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I Introduction

In recent time, investments into the Swedish mutual fund market have increased substantially. The total net funds' assets accounted for SEK 3000 billion by the end of 2014. The increase in value of the funds made up to SEK 521 billion for the year 2014. Of the total net funds' assets, SEK 1669 billion are invested into equity mutual funds in Sweden which is corresponding to 56 percent of the total net funds' assets (The Swedish Investment Fund Association, 2014).

According to the Swedish Supervisory Authority, the mutual funds registered in Sweden are binded to invest at least 75 percent of their assets in Swedish or foreign stocks based by the type of their strategy (Swedish Financial Supervisory Statutes, 2008:11). Equity mutual funds can be managed using two types of management activities known as active or passive management (Elton, Gruber, Brown & Goetzmann, 2011). The passively managed funds are the ones that follow a specific market index such as index funds. The goal of the funds that apply an active management is to outsmart the market and produce better performance in comparison with the market index by seeking for undervalued securities. By exploiting the active management, mutual funds take a yearly management fee from the investors for the mutual fund managers' active work for searching for these undervalued securities (Elton et al., 2011).

Nevertheless, the ability of mutual fund managers to outsmart the market is not in line with the efficient market hypothesis. The hypothesis states that stock market are efficient and that all relevant information is already included into the stock price. The theory entails the belief that it is impossible for investors to purchase undervalued stocks and outperform the market (Malkiel, 1999). Hence, the aim of this study is to evaluate the Swedish-based equity mutual funds' performance in the Swedish market and to see if the Swedish fund managers are able to outsmart the market and generate excessive returns for the investors.

I.1 Background

Mutual funds are defined as the investment tools which are formed by collecting money from investors with the goal to invest this money into different types of securities (Northcott, 2009). Buying shares in a mutual fund makes the investor an indirect owner and shareholder in that fund's investments. There are many types of mutual funds which an investor can choose from. For instance, the investor can invest in money market funds, growth funds, equity funds, value funds, income funds, bond funds and international funds, to name a few. Equity funds represent the biggest part of the mutual funds and are funds that invest in securities that are based on an ownership such as stocks (Northcott, 2009). In contrast to equity funds, bond funds are based on debt and their goal is to provide current income on a stable basis. The most common type of mutual funds are open-end funds. This means that the fund can sell shares at any time without unnecessary restrictions; the fund is "open" to new investments. If the open-end fund has a lot of people investing in it, the increase in the total amount invested may decrease the cost of management. On the other hand, closed-end funds are restricted in the way that there are a fixed number of shares in the fund (Northcott, 2009).

There has been a huge interest into mutual funds market from the investor perspective for several decades. Investors are investing their money mainly into equity mutual funds in order to gain profit. The big interest into mutual funds market raises questions for academics about how these funds perform in comparison with some benchmarks. This creates a base to investigate the performance of mutual funds and answer the question if it is really effi-

cient to load money into this type of funds. In order to do so, academics use different techniques to achieve this goal. Early studies on mutual funds' performance were using different benchmarks that are based on single-factor measures such as Sharpe ratio by Sharpe (1966) and Jensen's alpha by Jensen (1967) (Elton et al., 2011). These measures are all based on a single factor model, the Capital Asset Pricing Model (hereinafter, CAPM). Later studies were conducted on employing the more complex techniques which are defined as multi-factor models. The most widely used multi-factor model is called Fama-French three factor model (hereinafter, FF3FM) developed by Fama and French (1993). Moreover, the extensions of this model appeared (see Carhart, 1997) including additional factors. However, the FF3FM is the most widely used in measuring mutual funds' performance due to its strong evidence related to size and book-to market factors (Elton et al., 2011). The main idea of employing the FF3FM is due to the suggestion that there could be types of assets held in the managed portfolios which are not contained in the benchmark. In that case, the mutual fund could perform differently than the benchmark. By using only one-factor model, the interpretation of the results could be doubtful since one could not be sure if the performance is due to the manager's ability to select securities or due to the category from which securities are being selected which is not in the index possessing superior or inferior performance in comparison to the index (Elton et al., 2011).

1.2 The Swedish mutual fund industry

In the past years, the mutual fund industry in Sweden has grown rapidly. The development of the Swedish mutual fund market goes all the way to the 1950's, when the first mutual funds were launched. The source of inspiration came from the US, where savings in funds had increased rapidly in the 1940's. However, people got interested in investing in mutual funds when the government in 1978 introduced a tax-deductible saving policy for funds investments along with a rising stock market in the 1980's. There were some changes to the tax-saving policy until it was completely abolished in 1997 (The Swedish Investment Fund Association, 2011). A new pension system was launched in 1994, where 2.5% of the salary is saved for retirement. Here, one can choose actively from a selection of funds to invest in. However, if no active choice is made, the money goes directly to a specific equity mutual fund (The Swedish Investment Fund Association, 2011).

When the Swedish Investment Fund Association was founded in 1979, there were only 17 funds with the total net assets of SEK 1 million. In the beginning of 1995, the industry had a total of net assets that accounted for an amount of SEK 207 billion (Engström, 2004). In the study by the Swedish Investment Fund Association (2014), they conclude that no other country in the world has more people saving in mutual funds as in Sweden. Eight out of every ten people in Sweden have savings in mutual funds in addition to the fund-based premium-pensions savings. If the premium-pension savings are included, all people in Sweden are fund-savers. One third of the financial wealth of households in Sweden, where the pension represents a large part, is a fund-based. Approximately one fourth of all the people consider the historical return as very important, whereas one half of the people consider it to be quite important. Three out of ten people compares and evaluates their investment with the stock market performance and 17 percent of the people evaluate against another index that is comparable with the fund itself. The study also shows that over 50 percent of all the people use advisor recommendations for making decisions about their mutual funds' investments (The Swedish Investment Fund Association, 2014).

In present day, the total of the funds' net assets makes up to over SEK 3000 billion in Sweden, an increase with more than SEK 520 billion over the year of 2014. The net total of

SEK 153 billion were invested in funds in Sweden in the period of 2014. Out of this, the inflows of equity funds represent nearly SEK 10 billion (The Swedish Investment Fund Association, 2014). In the end of 2014, net assets of equity mutual funds constitute 56 percent of the total net assets in funds in Sweden. In addition, the Swedish-based equity mutual funds made up to about 46 percent in the same period of the total net assets in funds in Sweden. This confirms the huge popularity between households and investment companies of investing in the equity mutual funds in Sweden and the importance for these funds to deliver excessive results (The Swedish Investment Fund Association, 2014).

Mutual funds have received an important role as a part of the future savings for people in Sweden. The individual investor can participate in the mutual funds market without getting involved in the stock market himself, by the help of a manager to actively manage the equity mutual fund. With growing importance of the equity mutual funds market, affecting the vast majority of the population in Sweden, the need for evaluation of its performance may have never been greater. The following section will present a summary of what previous research have found regarding the ability of equity mutual funds to over perform the market.

1.3 Problem statement

Previous research studies on this topic finds various results regarding the ability of equity mutual funds to over perform the market. Most of the empirical researches are conducted in the U.S mutual funds market, and most of which support the efficient market hypothesis (Flam & Vestman, 2014). The efficient market hypothesis states that stock markets are efficient, implying that all information that is available is already incorporated into the stock prices (Malkiel, 1999). This implies that the ability to generate superior return and outperform the market is not in line with the efficient market hypothesis (Ippolito, 1993). The U.S studies show an average yearly excess return that is negative when deducting fees of management (Sharpe, 1966; Jensen, 1967; Elton, Gruber, Das & Hlavka, 1993; Elton, Gruber & Blake, 1996; Carhart, 1997; Pastor & Stambaugh, 2002; Elton, Gruber & Blake, 2003; Fama & French, 2009). Furthermore, some studies show an average yearly excess return that is positive when including management fees (Grinblatt & Titman, 1989; Grinblatt & Titman, 1993; Daniel, Grinblatt, Titman & Wermers, 1997; Wermers, 2012). These studies commonly indicate that managers, on average, have superior skill of securities selection. However, there is evidence that actual performance does not cover the cost of management expenses.

The geographical limitation of the research, mainly centred in the U.S and the U.K markets, are leaving other markets unexplored (Leite, Cortez & Armada, 2009). The few exceptions are the studies conducted by Kryzanowski, Lalancette and To (1997) in the Canadian market, Otten and Bams (2002) in some markets in Europe, Bauer, Otten and Rad (2006) in the New Zealand market and Leite et al. (2009) in the Portuguese market. The authors of this thesis find only three published empirical studies, Dahlquist, Engström and Söderlind (2000), Engström (2004), and Flam and Vestman (2014) regarding the Swedish mutual fund market. However, there is a lack of Swedish published papers on the widely used FF3FM to investigate Swedish mutual funds' performance. As the FF3FM is the foundation of multi-factor models of performance evaluation, the employment of these factors creates a base for the evaluation of the Swedish market.

The thesis aims to conduct a study in the unexplored Swedish mutual fund market due to the lack of Swedish research papers, especially on the FF3FM, and due to the importance

of Swedish equity mutual funds' performance evaluation. Engström (2004) argues that there are many reasons why evaluation of the mutual fund industry in Sweden are important. The Swedish mutual fund market is relatively young and consists of less sophisticated funds compared to the U.S. market. The popularity of equity mutual funds in Sweden is also a reason for examining its performance. The focus of the thesis will be on the Swedish actively managed equity mutual funds' ability to over perform the FF3FM's benchmarks. The next section will briefly explain the purpose and research questions of the thesis.

1.4 Purpose

This thesis adds to the scarce empirical literature on Swedish equity mutual fund performance. Employing the FF3FM, it aims at analyzing whether actively managed Swedish equity mutual funds outperform the Fama-French benchmarks net- and gross of management fees. In doing so, the thesis sheds light on whether Swedish actively managed equity mutual funds' performance supports the existence of skilled or informed mutual funds managers or not, and whether funds' underperformance is due to the expenses they charge. The present study moreover examines whether the findings speaks in favor of the efficient market hypothesis.

The thesis purpose can be subsumed into the following research question:

1. Do actively managed Swedish equity mutual funds outperform the Fama-French benchmarks net- and gross of the management fees?

1.5 Limitations

This thesis has two limitations. Firstly, the thesis focuses only on equity mutual funds that invest explicitly in Sweden and not Swedish-based equity mutual funds that invest abroad. Secondly, the selection of funds in the sample is based only on available data for the equity mutual funds. The thesis does not examine the relationship between equity mutual funds and management fees fund by fund due to the focus on the performance of the funds.

1.6 Organization of the thesis

The thesis begins with the introduction of the research topic including background, problem statement, research purpose and limitations. The background outlines the various types of mutual funds in the market, and their growing importance. It also presents recent approaches to measuring mutual funds' performance. Thereafter, the Swedish mutual fund industry is introduced, followed by the formulation of the problem statement. From the problem statement, the thesis purpose is derived. Section 2 contains the frame of reference including a relevant theoretical background of, and previous empirical studies on the topic. The thesis' methodology is discussed in Section 3, and Section 4 presents the empirical results and analysis. Conclusions and suggestions for future research are provided in Section 5.

2 Frame of References

In this section, the theoretical setting of the most important topics related to our study is presented and discussed. The section covers the topics such as Modern Portfolio Theory and Capital Asset Pricing Model. In addition, Jensen's alpha are presented as the risk-adjusted measure. Subsequently, Random Walk Theory, Efficient Market Hypothesis and the decomposition of the Fama-French Three Factor model is discussed and presented in details. The frame of references ends with the discussion of previous research studies on the topic.

2.1 Equity mutual funds

The most popular type of fund is the equity mutual fund, which invest in stocks that represent an ownership in a company (Mobius, 2007). Owning a great number of stocks in a mutual fund lowers the effect of a decrease in value of one single stock, thus offering a cost efficient and diversifiable portfolio. Equity funds generate profit for the investor in three different ways: dividends, capital gains distributions and appreciation in price/share. Combining these three elements make up the total return of the fund. The shares within the equity funds are categorized according to features such as company size, historical dividends, potential for capital appreciation and responses to changes in the economy (Mobius, 2007).

2.2 Active management

Active management implies that the manager is betting against the market by building a portfolio of assets that are different from a passive portfolio or market index. The purpose of actively managed mutual fund is to generate superior return for the fund (over the market index) by forecasting and searching for stocks that are undervalued (Elton et al., 2011). This is done by either using technical or fundamental analysis (Malkiel, 1999). Technical analyses concerns forecasting future movements in the stock price by looking at past prices and volumes of the traded stock in order to detect a positive- or negative trend. This trend will give buy- or sell indications. On the other hand, fundamental analyses concerns the true value of an asset. In order to arrive at the true value of an asset or security, specific firm information such as growth prospects and accounting details is studied. Eventually, the market will reflect the true value of an asset and as a consequence, if the analysed value is above the market price, the asset is considered to be mispriced and a good investment (Malkiel, 1999). The advantage of active management is that the manager can, based on his or her knowledge and experience, produce greater return by diversifying the portfolio and spread the risk (Northcott, 2009). Diversifying a portfolio means that if a company goes bankrupt, it will not have a great effect on the overall value of the fund; the manager can spread the risk. This costs the investor by the form of a yearly management fee in order to cover the expenses of active management (Northcott, 2009).

2.3 Modern portfolio theory

The Modern Portfolio Theory (hereinafter – MPT) is a financial theory that seeks to maximise the portfolio expected return with a given amount of risk or reduce a risk for a given level of expected return by properly choosing the quantity of assets in the portfolio (The Economic Times, 2015). The MPT was presented in 1952 by Harry Markowitz in his article named “Portfolio selection”. In the article, Markowitz revealed between efficient and inefficient portfolios in other words called “efficient frontier” or “set of efficient mean-variance combinations”. He suggested that means, variances and covariances of the securities can be determined by using a statistical analysis process by which a set of efficient

mean-variance combinations can be derived. The investor can rely on the efficient frontier for choosing a security based by the mixture of return and risk (Markowitz, 1999).

Markowitz's portfolio theory has an assumption that investors are risk-averse meaning that if there are two securities with the same returns, investor will choose the one with the lower risk. The portfolio theory extended and contributed to the diversification effect with the Markowitz's evidence that the mixture of negatively correlated securities can result in reduced total portfolio risk (Müller, 1988).

The MPT was extended with the proposition of CAPM for pricing risky securities. The CAPM explains how asset prices are determined and shows that the optimal portfolio of securities of an investor relies on the forecasts of portfolio manager about the different securities prices in the future and not on the investors own risk preferences (Lindbeck, 1990). According to Debra Baker, Head of BNY Mellon's Global Risk Solutions, (2013), the MPT provided institutional investors with the framework and process of how to manage risk and construct an optimal portfolio of assets and was a guideline after 1950s for decades.

2.4 Capital asset pricing model

The Capital Asset Pricing Model which is referred to as the CAPM was presented in the 1960s by Jack Treynor, William Sharpe, John Lintner and Jan Mossin who all developed the model independently. The CAPM contributes to comprehension of how the capital markets operates. The main idea of the CAPM is that investors should be compensated for the risk they take when obtaining a security or a portfolio of assets. The assumption of the CAPM is that a company is affected by the only risk factor named as the systematic risk (Elton et al., 2011). The systematic risk is represented by the Beta coefficient and is measured as the covariance between the stock and the market returns divided by the variance of the market returns (Chen, 2003):

$$\beta = \frac{Cov(R_i, R_m)}{Var(R_m)}$$

The CAPM states that the expected return of a security or a portfolio is equal to a risk free interest rate plus a risk premium:

$$E(R_i) = R_f + \beta_i(E(R_m) - R_f),$$

where R_f denotes the risk free interest rate, E is the expectation determinator, $E(R_m)$ is the expected market return, β_i is the measure of the systematic risk (beta) (Cont, 2010).

A relationship between the systematic risk or the expected market risk versus a return of the whole market at a specified point in time is called the security market line (hereinafter – SML). The SML is an instrument by which one can reveal whether an asset being considered for a portfolio provides a rational expected return for a taken risk (Vishwanath, 2009). From Figure 2-4, if the security's risk in relation to expected return is drawn above SML, it is considered to be undervalued due to investor can anticipate higher return for the systematic risk (non-diversifiable risk). If the security is plotted below the SML, it is overvalued due to the investor's expectations of the lower return in exchange for the risk (Vishwanath, 2009).

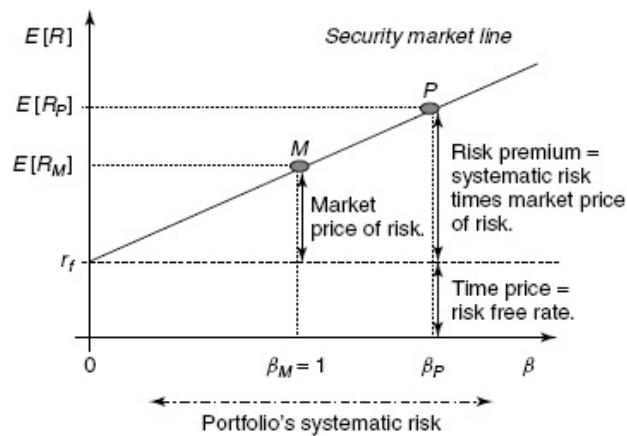


Figure 2-4 Security market line
Source: Elton et al. (2011)

The practical use of the CAPM comprises of three main parts. From investors point of view, the aim of the CAPM is using historical betas' estimates to forecast the future betas. The CAPM can also be used as a benchmark tool for making investor's decisions using SML and detecting the overvalued or undervalued securities (Lee, Finnerty & Wort, 2010). Eventually, the CAPM is used for performance evaluation by creating the performance indicators such as Sharpe ratio, Treynor index or Jensen's alpha (Cont, 2010).

The CAPM was also an object for criticism on its assumptions which are more theoretical and unrealistic from the practical point of view. Academics have put a lot of effort in validating the CAPM as a useful economic model. Black, Jensen and Scholes (1972) disclosed that in order for the CAPM to hold, the returns should be normally distributed and if the CAPM holds, only the beta should be priced. Fama and MacBeth (1973) tested the relationship between average return and risk for New York Stock Exchange stocks. Their empirical study showed that they couldn't reject the hypothesis of two parameter portfolio model that pricing the stocks makes the risk-averse investors to hold "efficient" portfolios. Eventually, Roll (1977) finalised the attempts of proval and disproval of CAPM in his paper work with the idea that since the "market portfolio" is not measurable, it is impossible to empirically prove or disprove the CAPM.

In spite of the different academics' opinions related to CAPM, the practitioners employ the CAPM as the base of creating the risk-adjusted performance indicators such as Sharpe ratio or Treynor index. In 1966, William Sharpe presented the Sharpe ratio and measured the performance of mutual funds. After the adjustment of this ratio in 1994, the main idea was to evaluate the expected return for each unit of risk taken for a zero investment strategy (Sharpe, 1994). The Treynor ratio is similar ratio to the Sharpe measure which was presented in 1965 by Jack Treynor. The ratio measures the risk-adjusted performance of the fund. The Treynor ratio uses the systematic risk of the fund as a measure of the fund's risk as a substitute to standard deviation (Treynor, 1965).

There have been numerous empirical researches testing the effectiveness of the Sharpe ratio on the performance measurement (Goodwin, 1998; Ankrim, 1992; Grinold & Kahn, 1992) as well as of the Treynor ratio (Scholz & Wilkens, 2005). The implications show that the Sharpe and Treynor ratios are good measures to evaluate portfolios' or funds' performance. Nonetheless, it is agreed that investors should not rely on these single measures and



should take into account other indicators in the evaluation of portfolios' or funds' performance (Scholz & Wilkens, 2005).

2.4.1 Jensen's alpha

Jensen's alpha was proposed in 1967 by Michael C. Jensen when he was evaluating the performance of mutual funds. He derived the ratio in order to determine how much of the fund manager's ability to forecast adds up to the fund's returns. Jensen's alpha is based on the CAPM theory and approximates the average return of a portfolio which is greater than the one estimated by CAPM taking into account portfolio's beta and average market return. Jensen's estimation of 115 mutual fund managers resulted that on average the managers were not capable to predict security prices to outperform the market (Jensen, 1967).

According to Elton et. al (2011), Jensen's alpha can be represented as follows:

$$\alpha_p = \overline{R_p} - [R_f + \beta_p(E(R_m) - R_f)],$$

where $\overline{R_p}$ denotes expected return of the portfolio, R_f denotes the risk free rate, β_p represents the beta of the portfolio and $E(R_m)$ indicates expected market return.

Since Jensen's alpha is an indicator of the risk-adjusted performance of a fund, it can be inferred as the risk-adjusted value generated by the active fund management. If the measure is larger than zero, the fund is considered to have higher return than expected by CAPM. In this case, it implies a positive fund manager's performance by generating excess returns by taking into account market sensitivity factor (beta) of the portfolio. A negative Jensen's alpha shows that the fund underperformed the market (Feibel, 2003).

The importance of Jensen's alpha is proposed in Pedersen and Satchell (2000) when they were evaluating the performance measures in the asymmetric response model. Schneeweis and Spurgin (1999) disclosed that the risk-adjusted performance alpha can be used as the performance indicator when comparing manager's ability to select assets allocation in comparison with a benchmark. The study performed by Kang and Lee (2013) determined that the Jensen's coefficient can be a biased performance measure if the returns of the benchmark portfolio are serially correlated. However, the indicator is widely used by financial industry as an indicator for rewarding investment opportunities even until today (Gerber & Hens, 2009).

2.5 Efficient market hypothesis

The concept of the efficient market hypothesis was introduced in 1965 by Eugene Fama where he proposed both the theory and the evidence for the hypothesis of the efficient markets. He presented that an "efficient market" comprise of a numerous actively rivalling participants where no one appeals the market power. The goal of the participants is to maximise their profits by operating in a rational way. The object of every participant is to determine the true value of the securities in a background where the information is freely available to all the rivalling market participants. Subsequently, the rivalry between the market participants would induce that the real price of each security always will completely reflect all the available information that prevails in the market. In other words, the main suggestion of the theory is that it is impossible to "beat the market" due to that the stock market efficiency causes the existing share prices to always contain and reflect all the relevant information (Fama, 1965).

In his later paper, Fama (1970) decomposes the market into three different efficiency stages and performs the empirical analysis to test if his theory holds. His findings stand in line with the efficient market hypothesis and controversial studies were uncommon. The three efficiency stages can be presented as follows:

1. Weak. This level of the efficient market hypothesis states that the security prices are reflected on the historically available information. This does not back up the technical analysis which states that the historical data can give profitable signs to the future price movement of the stock (Fama, 1970).
2. Semi strong. The level states that all the public information (particularly the financial data) is reflected in the securities prices (Fama, 1970). This implies that once the public information will be released, it will have an instant impact on the stock price. Hägg (1988) states that a mutual fund manager's ability to generate superior risk-adjusted return is a test of the semi strong market efficiency.
3. Strong. This level states that security prices are reflected by both publicly available and private (insider) information. The theory explains that the investors who proceed on the inside information cannot profit by doing so if the markets are strong efficient (Ryland, 2014).

In his study, Fama (1965) comprehended that the previous studies backing up the random walk theory were not in line with the technical and fundamental analysis. His results show that if the entrance fee of the mutual funds were disregarded, the funds performed about the same as the randomly chosen portfolio. On the contrary, when taking into account the entrance fee of the mutual funds, their performance became lower than that of the randomly chosen portfolio. He concluded that financial institutions and investment companies cannot outperform the normal buy-and-hold strategy. Fama's implication was in accordance with the previous random walk studies (Fama, 1970).

In 1973, the Burton Malkiel wrote a book called "A Random Walk Down Wall Street". In the book, Malkiel (1973) presents statistics which proves that majority of the mutual fund's managers were unsuccessful in beating the benchmark averages and proclaims that both the technical analysis and the fundamental analysis are still not confirmed in outperforming the markets. He declared that a long time span buy-and-hold strategy is the finest and individuals should not try to outperform the market.

To summarise the random walk theory and the efficient market hypothesis presented previously, the academics' studies confirms that it is impossible for the investors to acquire undervalued stocks or sell the stocks for the higher prices since the stocks are always traded at their true value on the stock markets. For this reason, it should be impossible to outperform the overall market using the expert stock selection or the market timing abilities. The single way for the investor to gain the higher returns is by acquiring riskier investments (Ryland, 2014).

2.6 Modified efficient market hypothesis

The modification of the efficient market hypothesis was proposed by Grossman and Stiglitz (1980), where they stated that the efficient market hypothesis turns out to be unstable if the information is expensive to get. It is impossible for the investors to gain the abnormal returns on his or her managed information if it is expensive to obtain the information or if the trade takes place at the prices which include all the information. This would

imply that traders would not be compensated from becoming informed and they could cut off their payments for information and perform the same as the ones who paid for that. Therefore, no trader would want to pay for the information and there would only be the uninformed investors in the market. Grossman and Stiglitz concluded that an economic incentive to gather information would appear. This information would be applied for the trading process before others would find out.

Under the theory presented by Elton, Gruber, Das and Hlavka (1993), the informed traders can perform better compared to others because of the skills they possess for collecting the information. In this case, the superior performance could arise due to the existence of skilled or informed mutual fund managers as opposed to the luck when selecting under-priced securities. Ippolito (1993) in his paper tested the modified portfolio theory for the mutual fund industry. The study reveals that the modified efficient market hypothesis can go in line with his results which showed that the risk-adjusted returns net of fees and expenses are similar to those of the index funds. In contrast to the efficient market hypothesis, funds' managers should not over perform the market excluding the expenses from the returns and should be inferior to the passive investment (Ippolito, 1993).

2.7 Multi-Factor models

Due to only one market proxy used as the benchmark, the CAPM is regarded as the single-factor model. As already stated previously, the derivation of Jensen's alpha is based by the CAPM and the term of the single-index model is sometimes referred to as the estimation of the excess returns using Jensen's indicator (Faust, 2010).

Regardless of the use of the risk-adjusted performance measures or single-factor model, the multi-factor models were developed as the substitute to the CAPM which was a subject to Roll's (1977) criticism. The models allow us to clarify the portfolio returns taking into account certain factors which can be named as market indexes, macroeconomic factors or fundamental factors. The idea behind the use of these type of factors is due to the concern that single-index model based by CAPM is too theoretical and reflects the non-observable market portfolio. The multi-factor models enhance the part of variance explained by the regression and describes management performance on mutual funds more accurately (Le Sourd, 2007).

The general equation of the multi-factor model is as follows:

$$R_{it} = \alpha_i + \sum_{k=1}^k b_{ik} F_{kt} + \varepsilon_{it},$$

where R_{it} denotes the rate of return of asset i , α_i denotes the expected return of asset i , b_{ik} represents the sensitivity of asset i to factor k , F_{kt} represents the return of factor k with $E(F_k) = 0$, ε_{it} denotes the residual return, or the part of the return that is not explained by the factors. The multi-factor models based by the fundamental factors are the type of factors which explain the returns of the assets in relation with variables that rely on the characteristics of the companies and not on the economic factors affecting the assets. This type of framework is used following the assumption that fundamental factors are described as the functions of the companies' characteristics. One of the most widely used fundamental type multi-factor models in academic literature as well as in practical application, is Fama and French's three-factor model (Le Sourd, 2007).

2.8 Fama-French three factor model

Fama and French previous studies revealed the uniqueness of their proposed three factor model known as the *Fama-French's three factor model*. In their research, they added two important factors which supplement to market risk and one of which accounts for *size* and other for *value*. Fama and French made an implication that value stocks perform better than growth stocks and stocks with small capitalization outperform those with large capitalization (Krichene, 2012).

Fama and French (1992) found that variables defined as size and value describes the greater part of the average stock returns. Size is identified as the market equity (ME) which is the price of the stock times the number of shares outstanding. Value is defined as the proportion of the book value to equity (BE) and market equity (ME) (BE/ME) (Fama & French, 1993). The idea behind the size- and value factors is that these variables clarify the variance of stock returns since they explain the underlying risk of stocks (Fama & French, 1992). These two variables are denoted by two portfolios which are small minus big (SMB) and high minus low (HML) for the size and the value factor, respectively. The FF3FM consists of three explanatory variables denoted as MRP, SMB and HML, which are considered to be the risk factors capturing the non-diversifiable (systematic) variance of the stocks (Fama & French, 1993).

The FF3FM is expressed as:

$$R_{it} - R_{ft} = \alpha_i + \beta_{im} \text{MRP}_t + \beta_{iSMB} \text{SMB}_t + \beta_{iHML} \text{HML}_t + \varepsilon_{it},$$

where R_{it} is the fund's return, R_{ft} denotes the risk-free rate, α_i is the alpha intercept of the fund i , β_{im} represents the beta of the fund i , MRP denotes the risk-adjusted market return, SMB indicates small minus big stocks, HML denotes high minus low stocks, ε_{it} denotes the residual return (Faust, 2010). β_{iSMB} and β_{iHML} are coefficients uncovered by linear regression. β_{iSMB} or size beta determines the sensitivity of the portfolio to small capitalization stocks and β_{iHML} or value beta determines the sensitivity of the portfolio to value stocks (Fama & French, 1993). In the SMB case, a beta coefficient which is higher than zero indicates greater sensitivity to small capitalization stocks compared to large capitalization stocks. In HML case, a coefficient which is higher than zero indicates greater sensitivity to small value stocks compared to growth stocks. If the beta coefficients for SMB and HML factors are negative, it implies that the portfolio has greater exposure to large capitalization stocks and growth stocks, respectively (Bacon, 2012).

2.8.1 Market risk premium

Market risk premium (MRP) is defined as the difference between the expected return of a market portfolio and the risk-free interest rate (Fernandez, 2004). Merton (1980) claimed that the MRP should be positively correlated to the volatility of the market portfolio. The idea of this is that investors require greater prospective returns in exchange for an additional risk. He produced estimates of the volatility of the market and reveals that the variance of the market returns changes significantly over time. He makes an implication that the MRP should also change over time. Fama and French (1988) were arguing that detected market variance can be decomposed into expected variance and unexpected variation in variance. They determined empirically that the expected MRP is positively correlated to expected variance and there is a negative relationship between the expected MRP and the unexpected variation in volatility.

Ang, Hodrick, Xing and Zhang (2006) examined the pricing of aggregate volatility risk in the cross-section of stock returns. Their findings show that those stocks with high sensitivities to innovations in aggregate volatility have poor average returns. Moreover, they determined that high idiosyncratic (unsystematic) volatility of the stocks has a negative correlation to returns. Furthermore, Jiang and Lee (2006) found that there is a positive relationship between the idiosyncratic volatility and market returns.

2.8.2 The Size factor and the Value factor

Fama and French (1993) proposed two factors, the one catching the size premium (SMB) and the second the value to growth premium (HML). Their factors complement the MRP to present the sufficient model of the cross-section of US returns. When Bantz (1981) examined the relationship between the return and total market value of NYSE common stocks, his results showed that companies having a lower market capitalization produce higher risk-adjusted returns compared with those companies having greater market capitalization. He made an implication that the size effect is existing and that the CAPM is misspecified. When Roll (1981) were examining size premium, he stated that small-firm premium is a consequence of difficulties in assessing risk. Later on, the same author came up with the conclusion that size premium could be a consequence of assessing return (Roll, 1983).

When evaluating mutual funds performance using a four-factor model, Huij and Verbeek (2009) discovered that there is no evidence of the SMB factor, but they confirmed that HML factor is relevant. They stated that factors based on mutual fund returns, as opposed to stocks, returns give better benchmarks in order to evaluate mutual fund managers. Durand, Juricev and Smith (2007) examined the SMB factor and made the implication that the size premium arise from investors' emotional induce.

On the contrary, the SMB and the HML are presented as the factors which impart the information concerning the future state of the economy in ten of the developing countries (Liew & Vassalou, 2000). Another study reveals that SMB in relation with the other macroeconomic factors do predict the market volatility and they are priced because they can give information about the future market volatility (Sohn, 2009).

With the proposition of the size factor, Fama and French (1993) presented the second factor, HML, which covers the value to growth premium. The factor is based by the idea that the “value” stocks have the greater ratio of book value of equity to market capitalization and “growth” stocks are considered to have a lower ratio.

Rozeff and Zaman (1998) were examining the overreaction and insider trading in growth and value portfolios. They stated that when stocks change from the growth class to the value class, it makes an incentive for insider buying to increase. Additionally, they found that the prices of value stocks are below their fundamental values and the prices of growth stocks are above the fundamental values. La Porta, Lakonishok, Shleifer and Vishny (1997) tested the hypothesis that the superior return to value stocks is the consequence of expectational errors which investors have made. These academics made an implication that investors are overreacting to bad or good information when the company proposes its earnings and as a consequence of that the prices of such stocks turn to be below or above their “true” values. According to La Porta et al. (1997), higher (lower) book-to-market ratios are

a function of the overreaction and the lower (higher) returns to growth (value) stocks denote the correction of the prices to this overreaction.

In some of the researches, the authors define that the value premium has an economic instead of behavioural underlying principle. As it was mentioned previously in the paragraph, the HML factor drives in the economic expectations (Liew & Vassalou, 2000). Another study was done where the risk of the value and the growth stocks were evaluated. The results showed that value stocks are run by economic causes (Petkova & Zhang, 2005). The authors of this thesis can claim that the above studies present the importance of the HML factor in representing the investors' expectations of economic welfare in the future.

2.9 Previous research

There have been multiple studies in the area of mutual funds performance and their ability to outsmart the market since their first appearance in the 1960's (Chen, Cheng, Rahman & Chan, 1992). Two studies have dominated this research area, one of which was conducted by Sharpe in 1966 and the other one by Jensen in 1967. In order to measure portfolio performance across mutual funds of different risks, the authors developed techniques that adjusted for risk. Those techniques laid the basis of today's measures of portfolio performance evaluation (Elton et al., 2011). Sharpe (1966) performed the analysis of 34 mutual funds in the period 1954-1963 in the US market. He found that 23 out of 34 funds underperformed the Dow Jones Industrial Average benchmark and therefore concluded that the market was extremely efficient. The study also showed that funds with smaller expense ratios obtained better results. The other 11 funds in the sample showed over performance compared to the benchmark. Jensen (1967) estimated the performance of 115 equity mutual funds in the period 1945-1964 and found similar results where he concluded that on average, mutual funds did not outsmart the market and had no manager skill, both when including and excluding management costs. For a long period of time these two studies dominated the research, communicating that additional resources spent on active management could not add the extra value above investing in the market index. Active management was therefore regarded as a total waste of money. Resources spent on research to find undervalued stocks were useless and could not be compensated to the investor (Malkiel, 1999). This perspective was consistent with the original efficient market theory, stating that all information available is already reflected into stock prices (Fama, 1970).

On the other hand, Ippolito (1989) examined the performance of 143 mutual funds over the period 1965-1984 and his study showed that mutual funds, excluding expenses, outperformed the market index. On this basis he argued that mutual fund managers are efficient in investing their money. He also concluded that the return sufficiently covered the high expenses of the funds that had higher fees and costs. Furthermore, he argued that when there is a costly information, his results were consistent with market efficiency and that it supported the modified market hypothesis developed by Grossman and Stiglitz in 1980 (Elton et al., 1993). Elton et al. (1993) argued that this view was incorrect on the basis that Ippolito did not take performance of certain type of assets into account properly. They investigated the informational efficiency of mutual fund performance for the period 1965-1984 in US market. Building on Ippolito's study, Elton et al. (1993) concluded that managers do not invest their money in an efficient way to cover the cost. Their study shows that actively managed funds' returns (before expenses) underperformed passive portfolios and higher fees generated the lower performance. In addition, the funds with high fees did worse than the funds with lower fees.

The same year as Ippolito's study, Grinblatt and Titman (1989) conducted a study free of survivorship bias and concluded that the risk-adjusted gross returns of some mutual funds were significantly positive. Grinblatt and Titman (1993) further conducted a study of a large sample of mutual funds for the period 1976-1985 and found that managers holding portfolios of mutual funds earned significantly positive risk-adjusted returns in their sample period. In turn, Brown and Goetzmann (1995) conducted a study free of survivorship bias for the sample of 372 funds in the period 1976-1988 and found little evidence that the equity funds underperformed a passive benchmark portfolio.

Using a sample of 188 funds for the period 1977-1993, Elton, Gruber and Blake (1996a) conclude that the studied mutual funds in US in general had negative excess returns when adjusted for risk in their multi-factor model. They argue that past performance carries information about the future performance, showing that funds that did well historically have a tendency to do well in the future on a risk-adjusted basis. Carhart (1997) conducted a study including 1892 equity mutual funds from 1962 to 1993 by employing multi-factor models. His findings were that the majority of the funds underperformed the market index by the amount of their expenses. He argues for three rules of thumb regarding the choice of fund. Firstly, one should not buy funds that have records of persistently poor performance. Secondly, funds that performed well previous year most likely will do better than average next year, but not in the following years. Thirdly, one should avoid funds with high expenses since it affects performance negatively. Carhart concluded that the findings did not support the existence of skilled or informed mutual fund portfolio managers. On the other hand, Daniel, Grinblatt, Titman and Wermers (1997) examined 2500 equity mutual funds from 1975 to 1994 by using multi-factor models and characteristic based performance measures. They found some evidence of stock selection ability of the equity mutual funds when examining their performance. Wermers (2012) concluded in their study that their evidence supported the value of actively managed mutual funds.

By estimating the alpha of the CAPM and the FF3FM, Pastor and Stambaugh (2002) found that the majority of the equity funds showed underperformance due to their negative alphas. Likewise, Elton, Gruber and Blake (2003) used a sample varying from 40 to 108 funds from 1990-1999 in US market and found underperformance by using multi-index model benchmarks. Fama and French (2009) examined 1374 US equity mutual funds for 1984-2006 and revealed that few funds generate risk-adjusted excess returns sufficient to cover their expenses. They conclude that the actively managed funds in the portfolio is close to the market portfolio, however, the expenses are generating lower returns to investors.

Even though there are numerous empirical studies focusing on US market, there is only little empirical researches on the performance of Swedish mutual funds. One study by Dahlquist, Engström and Söderlind (2000) examined the relationship between fund attributes and mutual fund performance in the Swedish market from 1993 to 1997. They used a sample of 80 equity funds based in Sweden and investing in Swedish market. It was found that equity funds, net of costs, did not over perform their benchmark characteristics. The results showed a negative alpha of -1.30 percent per year. In addition, they found that larger equity funds have a tendency to underperform smaller equity funds. The authors also found a negative relationship between performance and fees, where funds with high fees performed less well than funds with low fees. However, there were some cases in which funds with high fees over performed funds with low fees when fees were included. This result suggests that high fees or expensive management may generate good performance. However, the good performance is not sufficient to cover the expenses.

In his working paper, Engström (2004) provides evidence on the funds' portfolio characteristics and examines the relationship between performance and investment strategy of the management. His sample consisted of 97 Swedish based mutual funds investing in Sweden during the period 1996-2000. The author overall results found an average net excess return of 1.7 per cent per year. In addition, the majority of the funds (77%) delivered performance between -2 percent and 4 percent annually.

Flam and Vestman (2014) found out, by constructing multi-factor models to evaluate 115 mutual funds' performance, that actively managed Swedish equity mutual funds generated an average positive alpha of 0.9 per cent per year before expenses and a negative alpha of -0.5 per cent after expenses in the years 1999 to 2009. The authors found that it is good or bad luck that mostly explain the gross returns and not superior skill. They state that fund managers on average cannot compensate investors for management costs. The authors conclude that there is no empirical evidence that managers of Swedish equity mutual funds have superior stock-picking skills and one should choose a passively managed fund with low or no fee over an actively managed fund.

The numerous studies regarding the topic of mutual fund performance evaluation have found various results depending on the time span, the sample size and techniques used in the analysis. This thesis uses a different, and more recent time span along with the different funds in the sample size. The sample size and the country studied also differs from the other studies. The numerous studies have mostly been conducted in the US market, whereas the European market has been left much unexplored, especially the Swedish market where only three studies have been found.

3 Methodology

This section covers the research methods which are used in the study and the selection of funds which consists of time period, data and impact on survivorship bias. Moreover, the data sources are defined and the composition of returns and risk-free rate are presented in this section. After all, the variables used in the regression analysis are explained in more detail and the empirical method is presented in this chapter.

3.1 Research methods

According to Kothari (2004), research is an academic activity and consists of defining and redefining problems, formulating research questions or proposed solutions; collecting, arranging and evaluating the data and bringing up implications. Finally, testing if the research questions are being answered by the achieved implications. The aim of the research is to determine answers to questions by applying scientific procedures.

In order to conduct the research it is necessary to determine what philosophies, approaches and choices of data to adopt to it that the research would be consistent and sufficient and presented implications would be reliable. According to Saunders, Lewis and Thornhill (2012), there are four types of research philosophies in business management: positivism, realism, interpretivism and pragmatism. The positivistic view believes in the possibility to observe and describe reality from an objective point of view. For instance, the philosophy can determine “general” relationships and “general” laws or test the theories (Saunders et al., 2012). The authors of this thesis believe to reflect the positivism in this study where the data, based on empirical observations, is collected to describe the objective reality of fund’s performance.

To be able to answer the research question, the deductive research approach was chosen. Based by Saunders et al. (2012), the deductive research approach is used to test the theory and moves from theory to data. In addition, the approach is mainly used for collecting quantitative data, applying controls for validity of data, selecting the samples of a sufficient size. This was also the case in this thesis, where the research question has tested the efficient market hypothesis in the Swedish market, based on quantitative fund-data. Moreover, a deductive approach is related to the development of a hypothesis and is based on existing theory and includes the composition of the research strategy to test the hypothesis (Saunders et al., 2012). Although, this thesis has not based the research on hypothesis testing explicitly by using H_0 and H_1 from statistics, the research questions arisen from the theory were considered as the hypothesis which was needed to be answered.

Following the deductive approach, quantitative data was used in this thesis. The decision to use quantitative data instead of qualitative data (interviews) is due to that if the performance evaluation of mutual funds would have been tested by using qualitative data, it could have resulted in a study concentrated only on strategies the managers use or valuation techniques of the stocks they apply. As far as the authors of this thesis know, the majority of this type of information is confidential in the mutual funds industry. Moreover, the best way to test the efficient market hypothesis was considered by the authors of this thesis to be the quantitative approach. Moreover, the use of quantitative data when measuring performance of mutual funds is justified in previous research (Fama & French, 2009; Elton et al., 2011).

3.2 Selection of funds

In order to avoid biases in the sample, only equity based mutual funds which should be defined as the actively managed funds were included. The reason for the sample chosen was that passively managed funds did not line up with the purpose of the thesis since they are tracking specific indexes. Actively managed equity mutual fund managers are seeking to over perform the market by selecting the exact securities which seem to be perspective in their analysis (Elton et al., 2011). As the model in this thesis was applied for the Swedish market, the sample was extended with another boundary, namely the Swedish based equity mutual funds, which invests the major part of their capital in Sweden. The other boundary that was set for the sample was that the funds chosen should be surviving for the estimated time period. This means that that the funds should be active during the time period that was studied.

3.2.1 Time period

A time period of ten years for the period 2003-2013 was chosen. The period was chosen due to the exact availability of the data. In addition, the choice of the time span was based by the fact that the longer the time period, the higher the probability to avoid the biased estimation errors (Bartholdy & Peare, 2005). The importance of this time span was also based by the rapid increase of funds' asset values in recent time. According to the Swedish Investment Fund Association (2014), the Swedish fund market has more than twice as much assets as in year 2003. The authors of this thesis considered that the period of ten years contained sufficient amount of information to present insights and implications and to perform an in-depth analysis in this study.

3.2.2 Data

The data was collected using Morningstar of Sweden and Thomson Reuters Datastream databases, as well as data provided by the Swedish Investment Fund Association, which supplies the data of the operating funds in Sweden. First of all, 108 Swedish based equity mutual funds investing in Sweden were found. The funds were sorted out in line with our timeline (2003-2013) and the funds which were out of the time period were eliminated since only ten years data was needed. The names and the ISIN codes of a total of 42 equity mutual funds investing in Sweden were extracted from Morningstar of Sweden. Afterwards, Datastream was used in order to get the monthly Net Asset Values (NAVs) of the funds with the adjustment for dividends. The data of only 21 out of 42 equity mutual fund was provided using this database. Subsequently, the authors of this thesis turned to the Swedish Investment Fund Association to get the data of the remaining funds. The adjusted daily data of 21 equity mutual fund was presented and the monthly NAVs were obtained from this data by taking the adjusted closing NAV value of every month in order to be in line with the remaining fund data obtained from the Datastream database. Hence, the total number of funds in the sample was 42.

The data collected from Datastream was considered to be secondary data, since this type of data include raw data or was used previously for some other purposes (Saunders et al., 2012). Even though the data is secondary data, the authors of this thesis assume that Thomson Reuters Datastream is a reliable resource since previous academics have used it for their empirical studies (Dalquist, Martinez & Söderlind, 2014) and it is widespread between the practitioners in finance. Moreover, the Swedish Investment Fund Association provides their data to Datastream for onward transmission to the media.



3.2.2.1 Return

Mutual funds are traded using the Net Asset Values (NAV). In other words, it is the term of the underlying securities of the fund per share. The NAV is calculated one time per day at the end of the trading day and reflects the mutual fund's share price for the next trading day (Farlex Financial Dictionary, 2009). The NAV comprises of the market value of the different assets that the fund holds and dividing it by the number of shares in the fund. The NAV includes reinvestments of income and capital gains. The monthly return of the mutual fund was calculated using the following formula:

$$R_{t+1} = \frac{NAV_{t+1} - NAV_t}{NAV_t},$$

where R_{t+1} denotes the return in month $t+1$, NAV_{t+1} is the net asset value of the fund on the last trading day of the month $t+1$, NAV_t is the net asset value for the fund the last trading day at month t (Simons, 1998).

The analysis was performed by focusing on the equally weighted portfolio. This was done by taking the average of the monthly returns of every fund in order to get the equally weighted portfolio. Monthly excess returns were calculated from February year t to December year $t+1$. The returns were calculated from January year t , except for 2003, when returns were calculated from February 2003 due to the starting data point of monthly NAV as January 2003.

3.2.2.2 Risk free rate of return and the market return

As the risk free rate, the monthly 90-days treasury bills of Sweden was obtained from the Swedish Central Bank. The monthly rates were chosen in order to be in line with the same time span as the funds' returns (Fama & French, 2009). The OMX Stockholm 30 Index was used as the market return in this thesis based on previous research.

3.2.2.3 Management fees

The yearly management fees were obtained from the Swedish Morningstar database for most of the funds and other fees were taken from the funds' prospectus. Subsequently, the yearly fees were adjusted for the monthly data by dividing each fund's early fee by twelve and as a result obtaining the monthly number. The yearly management fees of the actively managed equity mutual funds varied between 0.3 % and 2.5 % in our sample. The idea to include fees into the analysis of this thesis was due to the claim that if the efficient market hypothesis holds, equity mutual funds managers should not be able to outperform the market. Additionally, to test if underperformance of the funds was due to the expenses they charge.

3.2.2.4 Sorting into deciles

In order to perform the broader analysis, the data was sorted out into deciles (Flam & Vestman, 2014). First of all, the 42 regressions were run against each of the 42 funds net and gross of management fees and 42 alphas were obtained. The alphas were sorted out from the largest to the smallest by value in line with the funds. The funds were sorted out into deciles by the best performing funds to the least performing funds according to the obtained alphas. Each decile was composed by averaging the alphas of the funds in the decile. The funds were sorted out into ten deciles that all of the deciles would have an integer number of the funds.

3.2.2.5 Alpha transformation

The observed alphas were denoted as monthly alphas since monthly data was used in this thesis. For comparison purposes, the alphas were annualized and reported as both monthly and annualized alphas in the result section of this thesis. The monthly alpha was annualized by employing the following formula (Betker & Sheehan, 2013):

$$\alpha_{annual} = (1 + \alpha_{monthly})^{12} - 1$$

3.2.3 Impact on survivorship bias

Some of the previous studies have presented that survivorship biases might have a substantial impact in estimating funds performance since it can cause an over-estimation of funds returns (Malkiel, 1995; Elton, Gruber & Blake, 1996b). By only using a survivorship bias free screened sample of funds, it was possible to analyze the effect of using only surviving funds in this thesis. For the ten year time period, only funds which survived during this period were included in the sample in order to avoid the survivorship bias effect in this thesis. Even though it was not tested if the mean returns of surviving funds were statistically different from the mean returns when including all funds, and therefore if the alpha was over-estimated in the model, the authors of this thesis relied on the previous studies which stated the importance of survivorship bias and the need to eliminate the dead funds from the sample (Leite et al., 2009).

3.3 Presentation of the model

The model that was used in this thesis was the Fama-French three factor model. As mentioned before, the lack of Swedish papers using this model and the fact that it is a base for all multi-factor models, was the reason for the choice of the model. Furthermore, Hou, Xue and Zhang (2015) argue that including too many factors, in this case using different modifications of the Fama-French model, does not necessarily mean that the factors can explain the performance better. This also justified why the FF3FM was used in the thesis.

Regarding the regression model, two different regressions were performed in this study to be able to answer the research questions and the purpose related to the net- and gross excess returns of management fees. Both regressions were performed by means of ordinary least squares (OLS) regression analysis. The regression equation below was used to run the regression net of the management fees and one more time run the regression gross of the management fees. In the regression equation, country specific factors were used in order to see the power of the test in Sweden.

The model and regression equation can be presented as follows:

$$R_{pt} - R_{ft} = \alpha_i + \beta_{im}(R_{OMX} - R_{ft})_{SWE} + \beta_{ISMB}SMB_{SWE} + \beta_{IHML}HML_{SWE} + \varepsilon_{it},$$

where the detailed explanation of the dependent and explanatory variables are covered in the following subsections.

To ensure the validity of the results, first of all, the variables were tested for stationarity. Moreover, both regressions were checked for residual diagnostics: autocorrelation, heteroscedasticity, normality and miss-specification. The results of the previously mentioned tests had no issues, except for autocorrelation. The regressions were adjusted for autocorrelation problems by applying autoregressive and moving-average processes or the combination of both. The Eviews outputs of residual diagnostics are available upon request.

3.4 Explanatory variables

In this section, the explanatory variables which were used in the regression model are explained. To be more detailed, this section covers MRP, SMB and HML factors. The reader should be aware that only the MRP factor was constructed by the authors of this thesis. However, the construction of all factors will be explained in the following subsections in order to provide the reader with a comprehensive view on their foundations.

3.4.1 MRP

MRP is defined as the historical differential return on the market portfolio over the risk-free rate. It can be defined as the excess market return and calculated as follows:

$$\text{Excess market return} = R_{OMX} - R_f,$$

where R_{OMX} denotes the OMX Stockholm 30 Index returns and R_f denotes 90-day treasury bills of Sweden. Since the MRP is used to predict expected returns, the use of this proxy is based by the idea that security's returns are dependent on a market beta.

3.4.2 SMB and HML

As stated previously, the SMB and HML factors were not constructed by the authors of this thesis but were instead provided by the Italian professors Stefano Marmi and Flavia Poma (2012) from their website. This was the only source providing Fama-French factors for the Swedish market. The reliability of the factors were checked by comparing the distribution of the European factors and the US factors taken from Marmi and Poma's website with the distribution of the same factors taken from Fama and French's original website. The results were plotted and the authors of this thesis did not observe a significant difference between the factors. Hence, the factors provided by the Italian academics were considered as reliable, since they are based on the Fama-French methodology. The authors of the thesis believed that it was necessary to explain the factors more explicitly. Hence, the computation of the factors are presented below.

The factors are constructed by using the 6 value-weight portfolios formed on size and book-to-market (Fama & French, 1993). According to Fama and French (1993), the portfolios for July of year t to June of year $t+1$ comprise all stocks market equity data for the last fiscal year end before March and June of year t and book equity data for the last fiscal year's end before March of year t .

According to the Italian professors, the portfolios were constructed at the end of each June following the methodology provided by Fama and French (1993). The methodology indicates that the portfolios are the crossroads of the two portfolios formed on size (market equity, ME) and three portfolios formed on the proportion of book equity to market equity (BE/ME). The size for year t is the medium market equity for the last fiscal year end before March t divided by ME for March of t . The dividing line for BE/ME are the 30th and 70th percentiles.

The stocks are separated by the median into two size groups which is small and big (S and B).

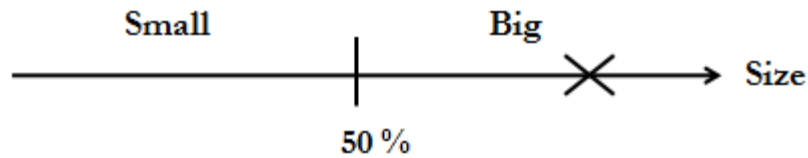


Figure 3-4-2a Sorting by size (X is the stock in the big group)
 Source: Authors' illustration (based on Fama and French, 1993)

The stocks are also separated into three book-to-market groups denoted as low, medium and high (L, M and H). The smallest 30 % is the low group, the middle 40 % is the medium group and the maximum 30 % is the high group (Fama & French, 1993).

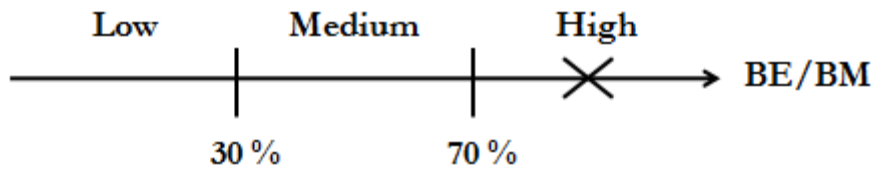


Figure 3-4-2b Sorting by book-to-market ratio (X is a stock in the high group)
 Source: Authors' illustration (based on Fama and French, 1993)

In total, there are three BE/ME groups and two size groups. Every stock is presented in one of the size groups and one of the BE/ME groups.

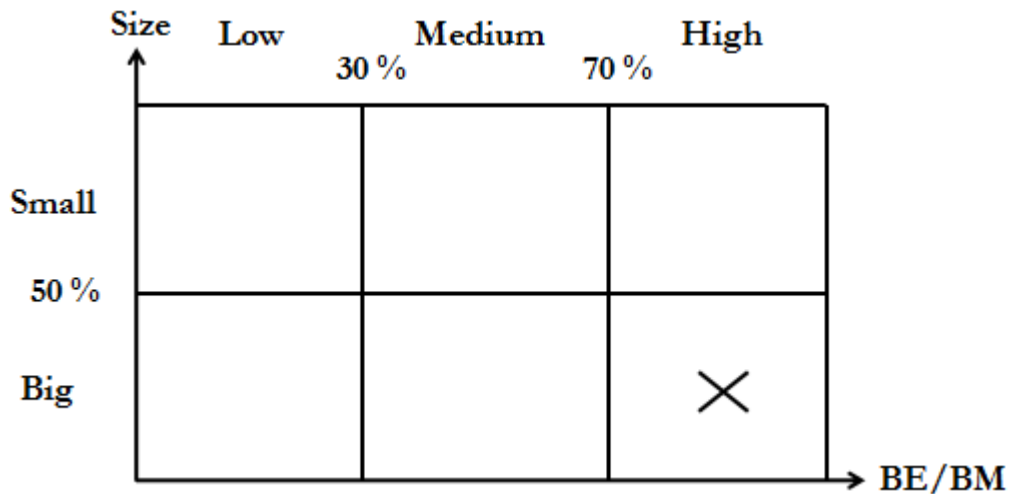


Figure 3-4-2c Sorting by book-to-market ratio and size (X is a stock and presented here in one size and BE/BM portfolio)
 Source: Authors' illustration (based on Fama and French, 1993)

The separate 2x3 types of size and B/M create the 6 value-weight portfolios (SL, SM, SH, BL, BM, BH). In this case, S and B denotes small and big, and L, M and H denotes low, medium and high respectively. The SMB and HML factors are derived from these six portfolios.

The SMB factor, which is used to reflect the risk factor in returns related to size, is the difference for each month between the arithmetic average of returns on the three small stock portfolios (SL, SM, SH) and the arithmetic average of the returns on the three big stock portfolios (BL, BM, BH).

The HML factor, which is used to reflect the risk factor in returns related to book to market equity, is the difference for each month between the arithmetic average of the returns on the two high BE/ME stock portfolios (S/H, B/H) and the average of the returns on the two low BE/ME stock portfolios (S/L, B/L) (Fama & French, 1993).

3.5 Dependent variable

The excess returns of the equally-weighted portfolio was used as the dependent variable in this study. In the first regression, the equally-weighted portfolio was constructed net of management fees and when running the regression the second time, the returns were taken gross of management fees. In both cases, the risk-free rate remained the same when calculating the excess returns. The formula for the excess portfolio returns can be expressed as follows:

$$\textit{Excess portfolio return} = R_p - R_f,$$

where R_p denotes net or gross return of the equally-weighted portfolio at time t and R_f denotes 90-day treasury bills of Sweden.

4 Empirical results

In the section, the descriptive statistics of the variables are presented together with the plotted distribution of the variables. In addition, the statistics of the main variables and the outputs of the regression model are represented and the results of the study are broadly described.

4.1 Descriptive statistics

Table 4-1 Descriptive statistics

Source: Authors' calculations

	ER_NET	ER_GROSS	MRP	SMB	HML
Mean	0,61	0,70	0,67	-0,30	-0,10
Median	1,07	1,15	0,41	-0,77	-0,08
Maximum	16,51	16,60	16,95	19,10	8,49
Minimum	-16,24	-16,15	-17,16	-13,29	-7,79
Std. Dev.	4,15	4,15	5,07	4,40	2,69
Skewness	-0,56	-0,56	-0,49	0,67	0,22
Kurtosis	5,98	5,98	5,14	7,44	3,42
Sum	72,82	83,01	79,41	-35,94	-12,47
Sum Sq. Dev.	2035,43	2035,43	3032,56	2281,91	850,98
Observations	119,00	119,00	119,00	119,00	119,00

Table 4.1 shows descriptive statistics of the excess returns and factor returns for the 119 observations. The variables are presented in its logged values. The average monthly risk-adjusted return for the equally weighted portfolios net- and gross of the management fees accounted for 0.61 percent and 0.70 percent respectively for the period 2003-2013. The median was higher than that of the mean for the excess returns of the equally weighted portfolios constructed of the 42 actively managed equity mutual funds. This implies that the excess returns are skewed left and the few values of the excess returns were much lower than the others. The monthly means for the multi-factor models are negative for SMB and HML factors and positive for MRP factor. The range among the lowest and the highest mean of the factors varies between -0.30 and 0.67 percent. The median was greater only for the value factor in comparison with the mean value indicating the same skewness as in the risk-adjusted return case. In contrary, the median for the MRP and SMB factors displays the lower value than that of the mean of the MRP and SMB and suggest that the few stocks included into these factors generated the better return than the rest of the stocks. The standard deviation for all of the variables are about the same level varying between 4.15 and 5.07 percent, except for the value factor which amounts to 2.69 percent and implies the variation in this variable is significantly lower in comparison with the others.

The correlation matrix of the explanatory variables is presented in the Appendix 7. From the Appendix 7, there is a low and negative correlation of -0.3381 between MRP and SMB. In contrary, the MRP has positive and extremely low correlation of 0.0559 with HML. In addition, the correlation between SMB and HML is also low and negative and accounts for -0.2047. The low correlation between the explanatory variables implies that there is no indication of multicollinearity.

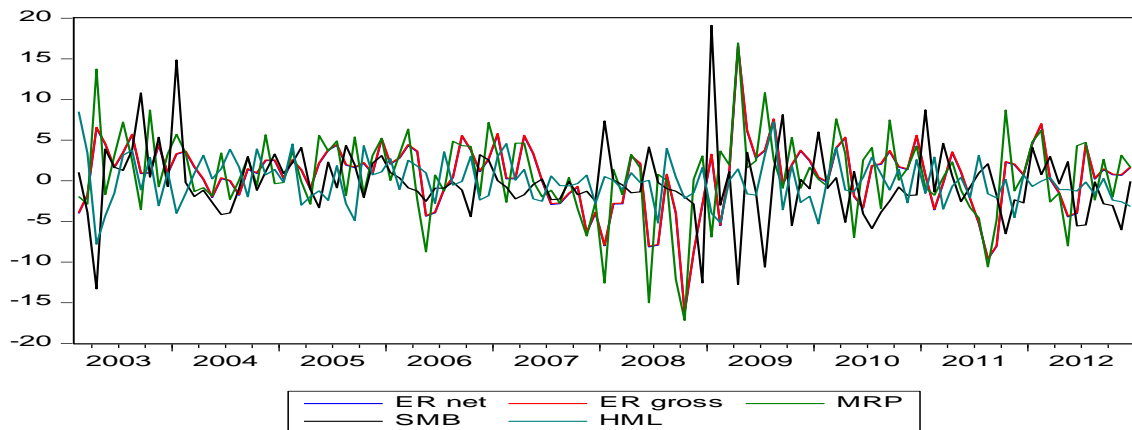


Figure 4-1a Distribution of the variables
Source: Authors' calculations

In Figure 4-1 above, the distribution of the variables is presented. From the chart, the distribution of the variables varied between -10 and 10 percent in the normal market conditions and increased into approximately -20 and 20 percent in the state of the financial crisis between the period 2007-2009. From the beginning of the studied period, there was a substantial variation for the SMB factor as well as for the MRP factor in 2003. Despite this, the risk-adjusted return net- and gross of the fees and the HML factor showed the moderate variation until 2007, when the financial crisis began. Due to the financial uncertainty in the markets, the excess return both net- and gross of the management fees and the market factor experienced the extensive fluctuations in 2007-2009. The wide-ranging volatility for the size factor began in the middle of 2008 and continued until the middle of 2009. Only the value factor was relatively stable in comparison with the other variables during the state of the financial crisis.

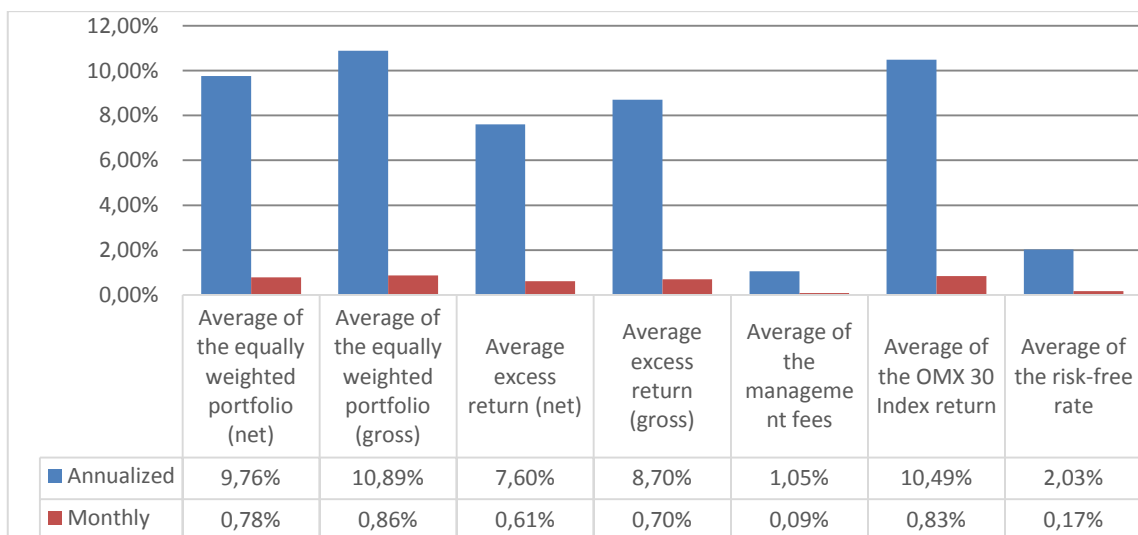


Figure 4-1b Statistics of the variables
Source: Authors' calculations

In Table 4-1b presented above, the monthly and annualized average data of the equally weighted portfolios net- and gross of the management fees, excess returns, management fees, OMX 30 Index and risk-free rate are displayed. The average monthly returns of both equally weighted portfolios (net and gross) were 0.78 and 0.86 percent respectively for our

sample comprising of 42 actively managed funds. The annualized average return for both portfolios made up 9.76 and 10.89 percent during the period 2003-2013. The annualized equally weighted average absolute net return without risk-adjustment was lower than that of the stock market return in Sweden by 289 basis points for the same period. As reported in Table 4-1b, the yearly average of the management fees was 1.05 percent per year which indicates that the gross return of the average equity mutual fund was slightly higher than the stock market return. Due to the low average of the risk-free rate, the average risk-adjusted return both monthly and annualized for two portfolios showed positive performance. However, the data do not provide us the information if the funds' managers have true stock picking skills. In order to test that, we adjusted the funds' returns with the risk free rate for the systematic risk which can be presented as the factors such as market, size and value factors.

4.2 Output of the regression model

Table 4-2a Net and gross excess returns (net and gross alphas) for equity mutual funds
Source: Authors' calculations

	Alpha (annualized)	Alpha (monthly)	β MRP	β SMB	β HML	R ²
Equally weighted portfolio (net)	3,60%*	0,29530*	0,68789***	0,27811***	0,26004***	60,01%
Equally weighted portfolio (gross)	4,67%**	0,38091**	0,68789***	0,27811***	0,26004***	60,01%

*Note: the asterisks are used to represent the statistically significant coefficients at the 1 % (***), 5 % (**) and 10 % (*) significance levels, based on autocorrelation adjusted errors.*

Table 4-2a reports the estimated net- and gross alphas of the Swedish equity mutual funds. The net alphas are statistically significant at 10 % level and the gross alphas are significant at 5 % level. All of the three multi-factors are strongly statistically significant at 1 % level for both of the equally weighted portfolios. The coefficient of determination (R²) for both portfolios indicates that the model explains 60 % of the variability of the response data around its mean. It means that the movements of the portfolios are 60 % explained by the movements in the multi-factors. Table 4-2a reports that both portfolios have the same exposure to the multi-factors. The equally weighted portfolios net- and gross of management fees are more exposed to the MRP factor and less exposed to the SMB- and HML factors. Since the beta coefficients of SMB- and HML factors are positive and accounts for 0.27811 and 0.26004 respectively, there is an indication that the funds in our sample have greater sensitivity to small capitalization and value stocks in comparison with large capitalization and growth stocks.

The monthly and annualized net alphas account for approximately 0.30 and 3.60 percent respectively and imply that the equally weighted portfolio consisting of the 42 funds over performed the market portfolios for the period 2003-2013. Likewise, after the management fees were added back to the funds' returns, regardless of the number of systematic risk factors adjusted for, Table 4-2a reports that the equally weighted both average monthly and annualized gross excess returns of all the funds were positive. By taking into account that

the net alpha was positive and the result that the annualized gross alpha are higher than the net alpha by 107 basis points and constitute to 4.67 percent, it suggests that Swedish fund managers are able to generate the superior performance and the management fees add up to the greater portfolio excess return relative to the risk and style characteristics.

Table 4-2b Net excess returns (net alphas) for equity mutual funds by decile
Source: Authors' calculations

Deciles	Monthly	Annualized
1st decile (5 funds)	0,86%	10,86%
2nd decile (4 funds)	0,69%	8,60%
3rd decile (4 funds)	0,55%	6,83%
4 th decile (4 funds)	0,49%	6,01%
5th decile (4 funds)	0,23%	2,84%
6th decile (4 funds)	0,09%	1,06%
7th decile (4 funds)	0,07%	0,81%
8th decile (4 funds)	-0,01%	-0,08%
9th decile (4 funds)	-0,05%	-0,60%
10th decile (5 funds)	-0,16%	-1,94%

Note: in order to sort out the sample of 42 funds into 10 deciles, each decile comprises of 4 funds except the top and the bottom deciles which contain 5 funds each due to that every decile should be the integer.

In Table 4-2b above, the net excess returns (net alphas) for Swedish equity funds by deciles are presented. From all of the sample, 9 funds had significant alphas at the 5 % level and 4 funds had significant alphas at the 10 % level leaving the rest of the funds' alphas insignificant. The variation between the net alphas across deciles are considerably large. The monthly alpha for the best performing funds (1st decile) is 0.86 percent which is 102 basis points greater than that of the lowest performing funds (10th decile). The annualized alphas constitute to 10.86 percent for the top decile and -1.94 percent for the bottom decile. The results show that funds in seven out of ten deciles generated the positive alphas.

Table 4-2c Equally-weighted net excess returns (net alphas) by year
Source: Authors' calculations

Time	Monthly	Annualized
2003	1,27%***	16,33%***
2004	0,59%	7,37%
2005	1,22%	15,67%
2006	0,59%	7,37%
2007	1,86%***	24,80%***
2008	-1,93%***	-20,84%***
2009	0,16%	1,98%
2010	1,07%	13,66%
2011	-0,66%	-7,63%
2012	0,84%	10,49%

*Note: the asterisks are used to represent the statistically significant coefficients at the 1 % (***), 5 % (**) and 10 % (*) significance levels, based on autocorrelation adjusted errors.*

Table 4-2c reports the average equally-weighted net excess return for every year starting from 2003 to 2013. As we can observe from Table 4-2c, in the eight of the analyzed years the net alphas were positive, and the remaining two years had negative alphas. The distribution across different years and among the highest and the lowest alphas indicates that alphas varied between -20.84 and 24.80 percent and experienced the abnormal variation. The highest and the lowest annualized alphas were 24.80 and -20.84 percent respectively. It can be stated, that the actively managed equity mutual funds generated the highest annualized alpha of 24.80 percent in 2007 due to the peak in the financial markets. Consequently to that, the big plunge in the financial markets has been followed by the negative annualized alpha of -20.84 percent of equity mutual funds in Sweden. As reported in Table 4.2c, the positive alphas were generated by the funds' managers in the subsequent years of our sample except 2011, where the annualized alpha made up to -7.63 percent.

Table 4-2d Gross excess returns (gross alphas) for equity mutual funds by decile
Source: Authors' calculations

Deciles	Monthly	Annualized
1st decile (5 funds)	0,97%	12,32%
2nd decile (4 funds)	0,79%	9,97%
3rd decile (4 funds)	0,67%	8,37%
4 th decile (4 funds)	0,54%	6,70%
5th decile (4 funds)	0,29%	3,49%
6th decile (4 funds)	0,18%	2,19%
7th decile (4 funds)	0,13%	1,60%
8th decile (4 funds)	0,08%	0,97%
9th decile (4 funds)	0,03%	0,31%
10th decile (5 funds)	-0,13%	-1,54%

Note: in order to sort out the sample of 42 funds into 10 deciles, each decile comprises of 4 funds except the top and the bottom deciles which contain 5 funds each due to that every decile should be the integer.

In Table 4-2d, the gross excess returns (gross alphas) for actively managed funds by deciles are presented. From all of the sample, 13 funds had significant alphas at the 5 % level and 3 funds had significant alphas at the 10 % level. The variation across deciles is sufficiently large. The monthly alphas varies between 0.97 and -0.13 percent between 1st decile and 10th decile respectively and the difference among them constitutes to 110 basis points. The annualized difference between the top decile of the gross alphas in comparison with the net alphas stands for 146 basis points and for the 40 basis points for the bottom decile.



5 Analysis

The value to the investor and the purpose of active management lies in the fund's ability to generate a net excess return over the market index (Elton et al., 2011). The manager can make adjustments based on his or her knowledge and experience to produce greater return and add diversification to the portfolio (Northcott, 2009). The empirical results show that Swedish-based equity mutual funds investing in Sweden on average, net of management fees, have over performed the Fama-French three-factor benchmarks. All of the Fama-French factors were highly statistically significant in our model which indicates that the factors had a significant impact on the performance of the equity mutual funds. Since SMB and HML factors are higher than zero, it implies that the funds in our sample have greater sensitivity to small capitalization and value stocks in comparison with large capitalization and growth stocks. In addition, the high value of MRP factor suggests that the funds are more exposed to the market than to the small capitalization and value stocks.

The results show the average monthly alpha of 0.30 percent and the annualized weakly statistically significant alpha of 3.60 percent. The empirical results indicate that managers are able to fulfil the purpose of their active management. This is not in line with the original version of the efficient market hypothesis, where over performing the market is not possible. Furthermore, these results contradict previous US studies where negative net excess return is confirmed by using multi-factor benchmarks (Elton et al., 1993; Elton et al., 1996, 2003; Pastor & Stambaugh, 2002; Fama & French, 2009). Our empirical results show over performance of equity mutual funds when adding back management fees. In this case, the average monthly alpha stands for 0.38 percent and the annualized statistically significant alpha stands for 4.67 percent for the Swedish market. These results support the US studies which in fact found over performance of mutual funds before deducting management fees (Grinblatt & Titman, 1989; Grinblatt & Titman, 1993; Daniel et al., 1997; Wermers, 2012). Basing our empirical results on these previous research studies, they show that there is an indication of evidence of management selection ability and show support of adding value to the investor.

Furthermore, our empirical results indicate that Swedish fund managers are able to generate the superior performance and the management fees add up to the greater portfolio excess return relative to the risk and style characteristics. However, since both alphas are positive, our findings are not in line with several US studies where it was found that under-performance is due to the expenses that the managers charge to the investors (Elton et al., 1993; Elton, Gruber & Blake, 1996a, 2003; Pastor & Stambaugh, 2002; Fama & French, 2009; Grinblatt & Titman, 1989; Grinblatt & Titman, 1993; Daniel, et al., 1997; Wermers, 2012). Our results support the study proposed by Ippolito (1989). Ippolito based his conclusion of a positive average net excess return over the market index on its support of the modified efficient market hypothesis (Grossman & Stiglitz, 1980). Elton et al. (1993) developed the modified efficient market hypothesis and stated that informed investors can perform better compared to the others due to the skills they possess for collecting the information. According to Elton et al., the skilled or informed mutual fund managers can generate the superior performance for mutual funds. Therefore, one can wonder whether the modified efficient market hypothesis speaks in favour with our study, confirming the proposition that mutual fund managers have skills or are informed. Ippolito's (1993) results coincide with the modified efficiency in the market and states that mutual funds are successful in obtaining and implementing new information to cover their expenses. During the following studies when examining mutual funds performance, there was a few who found

the evidence of modified efficiency in the market and stand in line with our empirical findings of positive alphas (Daniel et al., 1997; Wermers, 2012).

Two of the studies conducted in Sweden focused on fund attributes and performance (Dahlquist et al., 2000) and fund's portfolio characteristics such as the relationship between performance and investment strategy (Engström, 2004). These studies show mixed results. Our empirical results of over performance in the Swedish equity mutual funds market do not support the study by Dahlquist et al., where they found underperformance of net excess return of -1.30 percent per year, whereas our results support Engström's study which found over performance of 1.7 percent on the average net excess return of the funds. In addition, Engström found that the majority of the funds delivered alphas between -2 percent and 4 percent annually. Our empirical results delivered net alphas varying between -7.63 and 16.33 percent on annual basis under the normal conditions. Moreover, Swedish equity mutual funds represent extreme values of the net alphas under the meltdown of the world's financial markets in 2008 and under the peak before the financial crisis in 2007 with the values accounting for -20.84 and 24.80 percent on the annual basis respectively. However, since both studies focused on different attributes and characteristics of the funds, it is difficult to compare the studies with our empirical results. The recent study in Sweden, conducted by Flam and Vestman (2014) was examining the funds' excess returns by deciles. The top and bottom performing funds net of expenses in their sample accounted for 5.11 and -6.12 percent respectively for the three factor model. In our thesis case, the top and bottom values for deciles varied between 10.86 and -1.94 percent correspondingly. It can be observed, that the difference between the 1st and the 10th deciles for each of the funds sample constitutes to 1123 and 1280 basis points. This implies that there is a similar variation between the performance of the funds among our research and the Flam's and Vestman's study. In our study, the equity mutual funds experienced on average the annualized positive net excess return in seven out of ten deciles, whereas in the Flam's and Vestman's study there were four deciles with the positive alphas. This suggest that the funds in our sample performed better in comparison with the Swedish study. In addition, there were nine out of ten annualized positive alphas for the gross excess returns for actively managed funds sorted out by deciles. This indicates that management fees influence the performance of the actively managed equity mutual funds in the sample of our study. However, it cannot be stated that there is a relationship between the management fees and the performance of mutual funds. Further research needs to be done in order to verify or deny if higher expenses are associated with poorer performance.

The Swedish study by Flam and Vestman shows that actively managed Swedish equity mutual funds underperformed the benchmarks net of management fees with -0.5 percent per year. In contrast to these results, our empirical results show over performance of the funds with the annualized weakly statistically significant net alpha of 3.60 percent per year. However, when adding back management fees, Flam and Vestman found a positive alpha of 0.9 percent per year. This is in line with our result, which show an annualized statistically significant positive alpha of 4.67 percent. When comparing the overall results, our result of the net alpha contradicts Flam and Vestman's results for the net alpha. However, it supports the gross alpha. One can also notice that our results of a positive annualized gross alpha is much larger, namely by 377 basis points, compared to the same outcome by Flam and Vestman. The difference can be due to the time-span and sample size or the calculation of the multi-factors. While Flam and Vestman state that it is luck to obtain excess returns, we cannot confirm that in this thesis case. More studies needs to be done to examine if this is due to the funds' managers stock picking skills or just luck.

6 Conclusion and discussion

The aim of this thesis was to examine whether actively managed Swedish equity mutual funds outperform the Fama-French benchmarks net- and gross of management fees and if the findings speaks in favor of the efficient market hypothesis. Moreover, the thesis studied whether Swedish actively managed equity mutual funds' performance supports the existence of skilled or informed mutual funds managers or not, and whether funds' underperformance is due to the expenses they charge. The empirical findings showed that Swedish actively managed equity mutual funds over performed the Fama-French three factor model by an average annualized net excess return of 3.60 percent per year. Furthermore, the findings showed an average annualized gross excess return of 4.67 percent per year. The findings indicate that the efficient market theory is not supported when examining the funds of our sample and the conclusion is made such that there is an indication that Swedish actively managed equity mutual funds' managers are able to add value above passive investing. However, since this thesis has focused only on the performance of the Swedish equity mutual funds, but not on persistence of mutual fund performance, no explicit conclusion can be made regarding the existence of skilled or informed mutual funds managers in Sweden. In addition, after sorting out the net and gross alphas by deciles, the results showed that equity mutual funds before management fees generated slightly higher results in comparison to annualized net alphas. This indicates that management fees influence the performance of the equity mutual funds in the sample of our study. However, the findings of a positive annualized net and gross average excess return are not in line with several other US research studies where the studies found that underperformance is due to the expenses that the managers charge to the investors (Elton et al., 1993; Elton, Gruber & Blake, 1996a, 2003; Pastor & Stambaugh, 2002; Fama & French, 2009; Grinblatt & Titman, 1989; Grinblatt & Titman, 1993; Daniel, et al., 1997; Wermers, 2012). The empirical findings of this thesis do not support the Swedish study by Dahlquist et al. (2000) which found underperformance of net excess return, whereas they support Engström's (2004) study which found over performance of the average net excess returns. In addition, our findings support Flam and Vestman's (2014) study of a gross positive alpha but contradicts the net negative alpha in the Swedish market.

Further research needs to be done, focusing on the persistence in the performance of the funds, to determine the existence of skilled or informed mutual funds' managers in Sweden. This would investigate the question whether the superior performance is due to skills or luck. In addition, we cannot conclude that there is a relationship between the management fees and the performance of mutual funds in our study. If mutual funds invest money efficiently, there should be no relationship between performance and the expenses. Further research needs to be done in order to test this and verify or deny if higher expenses are associated with poorer performance. Moreover, the extension of the performance evaluation of mutual funds could be made by measuring mutual fund managers timing abilities. In other words, to examine if the mutual fund managers can predict the future direction of the market or to employ the allocation strategies of the mutual fund asset classes in order to make profit for the fund and simultaneously for the investor.

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Appendix I

Net and gross returns (monthly average)

No	Fund name	Net return (monthly average)	Gross return (monthly average)
1	Alfred Berg Sverige Plus A	0,0049	0,0054
2	AMF Aktiefond Sverige	0,0089	0,0101
3	Carnegie Sverigefond	0,0079	0,0093
4	Catella Reavinstfond	0,0096	0,0107
5	Catella Sverige A	0,0080	0,0092
6	DNB Sverige Koncis A	0,0094	0,0094
7	DNB Sverigefond A	0,0081	0,0084
8	Enter Sverige	0,0084	0,0084
9	Enter Sverige Pro	0,0087	0,0096
10	Folksam LO Sverige	0,0083	0,0094
11	Folksam LO Västfonden	0,0089	0,0100
12	Folksams Aktiefond Sverige	0,0078	0,0090
13	Folksams Tjänstemannafond Sverige	0,0084	0,0096
14	Lannebo Sverige	0,0081	0,0092
15	Swedbank Robur Ethica Sverige	0,0052	0,0056
16	Swedbank Robur Ethica Sverige MEGA	0,0093	0,0098
17	Swedbank Robur Humanfond	0,0069	0,0070
18	Swedbank Robur Sverigefond MEGA	0,0095	0,0105
19	SEB Sverigefond Stora Bolag	0,0067	0,0077
20	Skandia Sverige	0,0077	0,0079
21	Skandia Världsnaturfonden	0,0078	0,0081
22	Didner & Gerge Aktiefond	0,0103	0,0124
23	Handelsbanken AstraZeneca Allemansfond	0,0056	0,0070
24	SPP Aktiefond Sverige	0,0073	0,0086
25	Aktie-Ansvar Sverige	0,0066	0,0078
26	Eldsjäl Sverigefond	0,0066	0,0078
27	Aktiespararna Topp Sverige	0,0067	0,0079
28	Handelsbanken Sverigefond	0,0067	0,0078
29	Enter Select Pro	0,0076	0,0087
30	Handelsbanken Sverige Selectiv	0,0072	0,0083
31	Handelsbanken Bosparfonden Bostadsrätterna	0,0073	0,0084
32	Öhman Sverigefond	0,0065	0,0076
33	SSgA Sweden Equity Fund P	0,0106	0,0116
34	SEB Sverigefond	0,0071	0,0081
35	Länsförsäkringar Sverige Aktiv	0,0073	0,0081
36	Nordea Swedish Stars icke-utd	0,0079	0,0087
37	Swedbank Robur Sverigefond	0,0081	0,0087
38	SKF Allemansfond	0,0133	0,0139
39	SEB Sverigefond Chans/Risk	0,0071	0,0076
40	Danske Invest Sverige	0,0085	0,0088
41	Nordea Olympia	0,0054	0,0057
42	Nordea Alfa	0,0054	0,0054

Appendix 2

Risk-free rate (adjusted monthly), OMX 30 Index adjusted closing prices and market return

Date	Risk free rate (adjusted monthly)	OMX 30 adjusted closing price	Market return
2003-01-02	0,0030	477,80	
2003-02-02	0,0030	469,97	-0,0164
2003-03-02	0,0028	457,78	-0,0259
2003-04-02	0,0028	521,92	0,1401
2003-05-02	0,0027	514,46	-0,0143
2003-06-02	0,0023	531,46	0,0330
2003-07-02	0,0022	571,01	0,0744
2003-08-02	0,0022	586,43	0,0270
2003-09-02	0,0022	567,02	-0,0331
2003-10-02	0,0022	617,57	0,0892
2003-11-02	0,0022	614,52	-0,0049
2003-12-02	0,0022	636,29	0,0354
2004-01-02	0,0021	673,91	0,0591
2004-02-02	0,0020	698,18	0,0360
2004-03-02	0,0019	690,28	-0,0113
2004-04-02	0,0017	685,59	-0,0068
2004-05-02	0,0017	673,95	-0,0170
2004-06-02	0,0016	698,13	0,0359
2004-07-02	0,0016	683,30	-0,0212
2004-08-02	0,0017	685,03	0,0025
2004-09-02	0,0017	705,76	0,0303
2004-10-02	0,0016	702,55	-0,0045
2004-11-02	0,0016	743,34	0,0581
2004-12-02	0,0016	741,88	-0,0020
2005-01-02	0,0016	741,50	-0,0005
2005-02-02	0,0016	769,97	0,0384
2005-03-02	0,0016	770,39	0,0005
2005-04-02	0,0016	749,54	-0,0271
2005-05-02	0,0016	792,39	0,0572
2005-06-02	0,0014	822,49	0,0380
2005-07-02	0,0012	863,84	0,0503
2005-08-02	0,0012	849,51	-0,0166
2005-09-02	0,0012	896,29	0,0551
2005-10-02	0,0012	882,63	-0,0152
2005-11-02	0,0013	911,16	0,0323
2005-12-02	0,0014	960,01	0,0536
2006-01-02	0,0015	961,98	0,0021
2006-02-02	0,0016	995,01	0,0343
2006-03-02	0,0016	1059,94	0,0653
2006-04-02	0,0017	1036,87	-0,0218
2006-05-02	0,0017	948,05	-0,0857
2006-06-02	0,0018	956,49	0,0089
2006-07-02	0,0019	946,26	-0,0107
2006-08-02	0,0020	994,16	0,0506

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2006-09-02	0,0021	1039,34	0,0454
2006-10-02	0,0023	1085,56	0,0445
2006-11-02	0,0024	1068,07	-0,0161
2006-12-02	0,0025	1147,27	0,0742
2007-01-02	0,0026	1185,98	0,0337
2007-02-02	0,0027	1157,84	-0,0237
2007-03-02	0,0027	1214,41	0,0489
2007-04-02	0,0027	1273,83	0,0489
2007-05-02	0,0028	1276,32	0,0020
2007-06-02	0,0028	1254,86	-0,0168
2007-07-02	0,0029	1243,87	-0,0088
2007-08-02	0,0029	1213,24	-0,0246
2007-09-02	0,0030	1221,54	0,0068
2007-10-02	0,0031	1183,20	-0,0314
2007-11-02	0,0033	1106,71	-0,0646
2007-12-02	0,0034	1081,44	-0,0228
2008-01-02	0,0034	949,04	-0,1224
2008-02-02	0,0034	965,29	0,0171
2008-03-02	0,0035	952,13	-0,0136
2008-04-02	0,0034	986,06	0,0356
2008-05-02	0,0034	1004,90	0,0191
2008-06-02	0,0034	857,65	-0,1465
2008-07-02	0,0035	867,44	0,0114
2008-08-02	0,0036	870,86	0,0039
2008-09-02	0,0037	768,49	-0,1176
2008-10-02	0,0030	638,91	-0,1686
2008-11-02	0,0026	641,74	0,0044
2008-12-02	0,0015	662,33	0,0321
2009-01-02	0,0011	617,38	-0,0679
2009-02-02	0,0007	640,39	0,0373
2009-03-02	0,0003	653,04	0,0198
2009-04-02	0,0003	763,89	0,1697
2009-05-02	0,0004	776,50	0,0165
2009-06-02	0,0003	795,80	0,0249
2009-07-02	0,0002	882,05	0,1084
2009-08-02	0,0001	904,84	0,0258
2009-09-02	0,0001	896,76	-0,0089
2009-10-02	0,0001	944,67	0,0534
2009-11-02	0,0001	936,19	-0,0090
2009-12-02	0,0001	951,72	0,0166
2010-01-02	0,0002	953,71	0,0021
2010-02-02	0,0002	947,39	-0,0066
2010-03-02	0,0002	1019,68	0,0763
2010-04-02	0,0002	1053,88	0,0335
2010-05-02	0,0002	980,62	-0,0695
2010-06-02	0,0002	1005,93	0,0258
2010-07-02	0,0003	1047,26	0,0411
2010-08-02	0,0004	1011,70	-0,0340
2010-09-02	0,0004	1087,71	0,0751
2010-10-02	0,0007	1089,32	0,0015
2010-11-02	0,0009	1107,05	0,0163
2010-12-02	0,0011	1155,57	0,0438
2011-01-02	0,0012	1147,22	-0,0072

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2011-02-02	0,0014	1128,66	-0,0162
2011-03-02	0,0014	1134,87	0,0055
2011-04-02	0,0015	1162,84	0,0246
2011-05-02	0,0016	1151,36	-0,0099
2011-06-02	0,0015	1115,23	-0,0314
2011-07-02	0,0015	1065,97	-0,0442
2011-08-02	0,0014	954,63	-0,1044
2011-09-02	0,0013	910,17	-0,0466
2011-10-02	0,0012	990,44	0,0882
2011-11-02	0,0011	979,36	-0,0112
2011-12-02	0,0011	987,85	0,0087
2012-01-02	0,0013	1036,34	0,0491
2012-02-02	0,0013	1101,76	0,0631
2012-03-02	0,0012	1074,48	-0,0248
2012-04-02	0,0012	1059,62	-0,0138
2012-05-02	0,0011	975,98	-0,0789
2012-06-02	0,0010	1019,06	0,0441
2012-07-02	0,0009	1068,16	0,0482
2012-08-02	0,0010	1043,93	-0,0227
2012-09-02	0,0009	1072,45	0,0273
2012-10-02	0,0008	1052,11	-0,0190
2012-11-02	0,0009	1085,85	0,0321
2012-12-02	0,0008	1104,73	0,0174

Appendix 3

Dependent and independent variables (percentage)

Date	MRP (percentage)	SMB (percentage)	HML (percentage)	Excess return (net)	Excess return (gross)
2003-02-02	-1,93	1,04	8,49	-4,02	-3,93
2003-03-02	-2,87	-3,87	3,43	-1,79	-1,71
2003-04-02	13,73	-13,29	-7,79	6,49	6,57
2003-05-02	-1,70	3,92	-4,33	4,50	4,58
2003-06-02	3,07	1,67	-1,54	1,61	1,69
2003-07-02	7,22	1,28	3,15	3,42	3,50
2003-08-02	2,48	3,80	3,75	5,64	5,72
2003-09-02	-3,53	10,81	-1,13	0,88	0,96
2003-10-02	8,69	0,45	2,89	0,96	1,05
2003-11-02	-0,72	5,36	-3,07	4,40	4,48
2003-12-02	3,32	-0,70	1,09	0,87	0,96
2004-01-02	5,70	14,85	-4,00	3,26	3,35
2004-02-02	3,40	-0,20	-1,57	3,58	3,66
2004-03-02	-1,32	-1,92	0,90	1,68	1,76
2004-04-02	-0,85	-1,16	3,12	0,15	0,23
2004-05-02	-1,86	-2,65	0,24	-2,05	-1,97
2004-06-02	3,42	-4,16	1,48	0,28	0,36
2004-07-02	-2,29	-3,96	3,88	-0,04	0,04
2004-08-02	0,09	-0,97	1,69	-1,77	-1,69
2004-09-02	2,86	2,98	-1,97	1,42	1,50
2004-10-02	-0,62	-1,17	3,92	0,90	0,98
2004-11-02	5,64	1,10	0,72	2,48	2,56
2004-12-02	-0,36	3,29	1,40	2,50	2,58
2005-01-02	-0,22	0,91	-0,17	0,28	0,36
2005-02-02	3,68	2,23	4,53	2,50	2,58
2005-03-02	-0,11	4,10	-3,00	1,31	1,39
2005-04-02	-2,87	-1,06	-1,95	-1,03	-0,94
2005-05-02	5,56	-3,30	-1,23	2,12	2,20
2005-06-02	3,66	2,30	-2,40	3,73	3,81
2005-07-02	4,90	-0,87	1,84	4,40	4,48
2005-08-02	-1,78	4,34	-2,82	1,93	2,01
2005-09-02	5,38	1,95	-4,88	1,60	1,69
2005-10-02	-1,65	-2,05	4,31	2,15	2,24
2005-11-02	3,11	2,16	0,73	0,86	0,94
2005-12-02	5,22	3,08	1,11	5,14	5,22
2006-01-02	0,05	1,00	2,72	2,05	2,13
2006-02-02	3,27	0,35	-1,07	2,77	2,85
2006-03-02	6,36	-0,87	2,51	4,35	4,43
2006-04-02	-2,35	-1,26	1,81	3,56	3,65
2006-05-02	-8,74	-2,52	0,96	-4,35	-4,27
2006-06-02	0,71	-0,90	-2,80	-3,93	-3,85
2006-07-02	-1,26	-0,91	3,57	-1,05	-0,97
2006-08-02	4,86	-0,16	-0,54	0,39	0,47
2006-09-02	4,34	-1,14	-0,08	5,48	5,57
2006-10-02	4,22	-4,40	3,02	3,75	3,84

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2006-11-02	-1,85	3,21	-2,36	1,13	1,21
2006-12-02	7,17	2,56	-1,82	2,62	2,70
2007-01-02	3,11	0,01	2,99	5,71	5,79
2007-02-02	-2,64	-0,76	4,56	0,24	0,32
2007-03-02	4,62	-2,22	0,08	0,26	0,34
2007-04-02	4,62	-1,72	1,40	5,50	5,58
2007-05-02	-0,08	-0,45	-2,23	3,31	3,39
2007-06-02	-1,96	0,20	-2,51	-0,01	0,07
2007-07-02	-1,17	-2,32	0,60	-2,91	-2,82
2007-08-02	-2,76	-2,25	-0,59	-2,81	-2,72
2007-09-02	0,39	-0,10	-0,63	-1,60	-1,51
2007-10-02	-3,45	-1,72	-0,33	-0,78	-0,70
2007-11-02	-6,79	-1,27	0,68	-6,41	-6,33
2007-12-02	-2,62	-2,52	-2,79	-3,95	-3,87
2008-01-02	-12,58	7,35	0,52	-7,99	-7,91
2008-02-02	1,37	0,11	0,08	-2,86	-2,77
2008-03-02	-1,71	-0,51	-1,07	-2,84	-2,76
2008-04-02	3,23	-1,47	0,98	3,00	3,08
2008-05-02	1,57	-1,36	-0,22	2,08	2,16
2008-06-02	-14,99	4,16	0,05	-8,12	-8,04
2008-07-02	0,79	-0,21	-5,20	-7,91	-7,83
2008-08-02	0,03	-0,97	4,00	0,71	0,80
2008-09-02	-12,12	-1,27	0,45	-4,02	-3,94
2008-10-02	-17,16	-1,97	-2,16	-16,24	-16,16
2008-11-02	0,18	-2,86	-1,48	-8,82	-8,73
2008-12-02	3,06	-12,55	1,61	-2,94	-2,86
2009-01-02	-6,90	19,10	-4,00	3,18	3,26
2009-02-02	3,66	-3,00	-5,13	-5,52	-5,44
2009-03-02	1,94	1,12	0,03	1,07	1,15
2009-04-02	16,95	-12,73	1,45	16,51	16,59
2009-05-02	1,61	3,51	-1,62	6,13	6,21
2009-06-02	2,45	-1,37	-1,78	2,79	2,87
2009-07-02	10,82	-10,60	3,21	3,70	3,79
2009-08-02	2,57	1,15	7,25	7,53	7,62
2009-09-02	-0,91	8,13	-3,56	-0,47	-0,39
2009-10-02	5,33	-5,50	1,84	1,94	2,02
2009-11-02	-0,91	0,16	-2,65	3,67	3,75
2009-12-02	1,64	-0,99	-1,91	2,45	2,53
2010-01-02	0,19	6,00	-5,30	0,38	0,47
2010-02-02	-0,68	-0,93	0,28	-0,20	-0,11
2010-03-02	7,61	0,38	4,12	3,99	4,07
2010-04-02	3,33	-5,10	-1,14	5,29	5,37
2010-05-02	-6,97	1,15	-1,32	-1,92	-1,84
2010-06-02	2,56	-4,06	0,41	-3,37	-3,29
2010-07-02	4,08	-5,89	2,89	1,81	1,90
2010-08-02	-3,43	-3,87	0,85	2,04	2,12
2010-09-02	7,47	-2,47	-1,14	3,63	3,71
2010-10-02	0,08	-0,77	1,41	1,67	1,76
2010-11-02	1,54	-1,82	-2,70	1,39	1,47
2010-12-02	4,28	-1,75	2,60	5,51	5,59
2011-01-02	-0,85	8,71	-1,54	0,68	0,77
2011-02-02	-1,76	-1,38	2,91	-3,56	-3,48
2011-03-02	0,41	4,61	-3,48	-0,32	-0,24

Appendix

2011-04-02	2,32	0,59	-0,67	3,48	3,56
2011-05-02	-1,14	-2,55	0,42	1,05	1,13
2011-06-02	-3,29	-0,77	-2,07	-2,20	-2,12
2011-07-02	-4,57	0,94	3,12	-5,25	-5,17
2011-08-02	-10,59	2,09	-1,60	-9,64	-9,56
2011-09-02	-4,79	-1,79	-2,10	-8,05	-7,96
2011-10-02	8,70	-6,52	0,15	2,28	2,36
2011-11-02	-1,23	-2,34	-4,53	1,97	2,05
2011-12-02	0,75	-2,71	0,71	0,69	0,77
2012-01-02	4,78	4,11	-0,68	4,53	4,61
2012-02-02	6,18	0,76	-0,03	6,94	7,02
2012-03-02	-2,60	3,00	0,40	0,19	0,28
2012-04-02	-1,50	-0,38	-1,09	-1,53	-1,45
2012-05-02	-8,01	2,34	-1,08	-4,42	-4,34
2012-06-02	4,31	-5,55	-1,25	-4,01	-3,93
2012-07-02	4,73	-5,44	-0,16	4,45	4,53
2012-08-02	-2,36	-0,13	-1,70	0,22	0,30
2012-09-02	2,65	-2,83	0,28	1,38	1,46
2012-10-02	-1,98	-3,05	-2,38	0,74	0,82
2012-11-02	3,12	-6,02	-2,57	0,67	0,75
2012-12-02	1,65	-0,06	-3,15	1,63	1,71

Appendix 4

Yearly and adjusted monthly management fees (percentage)

No	Fund name	Yearly Fee (percentage)	Monthly fee (adjusted in percentage)
1	Alfred Berg Sverige Plus A	1,75%	0,15%
2	AMF Aktiefond Sverige	0,40%	0,03%
3	Carnegie Sverigefond	1,40%	0,12%
4	Catella Reavinstfond	1,50%	0,13%
5	Catella Sverige A	0,60%	0,05%
6	DNB Sverige Koncis A	1,50%	0,13%
7	DNB Sverigefond A	1,25%	0,10%
8	Enter Sverige	1,70%	0,14%
9	Enter Sverige Pro	0,50%	0,04%
10	Folksam LO Sverige	0,40%	0,03%
11	Folksam LO Västfonden	0,40%	0,03%
12	Folksams Aktiefond Sverige	0,70%	0,06%
13	Folksams Tjänstemannafond Sverige	0,40%	0,03%
14	Lannebo Sverige	1,60%	0,13%
15	Swedbank Robur Ethica Sverige	1,25%	0,10%
16	Swedbank Robur Ethica Sverige MEGA	0,72%	0,06%
17	Swedbank Robur Humanfond	1,25%	0,10%
18	Swedbank Robur Sverigefond MEGA	0,52%	0,04%
19	SEB Sverigefond Stora Bolag	1,30%	0,11%
20	Skandia Sverige	1,40%	0,12%
21	Skandia Världsnaturfonden	1,40%	0,12%
22	Didner & Gerge Aktiefond	1,22%	0,10%
23	Handelsbanken AstraZeneca Allemansfond	0,90%	0,08%
24	SPP Aktiefond Sverige	0,20%	0,02%
25	Aktie-Ansvar Sverige	1,40%	0,12%
26	Eldsjäl Sverigefond	0,30%	0,03%
27	Aktiespararna Topp Sverige	0,30%	0,03%
28	Handelsbanken Sverigefond	0,65%	0,05%
29	Enter Select Pro	0,30%	0,03%
30	Handelsbanken Sverige Selectiv	1,40%	0,12%
31	Handelsbanken Bosparfonden Bostadsrätterna	2,50%	0,21%
32	Öhman Sverigefond	1,20%	0,10%
33	SSgA Sweden Equity Fund P	0,70%	0,06%
34	SEB Sverigefond	1,30%	0,11%
35	Länsförsäkringar Sverige Aktiv	1,30%	0,11%
36	Nordea Swedish Stars icke-utd	1,50%	0,13%
37	Swedbank Robur Sverigefond	1,25%	0,10%
38	SKF Allemansfond	1,00%	0,08%
39	SEB Sverigefond Chans/Risk	1,30%	0,11%
40	Danske Invest Sverige	1,30%	0,11%
41	Nordea Olympia	1,00%	0,08%
42	Nordea Alfa	1,41%	0,12%

Appendix 5

Funds sorted out by deciles (net excess return)

Decile	No	Fund name	Annualized alpha (percentage)
1st	38	SKF Allemansfond	15,31%
	40	Danske Invest Sverige	10,31%
	22	Didner & Gerge Aktiefond	9,99%
	31	Handelsbanken Bosparfonden Bostadsrätterna	9,65%
	36	Nordea Swedish Stars icke-utd	9,06%
2nd	24	SPP Aktiefond Sverige	8,95%
	37	Swedbank Robur Sverigefond	8,83%
	35	Länsförsäkringar Sverige Aktiv	8,80%
	32	Öhman Sverigefond	7,81%
3rd	25	Aktie-Ansvar Sverige	7,12%
	30	Handelsbanken Sverige Selectiv	7,12%
	28	Handelsbanken Sverigefond	6,64%
	34	SEB Sverigefond	6,45%
4th	39	SEB Sverigefond Chans/Risk	6,45%
	26	Eldsjal Sverigefond	6,38%
	41	Nordea Olympia	6,16%
	33	SSgA Sweden Equity Fund P	5,02%
5th	23	Handelsbanken AstraZeneca Allemansfond	4,41%
	42	Nordea Alfa	4,22%
	27	Aktiespararna Topp Sverige	1,36%
	18	Swedbank Robur Sverigefond MEGA	1,34%
6th	16	Swedbank Robur Ethica Sverige MEGA	1,09%
	29	Enter Select Pro	1,05%
	6	DNB Sverige Koncis A	1,05%
	4	Catella Reavinstfond	1,05%
7th	9	Enter Sverige Pro	1,03%
	2	AMF Aktiefond Sverige	0,94%
	19	SEB Sverigefond Stora Bolag	0,70%
	11	Folksam LO Västfonden	0,57%
8th	8	Enter Sverige	0,27%
	3	Carnegie Sverigefond	0,11%
	13	Folksams Tjänstemannafond Sverige	-0,32%
	10	Folksam LO Sverige	-0,38%
9th	20	Skandia Sverige	-0,38%
	7	DNB Sverigefond A	-0,58%
	5	Catella Sverige A	-0,70%
	14	Lannebo Sverige	-0,76%
10th	12	Folksams Aktiefond Sverige	-0,87%
	21	Skandia Världsnaturfonden	-0,89%
	15	Swedbank Robur Ethica Sverige	-1,64%
	17	Swedbank Robur Humanfond	-2,31%
	1	Alfred Berg Sverige Plus A	-3,97%

Appendix 6

Funds sorted out by deciles (gross excess returns)

Decile	No	Fund name	Annualized alpha (percentage)
1st	38	SKF Allemansfond	16,11%
	22	Didner & Gerge Aktiefond	12,75%
	31	Handelsbanken Bosparfonden Bostadsrätterna	11,07%
	40	Danske Invest Sverige	10,99%
	24	SPP Aktiefond Sverige	10,69%
2nd	37	Swedbank Robur Sverigefond	10,27%
	36	Nordea Swedish Stars icke-utd	10,04%
	35	Länsförsäkringar Sverige Aktiv	9,88%
	39	SEB Sverigefond Chans/Risk	9,68%
3rd	25	Aktie-Ansvar Sverige	9,05%
	30	Handelsbanken Sverige Selectiv	8,51%
	28	Handelsbanken Sverigefond	8,03%
	26	Eldsjal Sverigefond	7,88%
4th	34	SEB Sverigefond	7,75%
	41	Nordea Olympia	6,48%
	33	SSgA Sweden Equity Fund P	6,34%
	23	Handelsbanken AstraZeneca Allemansfond	6,25%
5th	42	Nordea Alfa	5,66%
	3	Carnegie Sverigefond	3,19%
	18	Swedbank Robur Sverigefond MEGA	2,62%
	32	Öhman Sverigefond	2,49%
6th	29	Enter Select Pro	2,37%
	4	Catella Reavinstfond	2,32%
	9	Enter Sverige Pro	2,06%
	11	Folksam LO Västfonden	1,99%
7th	2	AMF Aktiefond Sverige	1,81%
	16	Swedbank Robur Ethica Sverige MEGA	1,75%
	19	SEB Sverigefond Stora Bolag	1,66%
	13	Folksams Tjänstemannafond Sverige	1,18%
8th	6	DNB Sverige Koncis A	1,05%
	10	Folksam LO Sverige	1,04%
	27	Aktiespararna Topp Sverige	1,03%
	14	Lannebo Sverige	0,77%
9th	5	Catella Sverige A	0,70%
	12	Folksams Aktiefond Sverige	0,52%
	8	Enter Sverige	0,24%
	7	DNB Sverigefond A	-0,23%
10th	21	Skandia Världsnaturfonden	-0,50%
	20	Skandia Sverige	-0,55%
	15	Swedbank Robur Ethica Sverige	-1,27%
	17	Swedbank Robur Humanfond	-2,12%
	1	Alfred Berg Sverige Plus A	-3,29%

Appendix 7

Correlation matrix between dependent and independent variables

	Excess return (net)	Excess return (gross)	MRP	SMB	HML
Excess return (net)	1,00000				
Excess return (gross)	1,00000	1,00000			
MRP	0,70941	0,70941	1,00000		
SMB	-0,04414	-0,04414	-0,33812	1,00000	
HML	0,11835	0,11835	0,05586	-0,20471	1,00000