fund A is (10% - 1%) / 8% = 1,125 and for Fund B (5% - 1%) / 3% = 1,333. Even though Fund B had lower returns it achieved higher Information ratio.

4 Data and research methodology

In this chapter I will introduce the data and research methodology used in this thesis. This study concentrates on Finnish equity funds investing in Finland, Nordic Countries and Europe and more specifically on those funds that were supported by the required data. The time horizon of the thesis is from the first quarter of 2008 to the third quarter of 2010 and it was determined by the data available. Even though the time horizon of the data is quite short, the results of this thesis still give an indication of the situation in the Finnish mutual fund market. Furthermore, this chapter demonstrates all the methods that will be utilized in order to explore the level of active management in the Finnish funds. Furthermore, I will go through the performance measures applied in this thesis.

4.1 Data

In order to calculate Active Share, we need information about the holdings in funds and in benchmark indices. Other methods as well as performance measures require data about daily net asset values for both the funds and benchmark indices. In this thesis I will use only the accumulating share classes of the funds. Instead of paying out dividends, equity funds' accumulating share classes reinvest them and therefore the returns calculated from the net asset values represent the real performance of the fund.

The fund and benchmark index returns are calculated from the daily net asset values. The net asset value is the fund's share price and it is calculated by dividing the market value of a fund's assets by the number of fund shares outstanding. The management fees and transaction costs of the funds have been deducted directly from the daily net asset values by the fund management company. Management fees and transaction costs are the main differences between the cost structures of active and passive funds. Therefore we can compare the performance of active and passive funds by studying the returns and other performance indicators calculated from the net asset values. These daily values can be calculated at the different time of the day for the funds and benchmark indices and this might cause minor discrepancies in the values.

All the net asset values for the funds and benchmarks are from Investment Research Finland Ltd. I will also use total expense ratios (TER) which have been collected from the Finnish

Mutual Fund Reports. I will compare the total expense ratios to the actual activity level of the funds described by Active Shares. It is informative to see whether the funds' expenses are in harmony with the activity levels or do they charge high average fees with low Active Share levels.

Total expense ratio (TER) is a measure of a fund's total expenses in relation to its average assets and is expressed as an annualized percentage. The expenses include all fund's management and custody fees and any profit-related fees. Securities commissions are excluded. All the components of total expense ratio are explained in more detail in the following:

$$TER = A + B + C,$$

where

A = Management fee charged from the fund's assets

B = Custodian fee that may be charged separately from the fund's assets

C = Account maintenance and other bank charges that may be charged from the fund's assets

Data restrictions for benchmark indices affected on both the funds included and the time horizon applied in the thesis. Next I will introduce the fund and benchmark data obtained for this thesis.

4.1.1 Holdings data for the benchmark indices

The holdings data aren't publicly available for benchmark indices which restricts the possibilities to study the subject in hand. I obtained holdings data from MSCI Barra and NASDAQ OMX on quarterly basis for three equity benchmarks from the first quarter of 2008 to the third quarter of 2010. Since there isn't benchmark data available for longer time period, this will represent the time horizon for the thesis. The equity benchmark indices used in this thesis are the following: OMX Helsinki Benchmark CAP GI, VINX Benchmark CAP EUR GI and MSCI Europe. Benchmark indices have been selected to funds so that the average characteristics of the benchmark indices match the risk-return profiles of the funds. For some

of the funds in the sample none of these benchmark indices is the official benchmark index applied by the fund manager. However, the official benchmark indices represent the same investment scope as the ones applied in this thesis and therefore I find it justified to use these benchmark indices.

OMX Helsinki Benchmark CAP GI Index is a weight-limited portfolio index that measures the equity market performance in Finland. The weight of any company is limited to 10 percent of the total market capitalization of the index. GI refers to Gross Index which means that all the dividends are reinvested and therefore it reflects the real performance.

VINX Benchmark CAP EUR GI Index is a market capitalization weighted index adjusted by the free float. The index measures the equity market performance of the Nordic Exchange and the exchange in Oslo. GI refers to Gross Index which means that all the dividends are reinvested and therefore it reflects the real performance.

The MSCI Europe[1] Index is a free float-adjusted market capitalization weighted index. The index measures the equity market performance of the developed markets in Europe. The index consists of the following 16 developed market country indices: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

4.1.2 Holdings data for the funds

Limited amount of benchmark index holdings data restricts the selection of funds studied. Taking into account the obtained benchmark indices, I can study the equity funds investing in Finland, Nordic Countries and Europe. The equity funds' categorization of investment objectives follows the classification of the Finnish Mutual Fund Report. Consequently, my sample consists of the Finnish equity funds that were supported with data and whose investment strategies were comparable to the applied benchmark indices in this thesis.

[1] *The MSCI data contained herein is the property of MSCI Inc. (MSCI). MSCI, its affiliates and any other party involved in, or related to, making or compiling any MSCI data, make no warranties with respect to any such data. The MSCI data contained herein is used under license and may not be further used, distributed or disseminated without the express written consent of MSCI.*

Furthermore, there is no collective database where one could obtain holdings data for Finnish funds. Therefore I have collected the data from Investment Research Finland Ltd. as well as funds' annual and quarterly reports. The quarter holdings data was available for 64 equity funds and therefore these funds will form the fund group used in this thesis. The distribution by funds' investment scopes is as follows; 25 funds invest in Finland, 14 in Nordic Countries and 25 in Europe. The fund group contains 6 index funds.

Since the equity funds are divided into these three separate groups based on the funds' investment objectives, I will study each equity fund class individually. This way it is possible to compare the groups among themselves and also see if there are large deviations between the different classes. In addition, all the equity funds are also analyzed as one group in order to form an aggregated view of the level of active management in the Finnish equity fund market.

4.2 Methods

As mentioned earlier, I will apply two methods when measuring the level of active management of funds. These methods often examine the fund management from different angles. Consequently, the use of multiple methods will create a more comprehensive view of the level of active fund management in Finnish equity fund market.

In the first method I will use only Active Share which will be calculated for every fund on every quarter. In addition I will calculate the average Active Shares for every fund. Then I will divide the funds in the following four groups based on the level of Active Share; 0-25%, 25-50%, 50-75% and 75-100%. The funds in the first category represent the most passive part of the funds, whereas the fourth category contains the most active funds.

In the second categorization method Active Share is combined with tracking error. The funds will be divided into 20 categories based on the levels of Active Share and tracking error. Active Share applies the same categories as above and tracking error divides the funds into five categories in which the boundaries of tracking error of are 3 – 6%, 6 – 9%, 9 – 12%, 12 – 15% and 15 – 18%. Tracking error will be calculated as the annualized figure from the daily net asset values over the time horizon of this thesis, from the first quarter of 2008 to the third

quarter of 2010. The level of active management is higher when Active Share and tracking error increase.

Whereas I have used three-year average figures when categorizing the funds, Cremers and Petäjistö (2009) rebalanced the categories after every time period. However, the funds in my sample retained in the same categories with a substantially large percentage during the time horizon applied in this thesis. Therefore it is justified to say that the results wouldn't have changed even if the different method would have been used.

Cremers and Petäjistö (2009) claim that Active Share and tracking error together create a more comprehensive picture of active management by allowing to distinguish between stock selection and factor timing. The main conceptual difference between Active Share and tracking error is that tracking error incorporates the covariance matrix of returns and thus puts considerably more weight on correlated bets i.e. bets on systematic factors whereas Active Share puts equal weights on all active bets regardless of diversification. Hence, Cremers and Petäjistö consider tracking error to be a reasonable proxy for factor bets and Active Share for stock selection.

Cremers and Petäjistö (2009) argue that the main benefits for choosing tracking error and Active Share as proxies for the two dimensions of active management are the following: Unlike holdings-based approach, tracking error allows measuring the factor timing without assuming anything about how fund managers define factor portfolios at each point in time. Active Share similarly doesn't require any assumptions about the relevant factor portfolios. Cremers and Petäjistö also remind that tracking error is the most commonly used way to measure active management and Active Share is as a simple and intuitive method with a convenient economic interpretation.

In addition to the issues discussed above, I will study how closely the level of active management and the Total Expense Ratio are related in the sample applied in this thesis. The activeness of the management should determine the amount of fees charged. I will compare the funds' Total Expense Ratios to the levels of Active Shares and tracking errors and clarify whether the investors are getting what they are paying for.

I will also search for fund categories that contain closet indexing funds and determine whether these funds have underperformed the benchmark indices as assumed by the theory. Cremers and Petäjistö (2009) considered closet indexer as a fund with low Active Share and low tracking error. In this thesis closet indexing fund is determined as a fund with Active Share below 50% and tracking error below 9%. The only exception is the category with Active Share below 25% and tracking error below 6% which contains real index funds.

4.3 Performance measures

Next I will introduce the different performance measures applied in this thesis. The basic return figures aren't comparable among the funds due to the different risk levels and therefore I will use only risk-adjusted performance measures. The following chapters will focus on these risk-adjusted performance measures on a more detail level.

4.3.1 Sharpe ratio

Sharpe ratio or reward-to-variability ratio was developed by William Sharpe in 1966. It is a commonly used performance measure because the ratio is very simple and easy to compute. Sharpe ratio measures the performance on a risk-adjusted basis meaning that it takes into account the riskiness of the fund. Sharpe ratio measures the amount of excess return over the risk-free interest rate per volatility percent. Sharpe ratio can be calculated as follows:

$$S_i = \frac{r_i - r_f}{\sigma},$$

where

S_i is Sharpe ratio for the fund

r_i is the return of the fund

r_f is the risk-free return

σ is the standard deviation of the fund return over risk-free return

Since Sharpe ratio takes into account the riskiness of the investments, it is a more reasonable method to measure the fund's performance than the basic return figures. In Sharpe ratio the risk is measured by the standard deviation, which is a measure of total risk of the fund meaning that both systematic (market) and non-systematic (firm-specific) risks are taken into account. Sharpe ratio is used to describe how well the return of the fund compensates the investor for the risk taken. Higher Sharpe ratio indicates better performance on the risk-adjusted basis.

4.3.2 Treynor ratio

Treynor ratio or reward-to-volatility was the first risk-adjusted performance measure. It was introduced by Jack Treynor in 1965 and it differs from Sharpe ratio regarding the risk component. Whereas Sharpe ratio uses the total risk, Treynor ratio is strongly based on the CAP-model applying beta coefficient which measures only the systematic risk of the fund. Treynor ratio can be calculated as follows:

$$T_i = \frac{r_i - r_f}{\beta_i},$$

where

T_i is Treynor ratio for the fund

r_i is the return for the fund

r_f is the risk-free return

β_i is beta coefficient for the fund

Treynor ratio indicates the percentage change in excess return when systematic risk is increased. Just like Sharpe ratio, Treynor ratio is also used to characterize how well the fund's riskiness is compensated by the return of the fund. Higher Treynor ratio indicates better performance on the risk-adjusted basis.

5 Empirical results

In this section I will introduce the empirical results concerning the level of activity and performance in the Finnish mutual funds. I have applied two methods for measuring the level of active management. First, I will evaluate the level of active management based on the Active Share. Second, I will describe the funds' activeness based on the combination of Active Share and tracking error.

Since Active Share is a rather unexplored invention, the studies from Cremers and Petäjistö (2006 & 2009) and Petäjistö (2010) are the only ones concerning Active Share. Therefore I will compare my findings mainly to their results. When comparing the benchmark-adjusted returns, I have applied Sharpe and Treynor ratios whereas Cremers and Petäjistö have calculated their benchmark-adjusted returns in a slightly different way. However, both methods still indicate whether the benchmark has been beaten or underperformed. In addition, I will compare my findings to the theorem of efficient market hypothesis.

5.1 Active Share

In this section I will measure the funds' activity levels by using the Active Share method. The performance of the funds will be calculated with Sharpe and Treynor ratios. In addition, I will determine the Total Expense Ratios for every fund and compare the average TERs between different activity levels.

5.1.1 Distribution of funds to different activity levels based on Active Share

Table 2 presents the number of funds distributed in different classes based on funds' investment scopes and the level of Active Share. The average Active Share for the funds in my sample is 61,37% meaning that almost 40% of the funds' assets is on average invested in accordance with the benchmark indices.

Overall, the most active class with Active Share of 75 – 100% contains the largest amount of funds representing the 37,5% of the funds, whereas the most passive class with Active Share

of 0 – 25% contains only 11% of the funds. Moderately active and passive classes with Active Shares of 50 – 75% and 25 – 50% both represent about 25% of the funds.

Table 2 shows that the funds investing in Finland are very passive whereas the level of active management is significantly higher in funds investing in Nordic Countries and Europe. Half of the equity funds investing in Finland have Active Share of only 25 – 50% and only three funds have Active Share of 75 – 100%. The situation is totally different in funds investing in Nordic Countries and Europe as more than half of the funds are included in the most active category. None of the funds investing in Nordic Countries have Active Share of 0 – 25% and only under 10% of the funds investing in Europe are included in this most passive category.

Table 2: Funds with different investment scopes distributed in Active Share classes.

	Number of mutual funds in different categories				
	Active Share (%)				
Investment scope	0 - 25	25 - 50	50 - 75	75 - 100	**Total**
Finland	5	12	5	3	**25**
Nordic Countries		2	4	8	**14**
Europe	2	2	8	13	**25**
Total	**7**	**16**	**17**	**24**	**64**

Overall the equity funds investing in Nordic Countries and Europe seem to follow the same pattern that Cremers and Petäjistö (2006) discovered in their research in the U.S. Cremers and Petäjistö found that about 16,6 percent of their sample funds had Active Share below 50%. In my study 14,3 percent of the funds investing in Nordic Countries and 16,0 percent of the funds investing in Europe are included in the same category.

The equity funds investing in Finland seem to follow index much more frequently than mutual funds in U.S. My studies show that 68,0 percent of the funds have Active Share below 50% which is a quadruple figure compared to the results of Cremers and Petäjistö (2006). However, there is a rational reason for this phenomenon. In Finland the benchmark indices contain a significantly lower amount of stocks than the indices in U.S. Whereas the benchmark index that I have applied in this thesis, OMX Helsinki Benchmark CAP GI, contains 55 – 65 stocks, the equity indices in U.S. can contain over 5,000 stocks.

Consequently, it is much easier and cheaper to replicate the Finnish indices than the U.S. indices. Inversely put, there are significantly less stocks available in Finland than in U.S. and therefore there are fewer options available for fund managers while trying to outperform the benchmark index.

Table 3 introduces the three-year average Active Shares for every mutual fund involved in this thesis. This table also highlights the differences between funds investing in Finland and the funds investing in Nordic Countries and Europe. The average Active Share of funds investing in Finland is only about half of the average Active Share of funds investing in Nordic Countries and Europe.

Table 3: Average Active Shares for funds in the sample.

Finland		Nordic Countries		Europe	
Fund	**Active Share**	**Fund**	**Active Share**	**Fund**	**Active Share**
Fund 21	78,45 %	Fund 5	96,55 %	Fund 1	99,47 %
Fund 23	77,17 %	Fund 6	96,28 %	Fund 2	99,43 %
Fund 24	76,23 %	Fund 7	95,96 %	Fund 3	99,33 %
Fund 33	64,03 %	Fund 8	95,66 %	Fund 4	98,90 %
Fund 35	59,04 %	Fund 11	91,08 %	Fund 9	93,56 %
Fund 39	52,82 %	Fund 13	86,60 %	Fund 10	91,77 %
Fund 40	51,47 %	Fund 14	85,30 %	Fund 12	86,84 %
Fund 41	50,44 %	Fund 19	78,96 %	Fund 15	84,87 %
Fund 42	49,92 %	Fund 25	73,66 %	Fund 16	82,65 %
Fund 43	49,05 %	Fund 26	72,98 %	Fund 17	80,16 %
Fund 45	47,19 %	Fund 28	71,79 %	Fund 18	79,06 %
Fund 49	44,41 %	Fund 36	57,43 %	Fund 20	78,53 %
Fund 50	43,41 %	Fund 44	48,95 %	Fund 22	77,30 %
Fund 51	40,89 %	Fund 46	46,63 %	Fund 27	72,84 %
Fund 52	39,78 %			Fund 29	70,64 %
Fund 53	30,78 %			Fund 30	70,14 %
Fund 54	27,44 %			Fund 31	67,75 %
Fund 55	27,11 %			Fund 32	67,38 %
Fund 56	26,90 %			Fund 34	59,77 %
Fund 57	26,18 %			Fund 37	56,94 %
Fund 58	24,05 %			Fund 38	56,76 %
Fund 59	19,58 %			Fund 47	45,65 %
Fund 60	19,17 %			Fund 48	45,35 %
Fund 62	10,29 %			Fund 61	16,35 %
Fund 64	5,59 %			Fund 63	6,85 %
Mean	**41,66 %**	**Mean**	**78,42 %**	**Mean**	**71,53 %**
Median	**43,41 %**	**Median**	**82,13 %**	**Median**	**77,30 %**

5.1.2 Performance measures

As mentioned earlier, previous studies have suggested that actively managed funds can't outperform benchmark indices on net return basis. Table 4 displays the average benchmark-adjusted Sharpe and Treynor ratios for different Active Share levels and it also introduces Active Shares, tracking errors, Sharpe ratios and Treynor ratios for every fund in my sample.

Sharpe and Treynor ratios are benchmark-adjusted against the benchmark indices applied in this thesis. Furthermore, the table contains the mean and median figures for every ratio calculated separately for every fund class.

Table 4: Average benchmark-adjusted Sharpe and Treynor ratios in Active Share classes for funds with different investment scopes.

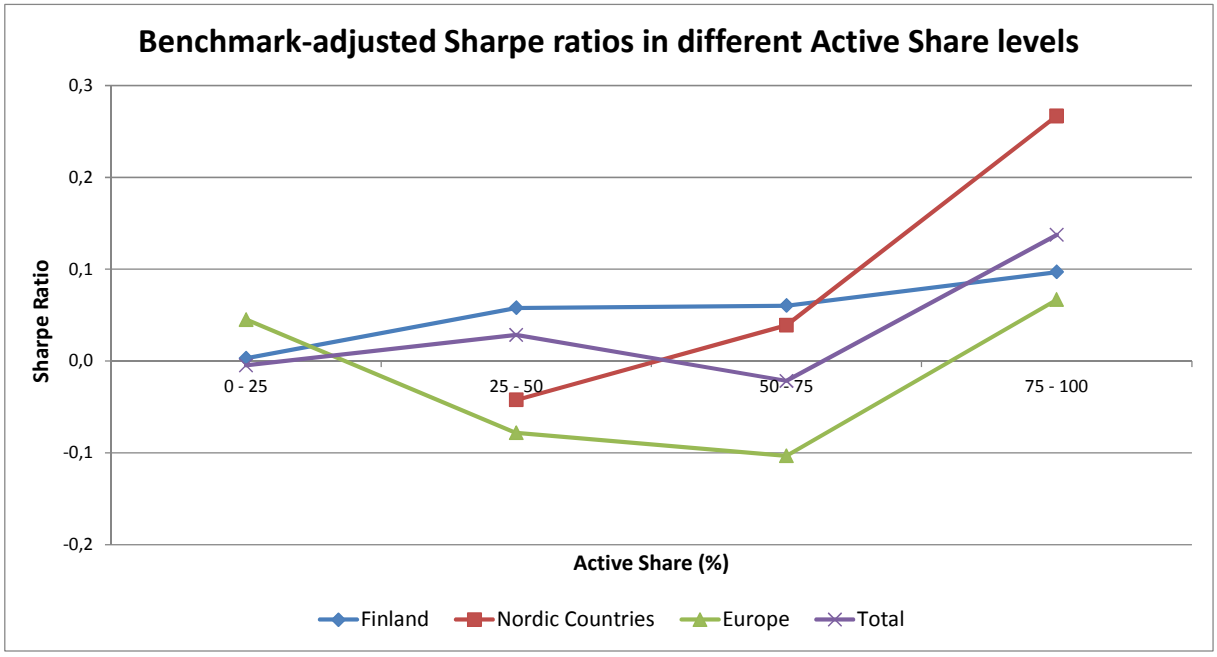
	Benchmark-adjusted returns - Treynor ratio					
	Active Share (%)					
Investment scope	0 - 25	25 - 50	50 - 75	75 - 100	**Mean**	**Median**
Finland	0,000	0,016	0,017	0,026	**0,014**	**0,011**
Nordic Countries		-0,009	0,017	0,093	**0,057**	**0,034**
Europe	0,019	-0,025	-0,026	0,030	**0,007**	**-0,017**
Mean	**0,005**	**0,008**	**-0,003**	**0,051**	**0,020**	
Median	**0,001**	**0,008**	**-0,006**	**0,038**		**0,008**
	Benchmark-adjusted returns - Sharpe ratio					
	Active Share (%)					
Investment scope	0 - 25	25 - 50	50 - 75	75 - 100	**Mean**	**Median**
Finland	0,003	0,058	0,060	0,097	**0,052**	**0,043**
Nordic Countries		-0,042	0,039	0,267	**0,158**	**0,096**
Europe	0,045	-0,078	-0,103	0,067	**-0,001**	**-0,069**
Mean	**0,015**	**0,028**	**-0,022**	**0,137**	**0,052**	
Median	**0,005**	**0,033**	**-0,032**	**0,114**		**0,021**

Table 4 reveals interesting results since the funds with the highest Active Shares actually recorded the highest benchmark-adjusted Sharpe and Treynor ratios in every fund class. These results indicate that the most active funds can add value relative to benchmark index by exploring the market. This outcome is in contrary to the previous studies suggesting that the actively managed funds can't outperform the index funds. The only exception is Cremers and Petäjistö (2009) who also find that the funds with the highest Active Share outperform their benchmarks. These findings suggesting that the funds with the highest Active Shares produce the highest benchmark-adjusted figures signal that the markets aren't perfect and there exists mispriced securities which can be exploited by the most active fund managers.

We can also observe the differences in average benchmark-adjusted Sharpe and Treynor ratios between fund groups from table 4. An interesting outcome can be seen from the Active

Shares of the funds investing in Finland and Nordic Countries as the benchmark-adjusted performance increases with the level of Active Share. The funds investing in Finland outperformed the benchmark index in every Active Share levels and in the group of funds investing in Nordic Countries only the most passive funds in the sample, in the Active Share level of 25 – 50%, underperformed the benchmark index. From graph 1 we can see that whereas the outperforming was more stable in the group of funds investing in Finland, the benchmark-adjusted performance increased more sharply among the funds investing in Nordic Countries as the Active Share increased. The funds investing in Europe beat the benchmark index in the most active and passive Active Share levels whereas the benchmark index performed better among the funds with Active Share between 25 – 75%.

Graph 1: Benchmark-adjusted Sharpe ratios in different Active Share levels.



Petäjistö (2010) find that the closet indexers can't beat the benchmark indices and underperform them after the fees. In my sample, as the table 4 shows, the closet indexers were able to outperform the benchmark index in the class of funds investing in Finland whereas the funds investing in Nordic Countries and Europe underperformed their benchmark indices.

Table 5 clearly shows that the equity funds investing in Finland have outperformed the OMX Helsinki CAP GI Index on net return basis on the three-year period applied in this thesis. The average Sharpe ratio for funds investing in Finland is 0,052 and Treynor ratio 0,014. The

similar phenomenon can be seen in the group of funds investing in Nordic Countries. The average Sharpe ratio is 0,158 and Treynor ratio 0,057 which indicates that the funds investing in Nordic Countries have outperformed the VINX CAP EUR_GI Index. The funds investing in Europe is the only group that underperformed the benchmark index. Even though the Sharpe and Treynor ratios offer distinct views of the performance against the benchmark, medians clearly show that the funds investing in Europe have underperformed the MSCI Europe Index.

Table 5 shows that the most active fund class, measured by Active Share has performed clearly the best. The funds investing in Nordic Countries had twice as large average Active Share as the second best fund class - the funds investing in Finland. As a result, the funds investing in Nordic Countries recorded three times better benchmark-adjusted performances than the funds investing in Finland.

Table 5: Average Active Shares, tracking errors and benchmark-adjusted Sharpe and Treynor ratios for funds in the sample.

Finland					Nordic Countries					Europe				
Fund	Active Share	Tracking error	Sharpe ratio	Treynor ratio	Fund	Active Share	Tracking error	Sharpe ratio	Treynor ratio	Fund	Active Share	Tracking error	Sharpe ratio	Treynor ratio
Fund 21	78,45 %	10,99 %	0,309	0,087	Fund 5	96,55 %	17,76 %	0,308	0,104	Fund 1	99,47 %	10,57 %	1,076	0,406
Fund 23	77,17 %	12,94 %	0,223	0,063	Fund 6	96,28 %	16,89 %	0,430	0,145	Fund 2	99,43 %	15,67 %	0,116	0,041
Fund 24	76,23 %	13,09 %	-0,241	-0,073	Fund 7	95,96 %	16,34 %	0,112	0,040	Fund 3	99,33 %	13,39 %	0,019	0,010
Fund 33	64,03 %	11,14 %	-0,032	-0,009	Fund 8	95,66 %	16,42 %	0,642	0,230	Fund 4	98,90 %	12,82 %	-0,554	-0,142
Fund 35	59,04 %	8,80 %	-0,093	-0,027	Fund 11	91,08 %	17,88 %	0,496	0,174	Fund 9	93,56 %	12,30 %	0,571	0,173
Fund 39	52,82 %	11,91 %	0,165	0,047	Fund 13	86,60 %	12,27 %	0,369	0,129	Fund 10	91,77 %	12,32 %	-0,188	-0,059
Fund 40	51,47 %	7,53 %	0,118	0,033	Fund 14	85,30 %	17,14 %	-0,224	-0,082	Fund 12	86,84 %	9,83 %	0,053	0,018
Fund 41	50,44 %	11,85 %	0,144	0,040	Fund 19	78,96 %	9,81 %	0,001	0,004	Fund 15	84,87 %	15,94 %	-0,252	-0,060
Fund 42	49,92 %	9,33 %	0,111	0,037	Fund 25	73,66 %	11,39 %	-0,045	-0,006	Fund 16	82,65 %	9,37 %	0,163	0,050
Fund 43	49,05 %	5,58 %	-0,011	-0,003	Fund 26	72,98 %	17,19 %	-0,006	0,001	Fund 17	80,16 %	9,03 %	0,064	0,025
Fund 45	47,19 %	10,42 %	0,086	0,024	Fund 28	71,79 %	11,36 %	0,125	0,044	Fund 18	79,06 %	8,97 %	0,131	0,036
Fund 49	44,41 %	6,27 %	0,168	0,047	Fund 36	57,43 %	13,82 %	0,081	0,029	Fund 20	78,53 %	11,22 %	-0,189	-0,061
Fund 50	43,41 %	5,03 %	0,116	0,032	Fund 44	48,95 %	8,81 %	-0,108	-0,028	Fund 22	77,30 %	12,33 %	-0,141	-0,040
Fund 51	40,89 %	9,47 %	0,043	0,011	Fund 46	46,63 %	10,07 %	0,023	0,010	Fund 27	72,84 %	6,63 %	-0,142	-0,036
Fund 52	39,78 %	6,10 %	0,101	0,028						Fund 29	70,64 %	6,18 %	0,051	0,017
Fund 53	30,78 %	8,70 %	0,013	0,002						Fund 30	70,14 %	11,26 %	-0,094	-0,027
Fund 54	27,44 %	6,70 %	0,097	0,027						Fund 31	67,75 %	11,45 %	-0,005	-0,005
Fund 55	27,11 %	8,89 %	0,047	0,012						Fund 32	67,38 %	6,76 %	-0,166	-0,040
Fund 56	26,90 %	9,08 %	-0,079	-0,025						Fund 34	59,77 %	8,82 %	-0,069	-0,014
Fund 57	26,18 %	6,56 %	0,003	0,001						Fund 37	56,94 %	9,79 %	-0,150	-0,037
Fund 58	24,05 %	8,25 %	-0,029	-0,009						Fund 38	56,76 %	5,50 %	-0,252	-0,064
Fund 59	19,58 %	4,39 %	0,014	0,003						Fund 47	45,65 %	10,48 %	-0,045	-0,017
Fund 60	19,17 %	3,32 %	-0,002	-0,001						Fund 48	45,35 %	10,69 %	-0,112	-0,033
Fund 62	10,29 %	9,19 %	0,027	0,006						Fund 61	16,35 %	10,26 %	-0,094	-0,030
Fund 64	5,59 %	6,11 %	0,005	0,001						Fund 63	6,85 %	6,66 %	0,184	0,068
Mean	**41,66 %**	**8,47 %**	**0,052**	**0,014**	**Mean**	**78,42 %**	**14,08 %**	**0,158**	**0,057**	**Mean**	**71,53 %**	**10,33 %**	**-0,001**	**0,007**
Median	**43,41 %**	**8,80 %**	**0,043**	**0,011**	**Median**	**82,13 %**	**15,08 %**	**0,096**	**0,034**	**Median**	**77,30 %**	**10,48 %**	**-0,069**	**-0,017**

5.1.3 Comparison between the level of active management and Total Expense Ratio

When a fund manager decides to apply a passive way of managing the fund by replicating the benchmark index, it doesn't generate high costs for the fund management company and therefore the fund should charge low management fees. On the other hand, if the fund manager actively explores the market and seeks opportunities to beat the benchmark index it incurs higher costs which are generally compensated by higher management fees.

Table 6 describes the overall picture of the relation between Total Expense Ratio (TER) and Active Share. The average TER in my sample is 1,596% which is slightly higher than the figure that Cremers and Petäjistö (2009) obtained, 1,24%. It is inherent that they recorded lower TER since U.S. fund market is more competitive and therefore the fees are generally on a lower level.

Table 6: Total Expense Ratios in Active Share classes for the funds with different investment scopes.

	Total Expense Ratio (%)					
	Active Share (%)					
Investment scope	0 - 25	25 - 50	50 - 75	75 - 100	**Mean**	**Median**
Finland	0,743	1,647	1,620	2,200	**1,527**	**1,610**
Nordic Countries		1,852	1,785	1,657	**1,721**	**1,805**
Europe	0,709	1,169	1,574	1,809	**1,595**	**1,800**
Mean	**0,733**	**1,612**	**1,637**	**1,807**	**1,596**	
Median	**0,679**	**1,800**	**1,610**	**1,805**		**1,800**

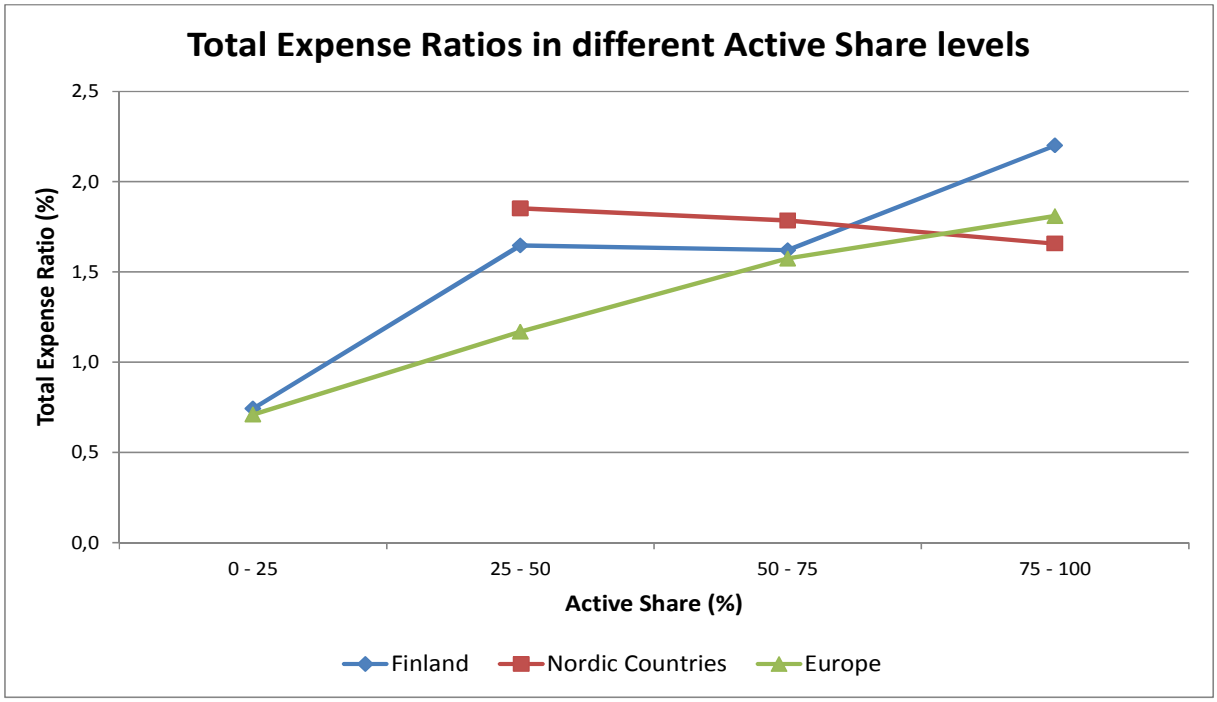
The trend of the aggregated figures in my sample follows closely the findings of Cremers and Petäjistö (2009). The most passive category with Active Share of 0 – 25% has significantly lower TER than the other categories. Funds in the most active category with Active Share of 75 – 100% have the highest TERs but the difference to moderately passive and active funds with Active Shares 25 – 75% is quite small. The findings also show that the average TER for the moderately passive category with Active Share of 25 – 50% is actually higher than the average TER in the whole sample.

From the same table we can also observe the average TER figures for the classes with different investment scopes. The lowest fees are in the funds investing in Finland with average TER of 1,527%. The funds investing in Europe have TER of 1,595% whereas the funds investing in Nordic Countries charge the highest average fees with TER of 1,721%. It is understandable that the funds investing in Nordic Countries charge the highest average fees since their average Active Share was the highest in my sample.

The Graph 2 demonstrates graphically the development of TER as the Active Share increases. The funds investing in Europe follow closely the theory suggesting that fees should be charged based on the activeness of the fund. In the group of funds investing in Finland the trend is also upward sloping and the most active funds charge significantly higher fees than the most passive funds. However, the moderately active and passive funds represented by the Active Share classes of 25 – 50% and 50 – 75% charge equal fees. Whereas the average TER is 1,647% for the funds with Active Share of 25 – 50%, the funds with Active Share of 50 – 75% have TER of 1,620%.

The funds investing in Nordic Countries are far from following the practice where more active funds charge higher fees. In my sample there are no funds investing in Nordic Countries with Active Share of 0 – 25% and therefore TER for this group is 0%. The Active Share class of 25 – 50% charges the highest fees in the group of funds investing in Nordic Countries recording the average TER of 1,852%. The more active funds charge lower fees since the funds with Active Share of 50 – 75% have TER of 1,785% and 75 – 100% TER of 1,657%.

Graph 2: Total Expense Ratios in different Active Share levels.



It is reasonable that the funds investing in Finland charge the lowest fees. First, the Finnish market is significantly smaller than the market of funds investing in Nordic Countries and Europe and therefore Finnish market can be explored with smaller effort. Second, in my sample the average Active Share of the funds investing in Finland was considerably lower than on the funds investing Nordic Countries and Europe. Therefore the average fees also need to be lower within the funds investing in Finland. Taking these things into account, the average TER should actually be even lower for funds investing Finland compared to the average level of TERs for funds investing in Nordic Countries and Europe.

Table 7 also provides us information about closet indexing. The funds with Active Share of 25 – 50% are moderately passive but they still charge high fees in every fund group. Especially, the funds investing in Finland and Nordic Countries with TERs over 1,5% can't provide enough value relative to index funds to compensate their high fees. Therefore investors would clearly be better off by investing in an index fund.

5.2 Active Share & Tracking error

In the previous chapter the funds' level of active management was determined by using only Active Share measure. In this section Active Share will be combined with tracking error. The performance of funds will be calculated as before by using Sharpe and Treynor ratio. I will also determine the Total Expense Ratios for every fund in the sample.

5.2.1 Distribution of funds to different activity levels based on Active Share and tracking error

In this section the level of active management in mutual funds is measured by using Active Share and tracking error and the distribution in different categories is presented in the table 7. The table shows that the funds' Active Shares and tracking errors increase quite simultaneously. For instance, in the Active Share class of 50 – 75% the majority of funds have tracking error between 6 and 12% whereas almost all the funds with Active Share of 75 – 100% have the tracking error 9 – 18%. The close relation between Active Share and tracking error can be observed from the fact there exists no funds in the categories with low Active Share and high tracking error or high Active Share and low tracking error. It is also notable that two thirds of the funds have tracking error between 6 and 12%.

Table 7: Funds distributed in different categories based on Active Share and tracking error.

	Number of mutual funds in different categories					
	Tracking Error (%)					
Active Share (%)	3 - 6	6 - 9	9 - 12	12 - 15	15 - 18	**Total**
75 - 100		1	7	8	8	**24**
50 - 75	1	6	8	1	1	**17**
25 - 50	2	7	7			**16**
0 - 25	2	3	2			**7**
Total	**5**	**17**	**24**	**9**	**9**	**64**

In table 8 the funds investing in Finland, Nordic Countries and Europe are distributed separately into different categories based on the level of active management measured with Active Share and tracking error.

Table 8: Funds with different investment scopes distributed in different categories based on Active Share and tracking error.

	Number of mutual funds in different categories - Finland					
	Tracking Error (%)					
Active Share (%)	3 - 6	6 - 9	9 - 12	12 - 15	15 - 18	**Total**
75 - 100			1	2		**3**
50 - 75		2	3			**5**
25 - 50	2	6	4			**12**
0 - 25	2	2	1			**5**
Total	**4**	**10**	**9**	**2**	**0**	**25**
	Number of mutual funds in different categories - Nordic Countries					
	Tracking Error (%)					
Active Share (%)	3 - 6	6 - 9	9 - 12	12 - 15	15 - 18	**Total**
75 - 100			1	1	6	**8**
50 - 75			2	1	1	**4**
25 - 50		1	1			**2**
0 - 25						
Total		**1**	**4**	**2**	**7**	**14**
	Number of mutual funds in different categories - Europe					
	Tracking Error (%)					
Active Share (%)	3 - 6	6 - 9	9 - 12	12 - 15	15 - 18	**Total**
75 - 100		1	5	5	2	**13**
50 - 75	1	4	3			**8**
25 - 50			2			**2**
0 - 25		1	1			**2**
Total	**1**	**6**	**11**	**5**	**2**	**25**

Table 8 shows that the majority of the funds investing in Finland are managed quite passively since almost all the funds have tracking error below 12% and two thirds Active Share below 50%. The funds investing in Nordic Countries are managed significantly more actively since almost all the funds have tracking error over 9% and Active Share over 50%. It is also quite exceptional that the most active category with Active Share of 75 – 100% and tracking error of 15 – 18% contains the largest amount of funds. The funds investing in Europe are also distributed in an interesting way since almost all the funds have Active Share over 50% but only the minority of the funds have tracking error over 12%.

Table 9 confirms that the funds investing in Finland are managed quite passively on average. They have considerably lower Active Shares and also lower tracking errors than the funds investing in Nordic Countries and Europe. In comparison between the funds investing in Nordic Countries and Europe the most significant difference is in the average tracking errors. Whereas the funds investing in Nordic Countries have only slightly higher average Active Share, the average tracking error is much higher.

Table 9: Three-year average Active Shares and tracking errors for Finnish equity funds.

Finland			Nordic Countries			Europe		
Fund	**Active Share**	**Tracking Error**	**Fund**	**Active Share**	**Tracking Error**	**Fund**	**Active Share**	**Tracking Error**
Fund 21	78,45 %	10,99 %	Fund 5	96,55 %	17,76 %	Fund 1	99,47 %	10,57 %
Fund 23	77,17 %	12,94 %	Fund 6	96,28 %	16,89 %	Fund 2	99,43 %	15,67 %
Fund 24	76,23 %	13,09 %	Fund 7	95,96 %	16,34 %	Fund 3	99,33 %	13,39 %
Fund 33	64,03 %	11,14 %	Fund 8	95,66 %	16,42 %	Fund 4	98,90 %	12,82 %
Fund 35	59,04 %	8,80 %	Fund 11	91,08 %	17,88 %	Fund 9	93,56 %	12,30 %
Fund 39	52,82 %	11,91 %	Fund 13	86,60 %	12,27 %	Fund 10	91,77 %	12,32 %
Fund 40	51,47 %	7,53 %	Fund 14	85,30 %	17,14 %	Fund 12	86,84 %	9,83 %
Fund 41	50,44 %	11,85 %	Fund 19	78,96 %	9,81 %	Fund 15	84,87 %	15,94 %
Fund 42	49,92 %	9,33 %	Fund 25	73,66 %	11,39 %	Fund 16	82,65 %	9,37 %
Fund 43	49,05 %	5,58 %	Fund 26	72,98 %	17,19 %	Fund 17	80,16 %	9,03 %
Fund 45	47,19 %	10,42 %	Fund 28	71,79 %	11,36 %	Fund 18	79,06 %	8,97 %
Fund 49	44,41 %	6,27 %	Fund 36	57,43 %	13,82 %	Fund 20	78,53 %	11,22 %
Fund 50	43,41 %	5,03 %	Fund 44	48,95 %	8,81 %	Fund 22	77,30 %	12,33 %
Fund 51	40,89 %	9,47 %	Fund 46	46,63 %	10,07 %	Fund 27	72,84 %	6,63 %
Fund 52	39,78 %	6,10 %				Fund 29	70,64 %	6,18 %
Fund 53	30,78 %	8,70 %				Fund 30	70,14 %	11,26 %
Fund 54	27,44 %	6,70 %				Fund 31	67,75 %	11,45 %
Fund 55	27,11 %	8,89 %				Fund 32	67,38 %	6,76 %
Fund 56	26,90 %	9,08 %				Fund 34	59,77 %	8,82 %
Fund 57	26,18 %	6,56 %				Fund 37	56,94 %	9,79 %
Fund 58	24,05 %	8,25 %				Fund 38	56,76 %	5,50 %
Fund 59	19,58 %	4,39 %				Fund 47	45,65 %	10,48 %
Fund 60	19,17 %	3,32 %				Fund 48	45,35 %	10,69 %
Fund 62	10,29 %	9,19 %				Fund 61	16,35 %	10,26 %
Fund 64	5,59 %	6,11 %				Fund 63	6,85 %	6,66 %
Mean	**41,66 %**	**8,47 %**	**Mean**	**78,42 %**	**14,08 %**	**Mean**	**71,53 %**	**10,33 %**
Median	**43,41 %**	**8,80 %**	**Median**	**82,13 %**	**15,08 %**	**Median**	**77,30 %**	**10,48 %**

It seems that the funds investing in Nordic Countries and Europe on average apply different investment strategies. Since both fund classes generate high Active Shares it implies that they actively explore the market and pick the stocks they believe to be undervalued. Whereas the funds investing in Nordic Countries on average seem to concentrate their stock picks on some

specific industries generating high tracking error, the funds investing in Europe diversify their stock picks on all industries generating lower tracking error.

5.2.2 Performance measures

Table 10 introduces very interesting results concerning the benchmark-adjusted returns for the sample. The most active levels of both Active Share and tracking error produce the highest returns. The Active Share level of 75 – 100% has mean Sharpe of 0,137 and Treynor ratio of 0,051 whereas the second best level is Active Share of 25 – 50% with Sharpe ratio of 0,028 and Treynor ratio of 0,008. The tracking error of 15 – 18% has mean Sharpe ratio of 0,180 and Treynor ratio of 0,066 while the second best level produces Sharpe ratio of 0,064 and Treynor ratio 0,023. These findings are similar with the results of Cremers and Petäjistö (2009). The most active funds appear to have stock-picking ability which enables them to outperform the benchmark indices even after fees.

Table 10: Average benchmark-adjusted Sharpe and Treynor ratios in different categories based on Active Share and tracking error.

	Benchmark-adjusted returns - Treynor ratio						
	Tracking Error (%)						
Active Share (%)	3 - 6	6 - 9	9 - 12	12 - 15	15 - 18	**Mean**	**Median**
75 - 100		0,036	0,076	0,008	0,074	**0,051**	**0,038**
50 - 75	-0,064	-0,011	0,006	0,029	0,001	**-0,003**	**-0,006**
25 - 50	0,015	0,013	0,001			**0,008**	**0,008**
0 - 25	0,001	0,000	-0,012			**-0,003**	**0,001**
Mean	**-0,007**	**0,003**	**0,023**	**0,010**	**0,066**	**0,020**	
Median	**-0,001**	**0,002**	**0,008**	**0,010**	**0,041**		**0,008**
	Benchmark-adjusted returns - Sharpe ratio						
	Tracking Error (%)						
Active Share (%)	3 - 6	6 - 9	9 - 12	12 - 15	15 - 18	**Mean**	**Median**
75 - 100		0,131	0,211	0,007	0,204	**0,137**	**0,114**
50 - 75	-0,252	-0,050	0,014	0,081	-0,006	**-0,022**	**-0,032**
25 - 50	0,052	0,046	0,004			**0,028**	**0,033**
0 - 25	0,006	0,007	-0,034			**-0,005**	**0,005**
Mean	**-0,027**	**0,010**	**0,064**	**0,015**	**0,180**	**0,052**	
Median	**-0,002**	**0,013**	**0,025**	**0,019**	**0,116**		**0,021**

Table 10 also shows that the categories with highest benchmark-adjusted returns are very active. First, the category with Active Share of 75 -100% and tracking error of 9 – 12% has average Sharpe ratio of 0,211 and Treynor ratio of 0,076. Second, the category with Active Share of 75 – 100% and 15 – 18% has average Sharpe ratio of 0,204 and Treynor ratio of 0,074.

Another interesting fact is that the most passive level of tracking error generates the lowest returns. While the tracking error of 3 – 6% has negative returns, all the other levels have positive returns. The same thing applies to Active Share except the Active Share of 50 – 75% which also produces negative returns.

The negative mean benchmark-adjusted returns for the lowest levels of Active Share and tracking error are normal since these levels contain index funds and closet indexing funds. These funds replicate the benchmark indices and produce similar gross returns than the indices and therefore the benchmark-adjusted net returns are negative.

Overall, the results of table 10 show that the mean benchmark-adjusted returns increase as Active Share and tracking error increase. The only exceptions are Active Share level of 50 – 75% and tracking error level of 12 – 15% which produce lower returns than the previous levels.

From table 4 we can compare mean performances between fund groups with different investment scopes. The funds investing in Nordic Countries is the most active fund group and it has also produced the highest benchmark-adjusted returns with average Sharpe ratio of 0,158 and Treynor ratio of 0,057. The funds investing in Finland is the most passive fund group while it generated second best returns with Sharpe ratio of 0,052 and Treynor ratio of 0,014. The funds investing in Europe performed the worst with Sharpe ratio of -0,001 and Treynor ratio of 0,007.

5.2.3 Comparison between the level of active management and Total Expense Ratio

Table 11 presents the average Total Expense Ratios for every activity categories based on Active Share and tracking error. When exploring the mean figures of both Active Share and tracking error it is easy to see that the sample funds follow on average the practice that higher fees are charged by more actively managed funds. As tracking error increases the mean TER also increases. The only exception is the highest tracking error class where the mean TER is slightly smaller than in the tracking error class of 12 – 15%. The mean TER also increases constantly as the average Active Share increases. The trend of TER increasing with Active Share and tracking error follows closely the findings of Cremers and Petäjistö (2009).

Table 11: Average Total Expense Ratios in different categories based on Active Share and tracking error.

	Total Expense Ratio (%)						
	Tracking Error (%)						
Active Share (%)	3 - 6	6 - 9	9 - 12	12 - 15	15 - 18	**Mean**	**Median**
75 - 100		1,700	1,713	2,017	1,694	**1,807**	**1,805**
50 - 75	1,862	1,392	1,744	1,860	1,810	**1,637**	**1,610**
25 - 50	1,790	1,566	1,608			**1,612**	**1,800**
0 - 25	0,332	1,111	0,567			**0,733**	**0,679**
Mean	**1,221**	**1,432**	**1,597**	**1,999**	**1,707**	**1,596**	
Median	**1,500**	**1,600**	**1,610**	**1,869**	**1,800**		**1,800**

The category with Active Share of 0 – 25% and tracking error of 3 – 6% has a mean TER of 0,332% which is very low. The reason is that the funds with the lowest Active Share and tracking error are generally index funds which replicate benchmark indices and therefore charge low fees. From the table 11 we can see that the categories close to the most passive category charge significantly higher fees. Excluding the most passive category, the other categories with Active Share below 50% and tracking error below 9% have mean TERs over 1% and from these categories the ones with Active Share of 25 – 50% have mean TERs even over 1,5%.

These funds that are distributed to the categories close to the most passive category are closet indexers. The funds' holdings replicate the benchmark holdings by over 50% and funds' daily prices follow closely the movements of the benchmark indices. Consequently, the fund

managers aren't actively taking bets in order to outperform the benchmark indices and therefore the fees charged are too high. The investors would be better off by investing in an index fund which replicates the benchmark index with considerably lower fees.

Table 12 describes how Total Expense Ratio varies with Active Share and tracking error among different fund groups. The funds investing in Finland charge higher fees as the activeness of the funds increase. The mean TER is larger as the Active Share and tracking error increase and the most passive funds have the lowest mean TER whereas the most actively managed funds charge the highest fees.

Table 12: Average Total Expense Ratios for funds with different investment scopes distributed in categories based on Active Share and tracking error.

	Total Expense Ratio (%) - Finland						
	Tracking Error (%)						
Active Share (%)	3 - 6	6 - 9	9 - 12	12 - 15	15 - 18	**Mean**	**Median**
75 - 100			2,100	2,250		**2,200**	**2,100**
50 - 75		1,450	1,733			**1,620**	**1,600**
25 - 50	1,790	1,476	1,830			**1,647**	**1,800**
0 - 25	0,332	1,297	0,454			**0,743**	**0,500**
Mean	**1,061**	**1,435**	**1,675**	**2,250**		**1,527**	
Median	**1,000**	**1,555**	**1,830**	**2,250**			**1,610**
	Total Expense Ratio (%) - Nordic Countries						
	Tracking Error (%)						
Active Share (%)	3 - 6	6 - 9	9 - 12	12 - 15	15 - 18	**Mean**	**Median**
75 - 100			1,500	1,855	1,650	**1,657**	**1,700**
50 - 75			1,735	1,860	1,810	**1,785**	**1,835**
25 - 50		2,104	1,600			**1,852**	**1,852**
0 - 25							
Mean		**2,104**	**1,642**	**1,858**	**1,673**	**1,721**	
Median		**2,104**	**1,600**	**1,858**	**1,800**		**1,805**
	Total Expense Ratio (%) - Europe						
	Tracking Error (%)						
Active Share (%)	3 - 6	6 - 9	9 - 12	12 - 15	15 - 18	**Mean**	**Median**
75 - 100		1,700	1,678	1,956	1,825	**1,809**	**1,800**
50 - 75	1,862	1,363	1,760			**1,574**	**1,705**
25 - 50			1,169			**1,169**	**1,169**
0 - 25		0,740	0,679			**0,709**	**0,709**
Mean	**1,862**	**1,315**	**1,517**	**1,956**	**1,825**	**1,595**	
Median	**1,862**	**1,450**	**1,610**	**1,869**	**1,825**		**1,800**

The funds investing in Nordic Countries produced very unusual results. The average TER in every category is between 1,5% and 2,1% but there is no correlation between the fees and the level of active management. Whereas the most active funds have the highest fees among the funds investing in Finland, the most passive category with Active Share of 25 – 50% and tracking error of 6 – 9% charged the highest fees within the funds investing in Nordic Countries.

When observing Active Share the funds investing in Europe charge higher fees as the level of Active Share increases. The most passive funds have very low mean TER and expenses increase steadily with the level of activity. However, the situation is more complex with tracking error. In terms of tracking error, funds in the most passive category charge very high fees. When excluding the most passive category, the mean TER increases with the level of tracking error.

The average TER for closet indexing funds is 1,49% which is almost the same as the average of the whole sample used in this thesis. When studying the fund groups separately we can see that there are differences in closet indexing between funds with different investment scopes. The group of funds investing in Finland contains the most of the closet indexing funds. 10 funds of the total 25 funds can be considered as closet indexing funds and the average TER for these funds is 1,50%. The funds investing in Nordic Countries and Europe both contain only 1 closet indexing fund. The fund investing in Europe has TER only 0,74% whereas the fund investing in Nordic Countries charged 2,10%.

6 Conclusions

This thesis studies the active management in Finnish equity funds investing in Finland, Nordic Countries and Europe. The time period applied in this thesis is from the first quarter of 2008 to the third quarter of 2010 in which the funds are analyzed with Active Share and tracking error activities.

Active Share (Cremers and Petäjistö, 2006) is a rather new method for measuring fund's activity relative to is benchmark index. The basic idea of Active Share is to determine the amount of active management by measuring how closely the holdings of the fund replicate the holdings of the benchmark index. Active Share describes the percentage of stock holdings in a fund that differ from those in the index. The more the fund deviates from the index, the more active the fund is. Tracking error is a more traditional method and it measures how closely the fund's daily prices follow the prices of the benchmark index.

The average Active Share for the funds in my sample is 61,37%. The most active class with Active Share of 75 – 100% contains the largest amount of funds representing the 37,5% of the funds and 64,1% of the funds have Active Share over 50%. The average tracking error is 10,42% and 28,1% of the funds have tracking error over 12%. These figures mean that a little less than 40% of the funds' assets are on average invested in accordance with the benchmark indices and over one fourth of the funds in the sample have substantially different daily movements than the benchmark indices.

Cremers and Petäjistö (2006) discovered in their research in the U.S. that about 16,6 percent of their sample funds had Active Share below 50%. There is a significant difference when compared to my findings since in my sample 35,9% of the funds have Active Share below 50%. The reason can be found in the average Active Share figures between funds with different investment scopes. The funds investing in Nordic Countries and Europe have average Active Shares 14,3 percent and 16,0 percent respectively whereas the same figure for the funds investing in Finland is 68,0 percent.

The same phenomenon can be found in the average Active Share figures. Whereas the funds investing in Nordic Countries and Europe have average Active Share of 78,42% and 71,53% respectively, the funds investing in Finland have substantially lower average figure with

41,66%. The same trend can be found from the average tracking errors. The funds investing in Finland have the lowest tracking errors of 8,47% on average while the average tracking error for the funds investing in Nordic Countries is 14,08% and in Europe 10,33%.

The equity funds investing in Finland follow the benchmark index much more frequently than for example the funds in U.S. because the Finnish benchmark index contains a significantly lower amount of stocks than the indices in U.S. Consequently, it is much easier and cheaper to replicate the Finnish indices than the U.S. indices. Inversely put, there are significantly less stocks available in Finland than in U.S. and therefore there are fewer options available for fund managers while trying to outperform the benchmark index.

Compared to the funds investing in Finland, the funds investing in Nordic Countries and Europe explore the market more intensively and take active positions more frequently generating higher average Active Share and tracking error figures.

The fund distribution in my study shows the similar outcome than Cremers and Petäjistö (2009) in the U.S; there are plenty of closet indexing funds in the Finnish equity fund market. 12 funds out of 64 funds fit inside the boundaries of "index funds" used in this thesis. The worst part is that these funds also charge substantial fees compared to their activity levels. The average TER for closet indexing funds is 1,49% which is almost the same as the average of the whole sample used in this thesis.

When studying the fund groups separately we can see that there are differences in closet indexing between funds with different investment scopes. The group of funds investing in Finland contains the most of the closet indexing funds. 10 funds of the total 25 funds can be considered as closet indexing funds and the average TER for these funds is substantially large, 1,50%. The funds investing in Nordic Countries and Europe both contain only 1 closet indexing fund. The fund investing in Europe has TER only 0,74% whereas the fund investing in Nordic Countries charged 2,10%.

When observing the Total Expense Ratios for the whole sample, we can see that the trend in Finnish equity markets follows closely the findings of Cremers and Petäjistö (2009) in the U.S. markets; the average TER increases with the level of active management. There are few

exceptions, for example the relatively high TERs of the closet indexing funds, but the general rule is that the level of active management and TER has a strong connection.

The funds investing in Finland have the lowest average Total Expense Ratios. This is reasonable since these funds are substantially more passive than the funds investing in Nordic Countries and Europe. Another reason for low fees is that the Finnish market is significantly smaller than the ones of Nordic Countries and Europe and therefore Finnish market can be explored with smaller effort. The funds investing in Nordic Countries have the highest average Total Expense Ratios. It is also understandable since these funds are on average the most actively managed.

My thesis has two main outcomes concerning the performance of the funds. First, the level of performance increases the level of active management increases. Second, the most actively managed funds have the best performances. These findings are in contradiction with the vast majority of the previous studies (see e.g. Hendricks, Patel & Zeckhauser, 1993 and Blake & Timmermann, 1998) suggesting that actively managed funds can't outperform benchmark indices on net return basis. However, my findings are similar with the results of Cremers and Petäjistö (2009) who applied Active Share in determining the funds' levels of active management.

The most active funds appear to have stock-picking ability which enables them to outperform the benchmark indices even after fees. These results indicate that the most active funds can add value relative to benchmark index by exploring the market. This outcome is in contrary to the previous studies suggesting that the actively managed funds can't outperform the index funds. The only exception is Cremers and Petäjistö (2009) who also find that the funds with the highest Active Share outperform their benchmarks. These findings suggesting that the funds with the highest Active Shares produce the highest benchmark-adjusted figures signal that the markets aren't perfect and there exists mispriced securities which can be exploited by the most active fund managers.

On average, the funds investing in Finland and Nordic Countries were able to beat the benchmark indices whereas the funds investing in Europe produced quite similar returns as the benchmark. We can conclude that the European fund market is working more efficiently than the Finnish market and the market of Nordic Countries since the fund managers investing

in European market haven't been able to beat the benchmark index. At the same time the fund managers investing in Finland and Nordic Countries have found inefficiencies in the markets and outperformed the benchmark indices by exploiting these inefficiencies. Since the European fund market is considerably larger and more competitive than these other markets, it is reasonable that the fund managers have beaten the benchmark indices in the Finnish market and the market of Nordic Countries.

It is also noteworthy that the most actively managed funds have the best performances among every fund group with different investment scopes. Therefore we can say that the most actively managed funds can find profitable investment opportunities from every market included in this thesis. Even though European market can be considered to be highly competitive, the intensive exploration of the market still pays off with higher after fees returns than the benchmark index.

When thinking about the generalizability of the above discussed findings, there are some limitations relating to them. First, the sample period is relatively short and a longer time horizon would give us a more comprehensive view of the situation in different economic conditions. Second, the sample in this thesis includes 64 funds which might restrict to generalize the findings from the Finnish mutual fund market. Third, the holdings data used in this thesis, describes the situations of funds and benchmarks on a quarterly basis. It would be more informative if the holdings data would be available on a daily basis. Fourth, data restrictions are also posed by the availability of the benchmark data which is why I have used only one benchmark index against each fund in the sample. Additional benchmarks could give more precise information about the funds' movements towards the indices. Due to these facts, the results of this thesis should be interpreted with some caution.

Based on this thesis, there are few suggestions for further research. First, the data used could be extended to include larger amount of funds and longer time horizon. This way the findings could be generalized with greater certainty. Second, the study could be included with new fund groups i.e. funds with different investment scopes. It would be interesting to see how the findings vary between several fund groups.

Appendices

Appendix 1:
Table 1: An example of holdings data for one mutual fund and one benchmark index on one period of time.

Company	Fund Weight	Benchmark Weight	Difference
AFFECTO OYJ	0,000714770	0,000809726	0,000094955
ALDATA SOLUTION OYJ	0,000667282	0,000744348	0,000077066
ALMA MEDIA OYJ	0,005774834	0,007359235	0,001584401
AMER GROUP	0,008953128	0,011896942	0,002943814
ATRIA	0,001038775	0,001324179	0,000285404
CARGOTEC CORP-B SHARE	0,011293267	0,010767929	0,000525338
CAPMAN OYJ	0,001399965	0,001604057	0,000204092
CRAMO OYJ-B SHS	0,004883144	0,004724428	0,000158716
COMPTEL OYJ	0,001505244	0,001352449	0,000152795
CITYCON OYJ	0,008230732	0,007170950	0,001059782
ELISA COMMUNICATIONS OYJ-A S	0,026000533	0,031071189	0,005070656
FINNAIR OYJ	0,002386543	0,002306829	0,000079714
FISKARS OYJ ABP-A SHARES	0,005242364	0,003900799	0,001341566
FISKARS OYJ ABP-K SHARES	0	0,001740582	0,001740582
FINNLINES OYJ	0,002168806	0,002208335	0,000039529
F-SECURE OYJ	0,001952275	0,001689865	0,000262410
FORTUM OYJ	0,082032118	0,090000000	0,007967882
HKSCAN OYJ	0,001742924	0,002329353	0,000586429
KONECRANES OYJ	0,014227387	0,012764159	0,001463228
KESKO OYJ-A SHS	0,009991025	0,010152710	0,000161685
KESKO OYJ-B SHS	0,020077222	0,021048240	0,000971019
KONE OYJ-B	0,052885549	0,045000000	0,007885549
KEMIRA OYJ	0,009799815	0,013616775	0,003816960
LASSILA & TIKANOJA OYJ	0,006762154	0,007832658	0,001070504
METSO OYJ	0,042053447	0,042370562	0,000317114
M-REAL OYJ-B SHARES	0,003892024	0,005484630	0,001592606
NORDEA AB - FDR	0,031082278	0,032099149	0,001016872
NESTE OIL OYJ	0,027205457	0,027521881	0,000316424
NOKIA OYJ	0,074191214	0,090000000	0,015808785
NOKIAN RENKAAT OYJ	0,032513783	0,026390451	0,006123332
NORVESTIA OYJ	0,000647814	0,000772120	0,000124306
ORIOLA-KD OYJ A	0	0,001367737	0,001367737
ORIOLA-KD OYJ B	0,003983984	0,002402427	0,001581557
OKMETIC OYJ	0,000377273	0,000455234	0,000077961
OLVI A	0,001711366	0,001454201	0,000257165
ORION OYJ A	0	0,007565541	0,007565541
ORION OYJ B	0,018918415	0,012612598	0,006305818
OUTOTEC OYJ	0,014200157	0,014049590	0,000150567
OUTOKUMPU OYJ	0,032972798	0,022239783	0,010733014
Pohjola Bank PLC	0,010271850	0,010204696	0,000067155
PÖYRY OYJ	0,006347669	0,006317680	0,000029989
RAISIO GROUP PLC-V SHS	0,001862708	0,001743852	0,000118856
RAMIRENT OYJ	0,012649670	0,010859994	0,001789677
RAUTARUUKKI OYJ	0,025024664	0,022189038	0,002835626
SAMPO OYJ-A SHS	0,081932170	0,078934828	0,002997342
SPONDA OYJ	0,006209971	0,005649209	0,000560761
STOCKMANN OYJ ABP-A	0	0,006446915	0,006446915
STOCKMANN OYJ ABP-B	0,016351699	0,008319801	0,008031898
STORA ENSO OYJ-A	0	0,010077780	0,010077780
STORA ENSO OYJ-R	0,035507826	0,034922220	0,000585606
SUOMEN TERVEYSTALO OYJ	0,000881979	0,001115696	0,000233717
SUOMINEN CORPORATION	0,000301901	0,000371306	0,000069405
SANOMAWSOY OYJ	0,026787031	0,027441344	0,000654313
TECNOMEN OYJ	0,000589823	0,000588294	0,000001530
TIETOENATOR OYJ	0,011403525	0,010106573	0,001296952
TEKLA OYJ	0,001404611	0,001658772	0,000254161
TELIASONERA AB	0,038839856	0,045000000	0,006160144
UPONOR OYJ	0,010750669	0,011215327	0,000464658
UPM-KYMMENE OYJ	0,058364631	0,065037681	0,006673050
WÄRTSILÄ OYJ ABP-A	0	0,011137185	0,011137185
WARTSILA OYJ ABP-B	0,039937903	0,033534921	0,006402983
YIT-YHTYMÄ OY	0,021634241	0,016925247	0,004708994
Cash & Cash Equivalents	0,029465736	0	0,029465736

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