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Fund Management Fees – Do you get
what you pay for?

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ABSTRACT

In this thesis, we study the relationship of 194 mutual funds' management fees with respect to the funds' risk-adjusted return, the alpha, derived from the four-factor model as defined by Carhart in 1997. This relationship has been investigated in two steps where the initial step consists of estimating the performance of the individual funds by applying the four-factor model. By using time series regressions on each fund against the factors derived from French (2014), we have seen by how much and whether or not the funds has had a positive or negative risk-adjusted excess return over the chosen time period. The second step involved regressing the alphas against the respective management fees in order to see whether or not these fees have been related to the risk-adjusted returns over time. By subdividing this period into smaller sub-periods we have also seen if this relationship differs between different time periods of the chosen business cycle. The chosen time periods are 2004-2013, 2004-2007 and 2008-2011.

The results show that when looking at the full time period, it does not appear to be a relationship between the funds' management fees and risk-adjusted returns at all. However, between 2004 and 2007 the results indicate a positive relationship but, quite the contrary between 2008 and 2011, suggesting that it does exist a relationship during smaller time periods but none during a full business cycle.

KEYWORDS

Mutual funds, management fee, Carhart's four factor model, risk-adjusted return, efficient market hypothesis, active management.

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1. Introduction

This section introduces the reader to the subject and what separates this thesis from the previous work done on this topic. It contains the background of why this topic was chosen, this thesis' contribution to the field, its delimitations and the hypotheses of interest.

1.1 Thesis Outline

The thesis consists of five chapters and the first chapter provides the reader with a short introduction to the subject. It is also in this chapter the contribution and the research questions are presented. In the second chapter previous studies are discussed in the literature review. Furthermore, this chapter introduces the theoretical framework, which puts focus into the efficient market hypothesis and the emergence of the factor models that are employed in the thesis. The aim of presenting these facts is to give the reader further understanding of this thesis. The third chapter consists of the data and methodology of this thesis where the two parts outline the included funds and which type of data and methodology used and approaches that have been utilized. The fourth chapter consists of the results and findings of the thesis, along with the analysis. It is also in this part the answers of the previously stated hypothesis can be found. Chapter five is the last part where the conclusion is formulated and suggestions on further studies are presented.

1.2 Background

Since the first establishment of mutual funds in 1924, they have grown into one of the most common savings type on the financial market (Cornett et al, 2012). About 80 percent of the Swedish people have money invested in mutual funds. Even though the amount of fund

investors have been fluctuating the last couple of years, due to unstable markets; the investing in mutual funds is still the most common (Fondbolagen, 2014). The growth of funds' popularity is not only due to the convenience the investors gain, but also the ease of distributing their investments on the capital market. The investors can enjoy fragments of the stock-market development and at the same time spread their risk, without having to invest huge amounts of money. A fund is a portfolio of securities and is mutually owned by the investors who invested into the fund. The growth of a mutual fund is derived from the dividends and gain when the shares in the fund are sold. The actions in the mutual fund are managed by the fund manager, yet another factor that increases the convenience for the investors (Aktiespararna, 2014).

The fund management is not free of costs and the investors with money in funds pay a management fee each year; the investor pay a certain percentage of the money invested. The funds' costs are often related to the managing of the fund and these must be paid for by the investors. The discussion about funds with high management fees that also does not beat the index is widely known. French (2008) and others discuss that investors spend a lot of money on fees related to actively managed funds, but the funds they pay for rarely beat market indices.

An index fund uses the method of buying parts of each stock that the stock has in a certain market index, this means that the performance of the fund will be slightly higher than the index each year due to reinvested dividends. The fund follows a market index and the investment is thus automatically handled. An index fund generally has a low management fee costs associated to the investment strategy, which technically means that the index funds will succeed better than the average investors on the market. The fund companies do not advertise the index funds as much as the funds with high management fees, due to their profit maximization (Morningstar, 2014).

Today Sweden has a lot of funds that claim to be actively managed and charge a fee accordingly, many discuss whether the funds actually are active or not. Cremers et al (2013) are one of them. The question still remains how the investors should act when it comes to choosing between index funds and equity funds with generally higher management fees.

1.3 Contribution

This thesis will study the relationship between Swedish mutual fund performance and the respective management fees between January 2004 and December 2013. It will answer the question whether or not the funds' respective management fees are justified with respect to its risk-adjusted historical return. The analysis will be based on current fund management fees since the historical data has been difficult to retrieve.

The ultimate goal of this thesis is to serve as a straightforward and easily interpretable piece of advice to the Swedish small-scale investor when investing in Swedish mutual funds. The findings will tell if the more expensive funds earn back their fees or if the risk-adjusted return is indifferently dependent on the respective management fee. This could suggest that mutual funds are priced on other factors than historical risk-adjusted return.

1.4 Delimitations

Since this thesis aims at being used as a piece of advice to the Swedish small-scale investor that has access to the Swedish fund market it will only consider the mutual funds that were available to Swedish investors in Sweden some time during the time span between January

2004 and December 2013¹. The sample includes all funds regardless of current market status to reduce the risk of survivorship bias and thus consists of active as well as inactive, liquidated and acquired funds.

The funds invest on the global market but are traded in Swedish Krona (SEK). Instead of choosing all mutual funds that invest in Sweden this criteria better reflects the fund supply available to the Swedish investor. The main asset class focus of these funds is the equity market. The performance evaluation will be applied to the same time period as stated above with the aim of capturing a full business cycle. Furthermore, this business cycle will be divided into two sub-periods in order to see if this relationship differs during different time periods. Figure 1 suggests that the market experienced relatively high volatility during the years of 2008-2011 and this period will thus be analyzed separately.



Figure 1 MSCI World Free NR USD-Index

Source: Morningstar (2014)

1.5 Research Questions

These hypotheses will answer the question whether or not the management fees are justified with respect to the funds' historical risk-adjusted return. If the efficient market hypothesis (EMH) were true, the risk-adjusted returns of the individual fund should be positively

¹ The definition of available to Swedish investors in Sweden is the same as the fund listing criteria of Bloomberg Database ("country of availability").

correlated to management fee because the higher fee should reflect the manager's information gathering costs. The first hypothesis will investigate this relationship during a full business cycle as defined by the time span between 2004 and 2013 whereas the second and third will look at this relationship during specific business cycle time frames.

First Hypothesis

H_0 : The management fee *does not* help explain fund risk-adjusted return during 2004-2013

H_1 : The management fee *does* help explain fund risk-adjusted return during 2004-2013

Second Hypothesis

H_0 : The management fee *does not* help explain fund risk-adjusted return during 2004-2007

H_1 : The management fee *does* help explain fund risk-adjusted return during 2004-2007

Third Hypothesis

H_0 : The management fee *does not* help explain fund risk-adjusted return during 2008-2011

H_1 : The management fee *does* help explain fund risk-adjusted return during 2008-2011

2. Theory and Literature Review

The theory section puts forth what the general economic theory suggests the results to be and how the model of interest was originally designed. The main idea behind the sections in the theory is to present the emergence of the models used in this thesis. The literature review has been formulated in order to help the reader get familiar with previous findings and how these were derived.

2.1 Theory

2.1.1 The Efficient Market Hypothesis

A theory that has affected many financial models throughout time is the EMH. The hypothesis refers to the rapidity which financial security prices change to unexpected news, as interest rates or other stock related events. These occurrences will affect the stock prices such that the current market price can in the short term move away from its fair price value. When this occurs and the stock price will be over- or undervalued, the stock traders will then determine whether to sell or buy and this will affect the stock price to move again. The theory implies that the market is said to be too efficient for an investor to make profits without exposing herself to some risks.

The EMH is referred to when prices and stock returns always reflects all available information and news on the market, but the EMH-measure vary in the category of information or news that is held by stock prices. These three categories are: weak form, semi-strong and strong form market efficiency. The EMH states the difficulties of earning abnormal returns, and therefore the mutual funds settings is characterized of which kind of

market efficiency it operates within. To understand the hypothesis better the three forms of market efficiency is presented below:

Weak Form Market Efficiency means that historical data on stock performance cannot be used when it comes to predict future performance, i.e. the future will not be affected by evaluating the past. This due to current stock prices in weak form is supposed to reflect all historic prices and volume information about a firm. Which means that an investor cannot expect to yield excess return due to that all participants on the market knows all available information on the market.

Semi-strong Market Efficiency reflects the apprehension about whether prices efficiently change to other information that is obviously publicly available. In this semi-strong form it is possible for an investor to use insider information and gain some excess return. The semi-strong form holds if and only if weak form holds.

Strong Form Market Efficiency means that when prices are formed the investors cannot use the advantage of having monopoly power of some information, that is, inside information. This is because in the strong form of market efficiency, stock prices fully reflect all information about the company, both public and private information. However the discovery of inside information is almost impossible, which implies that this form of market efficiency is difficult to test for. To ensure that insider trading does not occur in firms, the companies need to file monthly reports on what they do within the company when it comes to buying and selling the company's stocks. Making excess returns can thus be possible with a higher risk taking, then the level of risk should result in the same pattern of returns (Cornett et al. 2012).

2.1.2 Active Management

When describing the management of funds, companies often prefer two different types of management; active and passive management. Active management refers to that resources are being used to evaluate and predict the market, and then take actions actively to preferably increase the performance of the fund. Passive funds, or index funds as they also are called, is based on passive management, i.e. not a manager that steers the wheel. These funds are based on that a fund cannot in the long run outperform an efficient market. Instead of having active positions the funds follow the index. A big difference between the two types of funds is the fees; active funds have a lot higher fees than the index-following funds on the market. It is partly connected to the more expensive management structure in the active funds and can often be a problem that the index funds seem to have higher returns compared to the active funds relative to its fees (Malkiel, 2013). Since this problem often is mentioned in media, it has become increasingly popular to actually look into what the funds give the investor by looking at the measure of active share. This tool measures the activity in the fund and is easy to use because a value of 0 means that it follows a passive fund, an index and 100 indicates that the fund does not follow an index. There is also complications of using active share, due to investors lacking all information needed (Morningstar, 2013).

2.1.3 The Emergence of Factor Models

The Capital Asset Pricing Model was developed in 1964 by William F. Sharpe since he thought that the consisting performance measures lacked risk accounting models. Sharpe therefore presented a model that measured the required return on an asset by looking at the relationship between risks against expected return over a specific period. Even though the model is one of the oldest for rate of return calculations, it is still one of the most common. But the CAPM has been criticized to not reflect the reality sufficient enough, since the model

uses assumptions such that all investors can borrow and lend at the same rate and that investors' expectation are the same.

William F. Sharpe also introduced a model that uses a deviation to measure a fund's risk-adjusted returns. The ratio is also called the reward to volatility-ratio and describes the risk and return relationship of a fund. The greater a fund's Sharpe ratio, the better a fund's returns have been compared to the risk of the fund.

The formula of the Sharpe ratio is:

$$\frac{\bar{r}_p - r_f}{\sigma_p}$$

Equation 1 The Sharpe ratio

Where \bar{r}_p is the expected return of the portfolio, r_f is the risk-free rate and σ_p is the portfolio standard deviation.

If the ratio takes a value over one, it tells us that the fund manager has done a decent job of creating risk-adjusted returns. If the ratio would be negative the answer is to invest in another asset with a lower risk. When comparing funds' Sharpe ratios one must be careful, due to the differences between the risk-free rates that the fund managers use, they often have a wide spread. If two funds are compared and they have the same Sharpe ratio, the fund that undertakes the smallest risk is the most prominent (Bodie et al. 2011).

Jack Treynor developed a ratio, similar to the Sharpe ratio that measures a fund's return earned additional to what would be received on a risk-free investment. The performance of the fund is proven to be higher when the Treynor ratio is high. The ratio illustrates how a fund will perform in relation to the volatility it brings to a whole portfolio.

The ratio relies on an investment's sensitivity to market movements, the beta. The formula of the ratio can be described as:

$$\frac{r_p - r_f}{\beta_p}$$

Equation 2 The Treynor ratio

Where r_p is the return of the portfolio, r_f is the risk free return and β_p the portfolio's market risk, beta (Bodie et al. 2011)

In 1968 Michael Jensen developed a model that was connected to the CAPM and exploits the measurement of the market risk, the beta. This model is referred to as Jensen's alpha and it measures the fund's abnormal return compared to the expected return of the fund. The abnormal return refers to the excess return of a portfolio compared to its market portfolio return.

The formula can be written as:

$$\alpha = r_p - [r_f + \beta_p * (r_m - r_f)] + \varepsilon_p$$

Equation 3 Jensen's Alpha

Where, r_p is the return of the portfolio, r_f is the risk free return, r_m is the return of a market index, β_p is the portfolio's market risk and ε_p is the error term. Jensen's alpha shows that a good succeeding performance does not follow from good past performance (Carhart, 1997). When evaluating funds it becomes vital to not only look at the performance itself, but also to evaluate the funds' risk-adjusted performance by using the above measures. These models are developed to assess a fund with respect to its related risk (Behrens et al, 2011).

The alpha referred to in the economic models above, has become a common notion in portfolio theory and it is foremost used to show a fund's actual performance compared to the

expected development under the market risk of the fund. A positive alpha means that the fund outperformed the index with respect to inherent risk, whereas a negative alpha means that the fund underperformed the index (Falkpartners, 2014). The alpha can also be seen on the same graph as the security market line, SML which is derived from the CAPM, i.e. the line that shows the relationship between systematic risk and return.

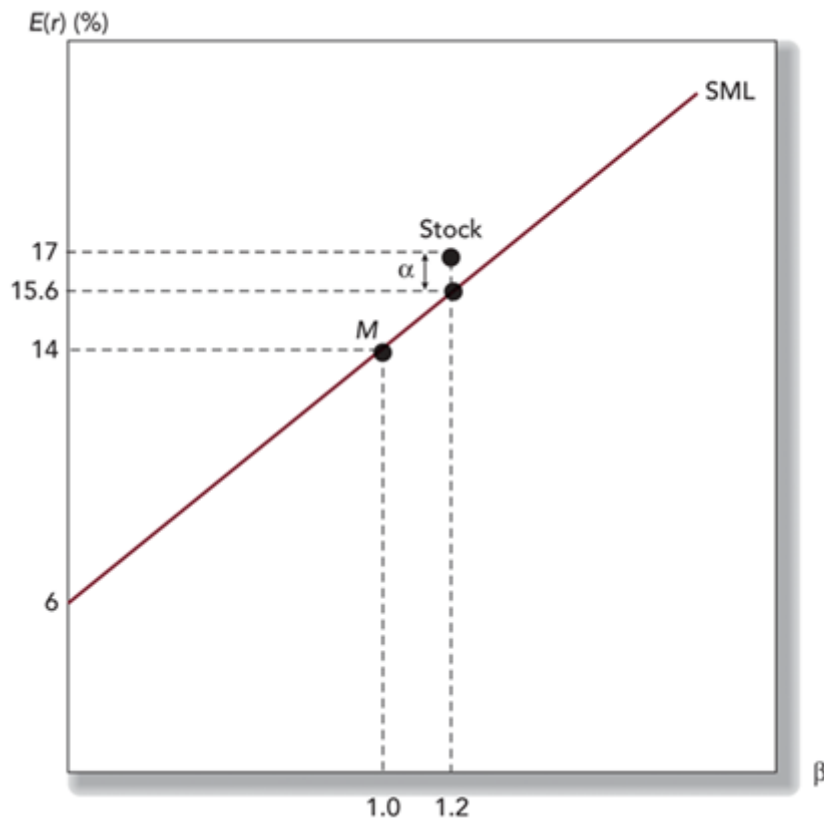


Figure 2 “The SML and a positive alpha stock”

Source: Bodie (2011, p 320)

Since alpha is the difference between expected return in excess of the fair expected return and fair expected return always plot on the SML. The relationship between alpha and SML can be shown in figure 2 above. The security market line can therefore be used when looking at the risk and return relationship of an asset. If the asset is above the line it is undervalued and the other way around when the asset is under the line (Bodie et al, 2011).

2.1.4 The Fama-French Three Factor Model

In 1992 a model, extended from previous studies, was presented by Fama and French. This model is known as the Three-factor model and was developed as an alternative to the earlier approach of using macroeconomic factors as sources of systematic risk. The model assumed that equity returns are connected to the size of a company and positively connected to a company's book to market value of equity, i.e. the new model concentrated on firm characteristics as a proxy for systematic risk exposure. This model has become one of the most commonly used when measuring risk and it can provide a stock's excess returns by using the excess of market returns (Bodie et al, 2011).

This model regresses a portfolio's excess return against excess market return, by including the difference in excess returns between small companies' return and big companies' (SMB) and the similar difference in excess return between companies with high book-to-market value and low book-to-market value (HML) (Koller et al. 2010). When testing for the three-factor models additional factors the following formula should be used:

$$E(R_t) = \alpha_i + \beta_i[RM_t - RF_t] + s_iSMB_t + h_iHML_t + \varepsilon_{it}$$

Equation 4 The Three Factor Model

The coefficients β_i , s_i and h_i are the betas of the stock on for each of the three factors, often called the factor loadings. If these are the related factors, excess returns ought to be fully described by risk premiums due to these factor loadings, i.e. if these factors fully describe asset returns the intercept, α_i should be zero (Bodie et al, 2011).

2.1.5 Carhart's Four-Factor Model

As an extension of the Fama-French Three Factor model in 1997 Carhart developed a model with yet another factor, this model is today known as the Four-Factor model. The fourth factor has been included even though the Fama-French model is acknowledged as one of the most famous economic models. The fourth factor of momentum was said to cover an anomaly that the Fama-French model did not account for. Carhart's strategy is based on how we can estimate parameters, how we can calculate standard errors of the estimated parameters and standard errors of the pricing errors and finally how to test the model (Martín et al. 2006). A reason why this model is preferred as performance measure is that it includes a momentum factor, derived from the monthly return alteration between the chosen funds' returns on the high and low prior return portfolios. Using this momentum in the model means that a fund that has performed well before will keep on doing so, but also the other way around when a fund has performed poorly before it will persist to do poorly. The momentum factor is added by Carhart foremost with the goal of evaluating mutual fund performance.

In this model, beta, size and momentum will be used by the following estimated formula:

$$E(R_t) = \alpha_i + \beta_i[RM_t - RF_t] + s_iSMB_t + h_iHML_t + p_iMOM_t + \varepsilon_{it}$$

Equation 5 The Four Factor Model

Where $E(R_t)$ is the difference between the return of the individual fund and the risk-free rate, the $[RM_t - RF_t]$ is the surplus return on a value-weighted aggregate market proxy; s_iSMB_t , h_iHML_t and p_iMOM_t are returns on value-weighted, zero-investment, factor-mimicking portfolios for size, book-to-market equity, and one year momentum in stock returns (Carhart, 1997).

What Carhart introduced was the fourth factor; momentum, which has come to be added to the standard controls for stock return. Carhart established that much of what seemed to be the

alpha of many mutual funds could in fact be described as their loadings or sensitivities to market momentum. The Fama-French model improved with a momentum factor has advanced to a common four-factor model used to evaluate abnormal performance of a stock portfolio (Bodie et al, 2011).

2.2 Literature Review

William F. Sharpe (1966) was one of the first that performed an empirical comparison between mutual funds and an index and proposed that an active portfolio might not always yield a return that, net of costs, is higher than a passive portfolio. He extended and concretized the work of Treynor (1965) and compared the results to the Dow Jones Industrial Average and discovered that the active portfolio fell short of the index. He proposed that a lower expense ratio would, all other things being equal, provide better results. Jensen (1968) extended these Capital Asset Pricing Models (CAPM) derived independently from Sharpe, Lintner and Treynor and introduced the alpha as a measure of abnormal return. His estimation showed indications of a negative relationship between the two, suggesting that active portfolio management could lead to worse results than a random selection of securities. His study concluded that this was the case, both when performance was measured net and gross of expenses.

Ippolito (1989) criticized the previous studies on management fees and asserted that they had been investigating too small samples leading to an incorrect result. He extended the earlier CAPM model by using a more extensive sample that better represented the mutual fund industry. His results found that mutual funds, net of fees and expenses, outperformed index funds on a risk-adjusted basis. This is in accordance with the findings of Grossman & Stiglitz (1980) and Grossman (1976) that concluded that the additional expenses investors pay for

active management does not make them worse off compared to choosing passive management.

Later on, Elton, Gruber, Das and Hlavka (1993) showed that Ippolito's deviant results are because of performance differences in the time spans used in Jensen's study and Ippolito's study. Whereas Ippolito claimed that performance was unrelated to expenses, Elton et al. defends previous research and affirm that mutual fund managers underperform passive portfolios. Further support of the traditional results was provided by Carhart (1997) who used Sharpe's original CAPM and his own 4-factor model as an extension of the three-factor model by Fama & French (1993) to investigate this relationship. Their results display a negative relationship as well.

Investigating the relationship between fee and performance in the mutual fund industry is still popular and many contemporary studies have been done on this topic. Many of them give support of the classical notion that there is a negative relationship between the two. Two studies were performed by Gil-Bazo & Ruiz-Verdú (2008) and Gil-Bazo & Ruiz-Verdú (2009) where the former exerted a theoretical algebraic approach to prove the negative relationship between equity mutual fund performance and fee. The latter used the 3-factor model and 4-factor model and proved that this was the case, empirically. French (2008) computed the cost, in aggregate, of investing in active and passive portfolios and concluded that an investor choosing an active market portfolio, on average, earns 67 basis points less net of fees. Fama & French (2010) used their 3-factor model and Carhart's 4-factor model to evaluate active equity mutual funds and came to the conclusion that these funds had an alpha close to zero, gross of expenses. The estimated alpha on net returns was negative by about the same amount of expenses, suggesting that an active fund does not justify its expenses. Malkiel (2013) and Malkiel (1995) present further proof that this might be the case.

Rönngren et.al (2013) presented a study on mutual fund activity and performance in the Swedish premium pension system. They used similar approaches as mentioned above but they also used analysis tools such as active share and tracking error volatility (TEV). They found evidence that funds with high active share, given a medium-to-low TEV significantly outperform funds with low active share.

A majority of the literature has been investigating the U.S. market and similar studies on the Swedish market are somewhat limited to find. Dahlquist, Engström and Söderlind (2000) performed a study on Swedish mutual fund performance. By using Jensen's alpha they concluded that performance is negatively related to fees.

Studies on Swedish mutual funds are, according to our research, limited and we therefore aim at applying the classical performance evaluation models on a Swedish sample and investigate the relationship between fee and performance. We, as some other before us, use Carhart's 4-factor model to investigate this relationship. The results will be compared to the respective management fees in order to answer the question whether or not these fees are justified with respect to risk-adjusted return on Swedish mutual funds.

3. Data & Methodology

The data section describes what kind of raw data that has been used, from where it was derived and why they have been chosen. The methodology section applies the data and explains how it has been adapted to the chosen model of performance estimation and how this model has been incorporated to this thesis.

3.1 Data

The data on the funds' performance and characteristics was retrieved from the online database of Bloomberg and consists of time-series data on total return, gross of dividends, between 2004 and 2013 and the management fees. The risk-free rate and market return needed in the Carhart model was collected from the Swedish central bank (2014) and the Bloomberg database (2014) and correspond to the annualized Swedish 1 month Treasury bill and the SIX Portfolio Index (*SIX PRX*) respectively. The second set of data for the remaining factors of the same model, i.e. the *SMB* and *HML* factors, were downloaded and used from Kenneth R. French's online database in a similar fashion as in Johansson & Määttä (2012) and Lozano B (2006). The calculation of these factors has been performed on monthly average value weighted stock returns, dividends reinvested, on the global market consisting of the returns of 23 countries' stock markets. The global stocks have been rearranged into two market capitalization portfolios and three book-to-market portfolios giving a total of six portfolios from which the *SMB* and *HML* factors have been calculated. A similar portfolio construction was done when calculating momentum with the exception that the portfolios were formed on size and lagged momentum.

Factor	Average Monthly Total Return	Std Dev	Cross-Correlation			
			Mkt-RF	SMB	HML	Momentum
<i>Mkt-RF</i>	1,1845	7,2894	1			
<i>SMB</i>	0,091	1,4822	0,1842	1		
<i>HML</i>	0,1814	1,5828	0,2655	-0,1191	1	
<i>Momentum</i>	0,4546	3,5813	-0,3323	0,0366	-0,3188	1

Figure 3 Summary Statistics for Carhart's four factors

Source: Carhart (1997) & French (2014)

From figure 3 it is clear that especially the excess market return shows a relatively high return compared to the average fund's return and could therefore help explain much of the variation in the funds' returns. The low cross-correlations provide further proof that the factors do not suffer from multicollinearity. Both of these results and drawn conclusions are consistent with the findings of Carhart (1997). The standard deviations of the market return and momentum factor are relatively high, even compared to the individual funds' standard deviation, which could partly be explained by the crisis years of 2008-2011. It is also interesting to see that the *SMB* and *HML* factors display a relatively small return, suggesting that the difference in return of small and large global stocks and high and low book-to-market stocks respectively is quite small over time.

The scanning for funds was first set to include inactive, liquidated and merged funds to reduce the risk of survivorship bias in the data sample. This bias would mean that only the better-performing funds would be included in the sample and the analysis would therefore be upward biased in terms of measuring performance.

The first criteria was Sweden as country of availability and resulted in 17 187 funds. This number was reduced to 3026 when the next restriction was set to only include mutual funds. These funds were later reduced to 198 when the trading currency was set to Swedish Krona (SEK) since we only want to investigate Swedish-based mutual funds. Two of these funds had

missing values on management fees and two funds were foreign-based and one particular observation displayed a monthly total return of 467 % which was considered a data error and subsequently deleted. This left a total of 194 funds with 19 600 observations.

The funds' performance will be measured by total return in order to appropriately estimate investor return as recommended by Vanguard (2001) and Carhart (1997). The performance will thus be defined as monthly total return starting from the last business day of the previous month and ending on the last business day of the month of interest. Price appreciations and depreciations are accounted for and dividends are assumed to be reinvested (Bloomberg LP, 2014). The return has been converted into USD in order to run regressions on the USD-denoted factors already provided by French.

The management fees have, somewhat arbitrarily, been assumed to be constant over time because of lacking historical data.

3.2 Methodology

The econometric framework for this thesis is the ordinary least squares (OLS) procedure where we will execute a two-step procedure to be able to investigate the relationship between the funds' risk-adjusted return and management fee.

The first step involves estimating the performance of the individual funds by applying the four-factor model from Carhart (1997) to estimate the risk-adjusted return of the funds, as denoted by the alphas. By performing time series regressions on each fund against the factors provided by French and calculated by us we will also see whether or not each fund has had a positive or negative risk-adjusted excess return over time.

The second step involves regressing these alphas against the respective management fees in order to see whether or not these fees are related to the risk-adjusted return over time. By subdividing this period into smaller time frames we will also see if this relationship differs between different time periods of the chosen business cycle.

3.2.1 Carhart’s Four-Factor model

As previously stated, this model uses four factors to explain a fund’s historical performance and the derivation of these factors is therefore the first step in order to run these time series data regressions. The *SMB*, *HML* and *Momentum* factors were downloaded and calculated from raw data retrieved from French’s online database. The raw data and portfolios from this website have previously been retrieved by French from the 201403 Bloomberg database.

The *SMB*, *HML* and *Momentum* serve as proxies that mirror a global portfolio of stock returns where company characteristics are historically associated with certain stock returns. These proxies can help explain how our funds have performed on a risk-adjusted basis and we will therefore have to calculate these for the sample period and the two sub-period, separately. In order to do so the returns of the global portfolio has to be divided into two portfolios based on size and three portfolios based on book-to-market value resulting in a total of six portfolios in a similar fashion as on French’s online database (2014).

	Small			Big		
	Low	2	High	Low	2	High
Time (t)						

Figure 4 Portfolios of global stocks needed for the factor calculations

Each portfolio is constructed at the end of June every year and display the corresponding average value weighted monthly return of the underlying stocks. We will replicate the factor construction process in several earlier papers and theses, such as Johansson & Määttä (2012), Rönngren & Xu (2013) and the original papers of Fama & French (1993) and Carhart (1997).

The resulting portfolios are denoted as SmallLow, Small2, SmallHigh and BigLow, Big2, BigHigh such as in French's online database (2014). Once the six portfolios have been constructed, the factors for each period in time, t , can be constructed by using the following formulas.

$$SMB_t = (1/3)[SmallLow_t + Small2_t + SmallHigh_t - BigLow_t - Big2_t - BigHigh_t]$$

Equation 6 Calculating SMB

$$HML_t = (1/2)[SmallLow_t + BigLow_t - SmallHigh_t - BigHigh_t]$$

Equation 7 Calculating HML

The calculation of momentum is based on six different portfolios constructed on a size and lagged 12 month cumulative stock return basis. These new portfolios use the same denotations as in the previous setting. The formula used for calculating each time period's momentum factor is derived from the following equation.

$$MOM_t = (1/2)[SmallHigh_t + BigHigh_t - SmallLow_t - BigLow_t]$$

Equation 8 Calculating Momentum

Once the factors have been individually calculated it is possible to run an OLS regression on each of the 194 sample mutual funds in order to estimate the fund performance as defined by the intercept, alpha. A positive alpha would mean that the individual fund would have had an excess risk-adjusted historical return whereas a negative alpha would mean that the fund underachieved on a risk-adjusted basis.

$$E(R_t) = \alpha_i + \beta_i[RM_t - RF_t] + s_iSMB_t + h_iHML_t + p_iMOM + \varepsilon_{it}$$

Equation 9 Deriving Alpha (i)

By rearranging the equation we would let α_i denote the left-hand side of the equation in the following setting.

$$\alpha_i = E(R_t) - \beta_i[RM_t - RF_t] - s_iSMB_t - h_iHML_t - p_iMOM - \varepsilon_{it}$$

Equation 10 Deriving Alpha (ii)

3.3 Econometric Issues When Using Time Series Data

This thesis will use the OLS procedure and analyze time series data ranging from 2004-2013. The OLS procedure is widely known and applied when wanting to estimate the parameters in

the multiple regression model. (Wooldridge (2013, p 64) and it is straightforward and intuitive to use.² The procedure does however require that some assumptions must hold in order for the coefficient estimators to be the best linear unbiased estimators (BLUE) of the population. There are different assumptions for each type of data used but since this thesis will investigate time series data one particular set of assumptions must hold in order for the OLS estimates to hold. The relatively large number of observations allows us to apply and satisfy the assumptions of large sample time series data such as formulated by Wooldridge (2013, p 372). However, these are not the same as the Gauss-Markow and the classical linear regression assumptions since the nature of time series data often violates these. These “asymptotic Gauss-Markow assumptions” as Wooldridge (2013, p 372) prefers to call them allows us to leave the normality assumption behind (Wooldridge (2013, p 391).

3.3.1 Large Sample Time Series OLS Assumptions

Assumption 1 – Linear in Parameters

“The stochastic process [...] (of the values of x_{ti} and y_t) follows the linear model

$$y_t = \beta_0 + \beta_1 x_{t1} + \dots + \beta_k x_{tk} + u_t$$

and “ $\{(x_t, y_t): t = 1, 2, \dots\}$ is stationary and weakly dependent”

Assumption 2 – No Perfect Collinearity

“[...] no independent variable is constant nor a perfect linear combination of the others”

² We will not go through the theory behind the OLS procedure and we therefore encourage the reader to consult a textbook of basic econometrics or statistics if desired.

Assumption 3 – Zero Conditional Mean

“The explanatory variables $x_t = (x_{t1}, x_{t2}, \dots, x_{tk})$ are contemporaneously exogenous as in the equation $E(u_t|x_t) = 0$ ”

Assumption 4 – Homoskedasticity

“The errors are contemporaneously homoskedastic, that is, $Var(u_t|x_t) = \sigma^2$ ”

Assumption 5 – No Serial Correlation

“For all $t \neq s$, $E(u_t u_s | x_t x_s) = 0$ ”

When these assumptions hold true the OLS estimators are said to be asymptotically normally distributed and the standard errors, t statistics and F statistics are therefore valid. (Wooldridge 2013 p. 376)

3.3.2 Testing the Validity of the Data Set

Before the OLS procedure could be applied to the data set, it must undergo a series of validation tests to verify that it does not violate any of the OLS assumptions stated earlier. This section describes the theory behind each of these tests and what ignoring these phenomenon could result in.

The Dickey-Fuller Test of Stationarity

OLS requires the variables to be stationary, i.e. being time series with constant mean, constant variance and constant autocovariances for each given lag. Brooks (2008, p 318ff) illustrate that non-stationary variables can lead to spurious and arbitrary results. In stationary data a sudden shock to a variable would have a decreasing effect on future values of the same variable whereas in non-stationary data this shock would not necessarily decrease over time. This means that it would no longer be possible to model or forecast future values and it could indicate a relationship between two variables that is not necessarily true. Being non-stationary is here the same as having one (or multiple) *unit root* such that $y_t \sim I(d)$ and that it therefore has to be differenced d times in order to become stationary. Any potential unit root(s) could be detected by using the following procedure from Wooldridge: (2013, p. 614)

$$\Delta y_t = \alpha + \delta t + \theta y_{t-1} + e_t$$

Equation 11 The Dickey-Fuller Test

Where Δ represents the difference between t and $t-1$, δ the trend variable included if a trend is likely in the data set and θ represents the unit root(s).

In order to detect whether or not a particular variable is non-stationary a Dickey-Fuller (DF) test helps discover any evidence of non-stationarity by searching for these unit roots. The DF test is a hypothesis testing procedure where:

$$H_0: \theta = 0 \text{ (Series contains a unit root)}$$

$$H_0: \theta < 0 \text{ (Series is stationary)}$$

A simple t test against the Dickey-Fuller distribution will help determine whether or not to reject the null hypothesis that there is a unit root in the series. The very testing for unit root is easily exerted in any sophisticated statistics software, such as STATA or Matlab.

If the data happen to suffer from a unit root, one way to correct for this is to difference the equation against the variable containing a unit root. Another way to possibly solve for unit root(s) is to detrend the data set, that is, subtract the trend variable from the equation.

The White test for Heteroskedasticity using the Lagrange Multiplier

The fourth assumption of large time series data states that the error terms must have a constant variance, as defined by σ^2 . If this would not be the case then the OLS estimators would still be unbiased but the respective variances of these estimators would be wrong and making correct inferences would therefore not be possible, causing the OLS to no longer be BLUE.

Testing for non-constant variances could be conducted by using a White test of heteroskedasticity. By plotting the residuals of the standard linear regression model in a similar fashion as in the following equation one could infer from hypothesis testing whether or not the variances are constant or not.

$$\hat{u}_t^2 = \alpha_1 + \alpha_2 x_{2t} + \alpha_3 x_{3t} + \alpha_4 x_{2t}^2 + \alpha_5 x_{3t}^2 + \alpha_6 x_{2t} x_{3t} + v_t$$

Equation 12 The White Test

v_t is here defined as a normally distributed error term independent of u_t . The Lagrange Multiplier (LM) test runs a regression of this auxiliary regression and could detect if it suffers from heteroskedasticity. The LM test takes the observed R square of this equation and multiplies it by the number of observations, T , as of:

$$TR^2 \sim \chi^2(m)$$

Equation 13 The Lagrange Multiplier

where m represents the number of regressors in the previous regression. (Brooks (2008, p 134))

If this observed value exceeds the critical value of the Chi square table then one could reject the null hypothesis of error homoskedasticity and the data set is therefore said to suffer from heteroskedasticity. The hypotheses are formulated like this:

$$H_0: \alpha_0 = \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha_6 = 0$$

$$H_1: \text{At least one } \alpha \neq 0$$

If the White test rejects the null hypothesis this means that the residuals suffer from heteroskedasticity. One way to solve for this is to use the so called heteroskedasticity and autocorrelation consistent (HAC) standard errors as defined by this equation:³ (Brooks, p 138)

$$se(\hat{\beta}_1) = [se(\hat{\beta}_1)/\sigma^{\wedge}]^2\sqrt{v^{\wedge}}$$

Equation 14 HAC Standard Error

The Breusch-Godfrey test for Autocorrelation/Serial Correlation

The fifth assumption of the OLS states that the data must not suffer from autocorrelation/serial correlation. Serial correlation means that there exists a relationship between the present residual of the regression and the previous residual. To regress an equation that suffers from serial correlation would provide erroneous standard errors and inflate the R square. The OLS would still be unbiased but it would no longer be BLUE. (Brooks (2008, p 149f))

Testing for serial correlation could be done with the Breusch-Godfrey (BG) test where the current residual of the OLS regression is regressed against the original OLS variables plus the lagged values of the previous residuals. The equation could be displayed like this:

$$\hat{u}_t = \gamma_1 + \gamma_2 x_{2t} + \gamma_3 x_{3t} + \gamma_4 x_{4t} + \rho_1 \hat{u}_{t-1} + \rho_2 \hat{u}_{t-2} + \rho_3 \hat{u}_{t-3} + \dots + \rho_r \hat{u}_{t-r} + v_t$$

$$, v_t \sim N(0, \sigma_v^2)$$

Equation 15 The Breusch-Godfrey Test

³ The HAC standard errors are available on any sophisticated econometrics software and a further mathematical derivation is also beyond the scope of this thesis.

Each residual represent the LHS and is regressed against the basic OLS variables, as defined by the λ :s, plus the lagged values of the previous residuals, as defined by the ρ :s. r represents the number of lagged values that should be included in the regression. Brooks (2008) recommends $r = 12$ for monthly observations.

By forming the following hypotheses one is able to detect whether or not there exists a serial correlation between the error terms:

$$H_0: \rho_1 = \rho_2 = \dots = \rho_r = 0$$

$$H_1: \rho_1 \neq 0 \text{ or } \rho_2 \neq 0 \text{ or } \dots \text{ or } \rho_r \neq 0$$

If the observed R square of the regression exceeds the critical value from the Chi-squared statistical tables one could reject the null hypothesis of no serial correlation. (Brooks (2008, p.148f))

If the residuals should show signs of being serially correlated over time, the solution to this phenomenon is once again to use the HAC standard errors as described earlier.

3.4 Critique

The Time Period

The chosen time period of 2004-2013 has been characterized by several shocks that have affected the global economy substantially that could make this investigation of the

management fee and return relationship somewhat extraordinary, suggesting that the analysis and conclusion might not be applicable to a more ordinary business cycle. The extreme volatility of the second sub-period have probably distorted the data and the underlying relationship between the two variables. The division of sub-periods has been stipulated to minimize this potential distortion.

The Data

The management fees used in the analyses are the current fund management fees and the historical fees have therefore not been incorporated in this thesis because of the difficulties in retrieving them. The analyses might therefore not be as accurate as it could have been as if the historical data had been retrieved. We do however believe that the management fees could be considered relatively stable over time.

The fund sample consists of 194 mutual funds and 19 600 observations over 10 years which should provide 120 monthly observations for each fund, if all funds were active during the whole time. However, as inactive and liquidated funds have been included as well, the number of observations for some funds is quite small which could jeopardize the credibility of the OLS-procedure. Especially since we have applied the large sample time series assumptions, in order to leave the normality assumption behind.

The factors needed for the employed model has been downloaded and calculated from data provided by French's online database. Even though this data should be considered credible, since it has been widely used by other researchers, we have not been able to verify the validity of the data set.

The Methodology

We have investigated the relationship between fund performance as denoted by its risk-adjusted return, i.e. its alpha, and the management fee and applied the *ceteris paribus* assumption on the remaining factors. We have derived the alphas as of Carhart's model and achieved a high measure of fit but these alphas have thereafter been explained only by the management fees and no other factors. This means that we have not considered how active the investigated funds have been throughout time. We have not measured any active share or any other measure of activity that could help explain the alpha. We could have investigated this measure of activity and thereafter done a relative comparison between management fee and risk-adjusted return in order to see if the more active funds earn back their respective fees or not.

Furthermore, if the EMH were true, each alpha would have been equal to zero and the model would therefore not be applicable at all. As

4. Results and Analysis

In this section the findings of this thesis are presented. The findings have furthermore been carefully analyzed in order to estimate what they could depend on and if they have similar characteristics as of the previous studies discussed in the literature review section. It ends with a summary of the regression results and what future studies could look at.

The three previously stated hypotheses have been formulated in order to answer the question whether or not the funds' respective current management fees are justified with respect to historical performance. If the efficient market hypothesis holds true then the additional fees paid by the investors should lead to a more sophisticated data gathering process by the fund management and thus lead to a higher risk-adjusted return compared to cheaper funds, *ceteris paribus*.

4.1 Results and Analysis of the Entire Sample Period of 2004-2013

Figure 5 shows a summary of our fund sample of the entire sample period of 2004-2013. When looking at the full business cycle we discover that the portfolio of the most expensive mutual funds performed worse in real terms when looking at monthly averages. It is also clear that the portfolio of the cheapest funds was the top-performing portfolio. The difference between these two was about 22 basis points in monthly excess total return. The standard deviation of the portfolios was more or less the same with the exception of the portfolio of the most expensive funds where it was slightly higher.

As in the case in sub-period two, we can here see that management fee and average monthly total return of the fund portfolios seem to be negatively correlated as of this simple portfolio summary. Figure 6 provides a graphical display of the funds' alphas.

Two extreme values in estimated alpha (3.91 & 1.94) have here been excluded in order to better estimate the relationship between the two variables. At first glance this suggests that the estimated risk-adjusted excess returns of the 192 funds (full sample of 194 funds minus two extreme values) is more or less the same for every fund regardless of management fee over the entire sample period. This means that, from this first graphical analysis, the risk-adjusted return of the more expensive funds seem to be more or less the same as for the cheaper funds'.

Summary of Funds Sorted by Management Fee in Quintiles						
Factors	Portfolios					
%	1	2	3	4	5	Total
No of Funds	39	39	38	39	39	194
Average Management Fee	1,9623	1,6405	1,4887	1,3410	0,5200	1,3905
Average Monthly Total Excess Return 2004-2013 Net of Fees	0,4020	0,4556	0,6264	0,5790	0,6268	0,5361
Standard Deviation	8,2690	7,7557	7,3289	7,3469	7,3489	7,6284
No of observations	3214	2830	2852	3072	2974	14942

Figure 5 Summary of funds during the entire sample period

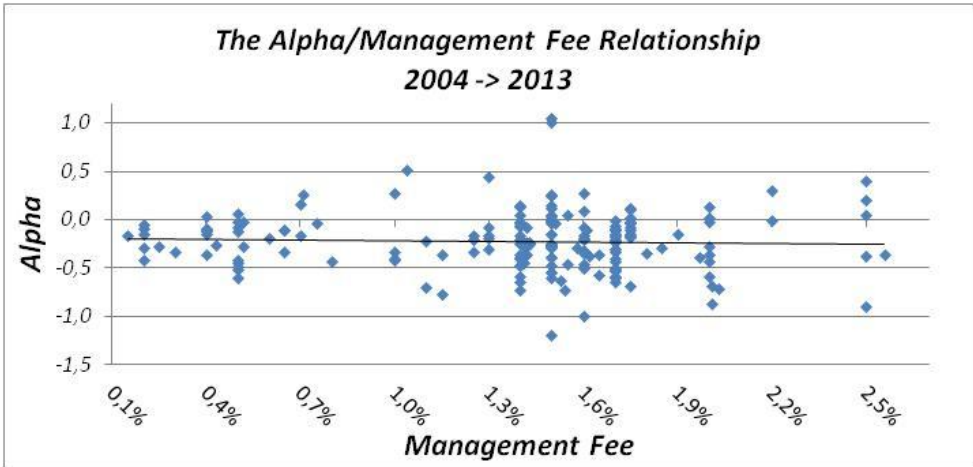


Figure 6 Fee and Alpha relationship during the entire sample period

Regression Results from STATA		
<i>VARIABLES</i>	<i>WholePeriod</i>	<i>Notes_Titles</i>
<i>managementfee</i>	-0.00924 (0.0625)	<i>Standard errors in parentheses</i> *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$
<i>Constant</i>	-0.176* (0.0926)	
<i>Observations</i>	194	
<i>R-squared</i>	0.000	

Figure 7 Funds' management fees regressed against respective alphas during the entire sample period

In figure 7 the funds' respective management fees have been regressed on the previously derived fund alphas for the entire sample period. The management fee coefficient displays a negative value of .009 that is not statistically or economically significant at any conventional confidence level. Furthermore, the regression displays an R-squared of 0. The statistical insignificance and low R-squared suggests that the model and thus the management fees is not correlated to and cannot explain the risk-adjusted excess return over the whole time period at all.

These results further support the findings of the graphical display that the more expensive funds do not achieve a higher risk-adjusted return than the cheaper funds during the full sample period. This is also related to the fact that the most expensive quintile of funds explained earlier did have the lowest average monthly total excess return.

4.2 Results and Analysis of the Sub-period of 2004-2007

Figure 8 shows a summary of the funds sorted in quintiles by management fee for the first sub-period. It is clear that the most expensive funds, as represented by portfolio 1, had the

highest monthly average return and that the cheapest funds had the second lowest return. The lowest return was achieved by the median portfolio. These results show that the most expensive funds had a 76 basis points higher average monthly total return as compared to the cheapest funds. Figure 9 shows a graphical display of the relationship between fund risk-adjusted return and management fee.

Summary of Funds Sorted by Management Fee in Quintiles						
Factors	Portfolios					
%	1	2	3	4	5	Total
No of Funds	39	39	38	39	39	194
Average Management Fee	1,9623	1,6405	1,4887	1,3410	0,5200	1,3905
Average Monthly Total Excess Return 2004-2007 Net of Fees	1,7961	1,1239	0,9648	1,0844	1,0435	1,1966
Standard Deviation	5,4907	4,6194	4,1894	4,0747	4,1449	4,5320
No of observations	1367	1517	1389	1523	1414	7210

Figure 8 Summary of funds during the first sub-period

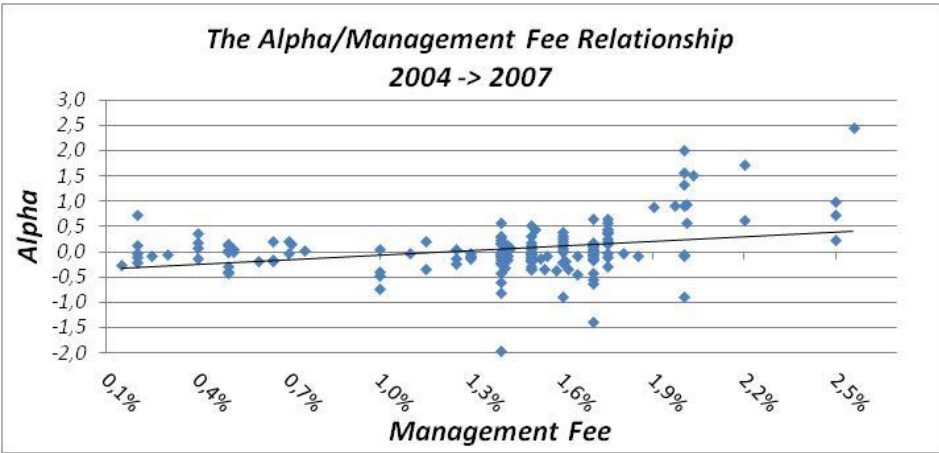


Figure 9 Fee and Alpha relationship during the first sub-period

Regression Results from STATA		
<i>VARIABLES</i>	<i>PreCrisis</i>	<i>Notes_Titles</i>
<i>managementfee</i>	0.297*** (0.0709)	<i>Standard errors in parentheses</i> *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$
<i>Constant</i>	-0.356*** (0.105)	
<i>Observations</i>	175	
<i>R-squared</i>	0.092	

Figure 10 Funds' management fees regressed against respective alphas during the first sub-period

The corresponding regression results are displayed in Figure 10. The management fee coefficient displays a positive value of .3 that is statistically and economically significant at 1 % even though the R-squared is only 9 %. As we can see, there appears to be a positive correlation between fee and alpha during this sub-period.

As the economy starts to recover from the early 2000's economic shocks, such as the financial turmoil following the IT-crash of 2000-2002 and the 9/11 terrorist attacks, the global financial market shows a general upswing. In combination with the "easy money" policy of the Federal Reserve in fear of a post dot-com bubble recession (Edlin & Stiglitz 2012, p. 59f), the stock market experienced a surge and subsequently a bubble that might have caused our fund sample returns to rise in similar proportions, favoring the more active funds.

We can from these results also see that the more expensive funds seem more exposed to the general market movement. The fact that they have a higher exposure to this systematic risk is coherent to economic theory that suggests that higher management fee should be correlated to a more active position on the financial market in order to find underpriced stocks and thus create a higher value to the investor. The summary statistics of the four factors of Figure 3 provides further proof that market risk is an important factor to consider when analyzing fund alpha.

4.3 Results and Analysis of the Sub-period of 2008-2011

The second sub-period looks at the crisis-years of 2008-2011 and Figure 11 summarizes the funds in a similar fashion as in Figure 5 and 8 with the only exception of a different time period. The funds with the highest management fees underperformed the fund portfolio with the highest average excess monthly total return by some 85 basis points. The top-performing fund portfolio was in this case portfolio number 3 and the portfolio of the cheapest funds was third best. The difference between the most expensive fund portfolio and the cheapest was 64 basis points in average excess monthly total return suggesting that the difference between these two portfolios is almost exactly the opposite when compared of the earlier sub-period. We can also see that the funds that achieved the highest monthly average return during this sub-period are the funds with a management fee between 1.3 to 1.7 %.

Summary of Funds Sorted by Management Fee in Quintiles						
Factors	Portfolios					
%	1	2	3	4	5	Total
<i>No of Funds</i>	39	39	38	39	39	194
<i>Average Management Fee</i>	1,9623	1,6405	1,4887	1,3410	0,5200	1,3905
<i>Average Monthly Total Excess Return 2008-2011 Net of Fees</i>	0,0899	0,6363	0,9318	0,7727	0,7275	0,6161
<i>Standard Deviation</i>	7,3857	8,0385	7,9096	7,8218	7,8210	7,7872
<i>No of observations</i>	707	614	601	653	608	3183

Figure 11 Summary of funds during the second sub-period

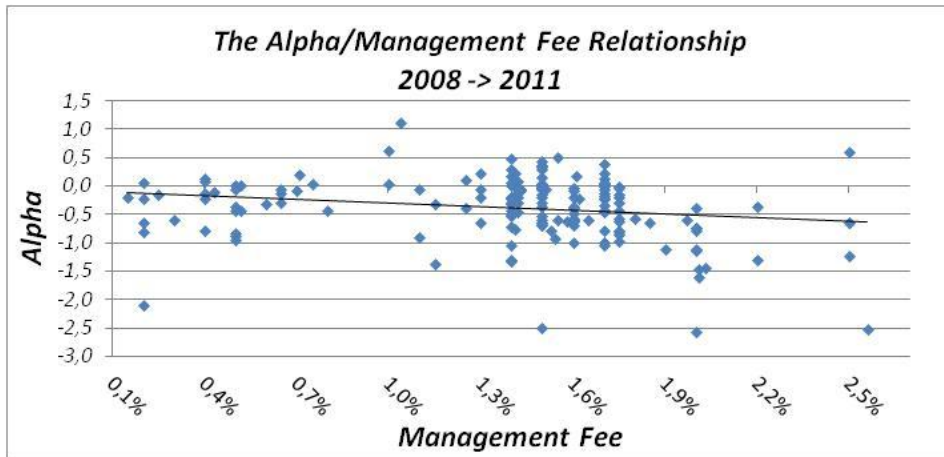


Figure 12 Fee and Alpha relationship during the second sub-period

Regression Results from STATA		
VARIABLES	DuringCrisis	Notes_Titles
<i>managementfee</i>	-0.217*** (0.0794)	Standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$
<i>Constant</i>	-0.0765 (0.118)	
<i>Observations</i>	177	
<i>R-squared</i>	0.041	

Figure 13 Funds' management fees regressed against respective alphas during the second sub-period

Whereas the earlier sub-period showed a positive relationship, Figure 12 indicates a slight negative relationship between the two. Figure 13 confirms that this relationship is indeed negative, both statistically and economically. The coefficient value of -0.217 is highly significant, even though the R-squared is very small with only 4 %.

These shocks are highly apparent in our data through the market risk factor included in the four-factor model. For instance, the September and October market excess returns in 2008 were (-19 %) and (-27 %) respectively. This provides evidence that cheaper funds (that generally could be assumed to take on more passive/less risky positions compared to the more

expensive funds as of the discussion in the background section) performed better compared to more expensive funds during these times of high volatility.

The negative relationship as depicted by Figure 12 and Figure 13 does tell us that as the economy crumbles and suffers from the worst financial distress since the great depression in the 1930's the funds with the higher management fees perform worse than the cheaper funds. We could compare this result with the discussion of the first sub-period where a more expensive fund should earn back the fee by investing more actively and therefore take on more risky positions. The systematic risk is extremely apparent in this sub-period as well where we can see that the funds that had the highest return pre-crisis now have the lowest return suggesting a much higher sensitivity to market risk compared to cheaper funds. A further proof of the sensitivity to systematic risk can be seen when comparing the respective funds' alphas between the two sub-periods where we see that the difference is by far larger in the more expensive funds.

As the global economy continues to exhibit bullish behavior during the mid-2000's several bubbles start to buildup, such as the American stock bubble and housing bubble. As the housing bubble burst in 2007 a financial turmoil started once again. When Lehman brothers failed in September 2008 the financial market plummeted once more. We believe that these events have had a massive impact on our Swedish sample and we can see that as the subsequent European sovereign debt crisis and Greek government debt crisis started in 2009, the more expensive mutual funds did not earn back their management fees when looking at risk-adjusted return. We also believe that the Fukushima tsunami in early 2011 could explain some of the high volatility of the financial market in this sub-period.

4.4 Answering the Hypotheses

Figure 14 summarizes the findings of the hypothesis testing.

<i>Hypothesis Testing Results</i>			
<i>Hypothesis</i>	<i>1st</i>	<i>2nd</i>	<i>3rd</i>
<i>Time Span</i>	<i>2004-2013</i>	<i>2008-2011</i>	<i>2004-2007</i>
<i>Management Fee Coefficient</i>	<i>(-0.009)</i>	<i>(-0.217)</i>	<i>0.297</i>
<i>Result</i>	<i>Not Rejected</i>	<i>Rejected</i>	<i>Rejected</i>

Figure 14 Summary of the three hypotheses testing results

1st. Does the management fee help explain fund risk-adjusted return during 2004-2013?

When looking at the full time period, it did not appear to be a relationship between the funds' management fee and risk-adjusted return. Figure 5 did however show that the quintile with the most expensive funds had the lowest monthly average return and that the quintile of the cheapest funds, on the contrary, had the highest monthly average return. When looking at Figure 7, we see that there is no statistically significant relationship between the two variables and we **cannot reject the null hypothesis of no correlation** between the two.

2nd. Does the management fee help explain fund risk-adjusted return during 2004-2007

We saw earlier that the quintile of the most expensive funds exhibited the highest performance when looking at average monthly total return during this time period. The graphical display suggested a positive correlation between the funds' risk-adjusted return and management fee. The regression results in Figure 10 provided statistical evidence that this was indeed the case and we are therefore able to **reject the null hypothesis of no correlation**

and conclude that there was indeed a positive correlation between the two during this time-span.

3rd. Does the management fee help explain fund risk-adjusted return during 2008-2011?

The second sub-period showed us that this relationship appears to be quite the opposite when compared to the first sub-period. Figure 11 provided a first glance at this relationship that appeared to be negative in this sub-period. With aid of the results in Figure 13 we can draw the conclusion that management fee and fund risk-adjusted return was statistically negative and that we can statistically **reject the null hypothesis of no correlation** between the two during this time period.

4.5 Comparison to Previous Studies

The majority of the previous studies in this field have suggested that there exists a negative relationship between management fees and fund performance and that the investor might be better off choosing cheaper funds, holding everything else but the management fee constant. This notion has been backed up by empirical and theoretical papers by authors such as Sharpe (1966), Carhart (1997) and Gil-Bazo & Ruiz-Verdú (2008 & 2009) amongst others.

When we ranked the funds into quintiles by management fees we found traces of evidence of this classical notion of a negative relationship between management fee and total return when investigating the time period of 2004-2013 by looking at monthly average total return. We even saw a 22 basis points worse monthly average total return in the portfolio of the most expensive funds compared to the portfolio of the cheapest funds, net of fees. The quintile

summary results are coherent with previous work on the field such as the findings of Elton et al (1993), French (2008) and Fama & French (2010).

But, when we regressed each individual fund's performance against the risk factors of the four-factor model we discovered that the risk-adjusted return and management fee does not appear to be correlated at all under the same time period. The fact that the more expensive funds do not achieve a higher risk-adjusted return than the cheaper funds contradicts the theory of an efficient financial market and thus the EMH.

However, as we divided the time period into shorter sub-periods we got different results as to the entire sample period. As we investigated this relationship between 2004 and 2007 we found evidence of a positive relationship that is in direct contrast to the majority of previous studies but coherent to the findings of Ippolito (1989) and Wermers (2000). Ippolito applied the classical CAPM to calculate the risk-adjusted returns, as of the alphas, and compared them to the management fees (among other fund factors) and concluded that the active funds (with generally higher management fees) did outperform the cheaper funds and earned back their additional expenses.

The findings of the second sub-period of 2008-2011 show a complete opposite relationship as of the first period and are more in accordance to previous studies in general. We could see that a one-unit increase in management fee was correlated to a 22 basis point decrease in risk-adjusted return during this time period. These findings are similar to the findings of French (2008) that concluded that investors choosing an active portfolio, on average, lose 67 basis points over a passive portfolio. Malkiel (2013) provided further evidence of this and concluded that the difference between active and passive investing was 64 basis points in the large-cap funds and 148 basis points in the small-cap funds.

5. Conclusion

This thesis has investigated the relationship between 194 mutual funds' management fees and the respective risk-adjusted performance as measured by the alphas, calculated with the aid of Carhart's four factor model. These alphas have been compared to the funds' respective management fees in order to investigate if there is a relationship between the two. The general idea is that higher management fee should be reflected by a more costly information gathering process where the fund manager is equipped with better tools to pick undervalued stocks that thus should create a higher risk-adjusted return compared to a passive and/or cheaper fund. This higher return should be presented as a higher alpha. The relationship has been investigated during three time periods; 2004-2013, 2004-2007 and 2008-2011.

When investigating the entire sample period we did not find evidence of this notion. We were not able to statistically prove that a higher management fee is correlated to a higher alpha when looking at a full business cycle, as defined by the period of 2004-2013. The regression results have shown us that a relationship between management fee and risk-adjusted return appears to be non-existing. We find no evidence that an investor earns a higher risk-adjusted return by choosing a more expensive fund compared to a cheaper.

But, when dividing the time span into several time periods we did however see that the more expensive funds performed relatively better during the boom of 2004-2007 but worse during the crash of 2008-2011 when compared to the cheaper funds.

The regression results from the three time periods have shown us that the management fee/alpha relationship varies over time. The relationship is not the same in an economic boom as it is during an economic recession. The results indicate that as the economy thrives the funds with a relatively high management fee is performing better on a risk-adjusted basis than the cheaper funds. The results do also indicate that during a financial crisis the more

expensive funds are the ones that achieve the lowest risk-adjusted returns. When looking at the entire time period of 2004-2013 we can see that these relationships seem to even each other out and that a full business cycle relationship seems to be non-existent. The regression results of the entire sample period show no significant relationship between fund management fee and risk-adjusted abnormal return. The management fees do not matter when analyzing risk-adjusted return under the assumption that the fees have been constant during the sample period.

5.1 Suggestions to Future Research

There is much to be done in the area of investigating fund management and management fees. A future researcher could for example use the same approach as this thesis but extend the historical data. This approach would affect the analysis and it could probably give more comprehensive results. Furthermore, future studies could also more precisely scrutinize the chosen funds, and in that way have a broader understanding of them. By categorizing the funds more deeply, a future researcher could investigate how this relationship differs when looking at other factors, such as level of activity and fund size etc. Further studies can also use the method of TER and TEV in a similar approach as Rönngren et al. (2013) when looking at the funds. What also could be done is to use a bootstrap simulation, in a similar fashion as Johansson et al. (2012), in order to distinguish between skill and luck when it comes to fund management.

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Appendices

APPENDIX 1 – FUNDS OF INTEREST

Fund Characteristics			Fund Alphas		
Ticker Code	Fund Name	Mgmt Fee	2004 -> 2013	2004 -> 2007	2008 -> 2011
ALFGLBA SS	ALFRED BERG GLOBAL	1,65	-0,5739	-0,4364	
ALFRYSA SS	ALFRED BERG RYSSLAND	1,75	-0,0143	0,4412	-0,8066
ALFSREA SS	ALFRED BERG SVERIGE PLUS	1,75	-0,1441	-0,011	-0,1968
ROBAIVA SS	ALLEMANSFOND KOMPLETT	1,42	-0,2708	0,0917	-0,0586
EUOPAF SS	AMF AKTIEFOND EUROLAND	0,40	-0,3657	0,0777	-0,2214
AKTIESV SS	AMF AKTIEFOND SVERIGE	0,40	0,0291		
AKTIEVA SS	AMF AKTIEFOND VÄRLDEN	0,40	-0,1516	0,1874	0,1246
BANAMER SS	BANCO AMERIKA	1,70	-0,3346	0,1059	-0,2232
BANETIS SS	BANCO ETISK GLOBAL	1,70	-0,426	-0,1486	-0,4398
BANNORD SS	BANCO ETISK NORDEN	1,70	-0,2096	0,0309	-1,0019
BANSVSP SS	BANCO ETISK SVERIGE SPECIAL	1,10	-0,2172		-0,9116
BANEURO SS	BANCO EURO TOP 50	1,70	-0,5825	0,1356	-0,7923
BANEUTO SS	BANCO EURO TOP 50	1,70	-0,6367	0,115	-1,0071
BANFIAR SS	BANCO FIÄRRAN ÖSTERN	1,70	-0,5993	-0,5377	-0,4379
BANHJAL SS	BANCO HJALP	1,70	-0,3987	-0,0445	-0,226
BANIDEE SS	BANCO IDEELL MILJO	1,70	-0,2356	0,1876	-0,138
BANKULT SS	BANCO KULTUR	1,70	-0,3066	-0,0301	-0,1767
BANMAXI SS	BANCO OFFENSIV	1,70	-0,5125	-0,1357	-0,4496
ALFRUSA SS	BANCO RUSSIA SEK	2,50	0,3954		0,6037
BANRYSS SS	BANCO RYSSLAND	2,50	0,0436	0,2519	
BANSMAB SS	BANCO SMÄBOLAG	1,70	-0,1065	-0,6065	-0,0529
SVEMILJ SS	BANCO SVENSK MILJÖ	1,70	-0,1104	0,1359	0,0614
ALFSVEA SS	BANCO SVERIGE	1,60	-0,1606		-0,0273
CAMELOT SS	CAMELOT	1,00	0,271	0,063	0,6232
CAPBRIC SS	CAPINORDIC BRIC	2,20	-0,0001	0,6335	-0,3603
CAPGLOP SS	CAPINORDIC GLOBAL OPPORTUNITY	1,40	-0,0691	-1,9521	-0,1901
CAPMMGF SS	CAPINORDIC MM GLOBAL FOCUS	2,00	-0,4362	-0,8872	-0,3782
CARL28A SS	CARLSON LÄRARFOND 21-44 AR	0,60	-0,186	-0,1854	-0,3242
HQAFRIK SS	CARNEGIE AFRIKAFOND	2,50	-0,3771	1,0023	-0,6527
HQTILLA SS	CARNEGIE EMERGING MARKETS	1,70	-0,3014	0,6674	-1,0449
HAGQVIN SS	CARNEGIE INDIENFOND	2,20	0,2983	1,731	-1,3073
HAGQVKI SS	CARNEGIE KINAFOND	1,90	-0,1546	0,8972	-1,1069
HQRYSSA SS	CARNEGIE RYSSLANDSFOND	2,50	0,2027	0,7287	-0,6392
HQSTRAA SS	CARNEGIE STRATEGIFOND	1,50	0,0086	0,5386	-0,0564
CARNSVE SS	CARNEGIE SVERIGE	1,70	-0,2133	-0,4094	0,3844
HQSVERA SS	CARNEGIE SVERIGEFOND	1,40	0,0504	0,308	0,1795
HQUTLAA SS	CARNEGIE UTLANDSFOND	1,50	-0,4702	0,1899	-0,6491
CATSVPA SS	CATELLA SVERIGE INDEX	0,75	-0,0362	0,047	0,0381
DGAKTIE SS	DIDNER & GERGE AKTIEFOND	1,40	0,1356	-0,0916	0,4834
CARSMAB SS	DNB SMÄBOLAGSFOND	1,50	0,1534	-0,1086	0,2977
CARSWMC SS	DNB SWEDEN MICRO CAP	1,50	0,2518	-0,3374	0,3393
CARSVER SS	DNB SVERIGEFOND	1,25	-0,1667	-0,1346	0,1141
CARUTLN SS	DNB UTLANDSFOND	1,25	-0,1992	0,0508	-0,3896
EACBALK SS	EAST CAPITAL BALKAN FUND	2,00	-0,5904	2,0266	-2,5735
EACBALT SS	EAST CAPITAL BALTIC FUND	2,00	-0,3526	0,9182	-1,1384
EACOSTE SS	EAST CAPITAL EASTERN EUROPE	2,00	-0,0174	1,3416	-0,7918
EACRUSS SS	EAST CAPITAL RUSSIAN FUND	2,00	0,1365	-0,0429	-0,7356
EACTURK SS	EAST CAPITAL TURKISH FUND	2,00	-0,2725	-0,0807	-0,7286
ENTSELE SS	ENTER SELECT	1,70	-0,0014		0,2167
ENTSPRO SS	ENTER SELECT PRO	0,50	0,0643	0,1594	-0,4238
ENTSVER SS	ENTER SVERIGE	1,70	-0,1655	0,0541	-0,0014
ENTSVFK SS	ENTER SVERIGE PRO	0,50	-0,0715	0,0399	0,0138
PAKSVER SS	ERIK PENSER AKTIEINX SVERIGE	0,50	-0,0159	0,1418	-0,3657
PAKTUSA SS	ERIK PENSER AKTIENINDEX USA	0,50	-0,5989	-0,3724	
PATJAPA SS	ERIK PENSER AKTIENINDEX JAPAN	0,50	-0,4926	-0,4205	
PENGL1 SS	ERIK PENSER GARANT GLOBAL 1	1,00	-0,3354	-0,4699	0,0307
PENGL2 SS	ERIK PENSER GARANT GLOBAL 2	1,00	-0,4077	-0,3751	
SEBETAK SS	ETHOS AKTIEFOND	0,15	-0,1561	-0,2583	-0,2091
GUSTBAL SS	GUSTAVIA BALKAN	2,56	-0,3547	2,4508	-2,5308
GUSGRSM SS	GUSTAVIA RYSSLAND	2,03	-0,7133	1,511	-1,4399
GUSTSVE SS	GUSTAVIA SVERIGE	1,51	-0,0412	0,4625	-0,0606
HANITOP SS	HANDELSBANKEN 30 I TOPP INDX	0,50	-0,4502	-0,2873	-0,8739
HAMERIK SS	HANDELSBANKEN AMERIKAFOND	1,50	-0,1435	-0,2746	-0,0326
HANASIE SS	HANDELSBANKEN ASIENFOND	1,60	-0,1857	0,0874	-0,394
HEURINX SS	HANDELSBANKEN EUROPA INDEX	0,50	-0,4174	0,0061	-0,8263
HEUROPA SS	HANDELSBANKEN EUROPAFOND	0,50	-0,5157	0,0058	-0,9528

Fund Characteristics			Fund Alphas		
Ticker Code	Fund Name	Mgmt Fee	2004 -> 2013	2004 -> 2007	2008 -> 2011
HUTLAND SS	HANDELSBANKEN GLOBALFOND	1,60	-0,4518	-0,1997	-0,5692
HITFOND SS	HANDELSBANKEN IT-FOND	0,65	-0,3341	-0,1756	-0,303
HAJAPAN SS	HANDELSBANKEN JAPANFOND	1,60	-0,4878	0,0114	-0,6929
HANLAKE SS	HANDELSBANKEN LAKEMEDELAFOND	1,50	-0,0355	-0,1057	-0,0358
HANLATI SS	HANDELSBANKEN LATINAMERIKAFOND	1,60	0,2819	0,2104	-0,1966
HANMEGA SS	HANDELSBANKEN MEGA SVR INDX	0,50	-0,1203	0,0454	-0,0626
HNORDAG SS	HANDELSBANKEN NORDEN AGGRESS	1,85	-0,2913	-0,0647	-0,6505
HNORDEN SS	HANDELSBANKEN NORDENFOND	1,60	-0,322	-0,1907	-0,6002
HANNORS SS	HANDELSBANKEN NORDISKA SMÁBOLAG	1,60	0,0964	0,3335	-0,364
HFIF100 SS	HANDELSBANKEN OFFENSIV 100	1,80	-0,3407	-0,0142	-0,5708
HANOSTE SS	HANDELSBANKEN ÖSTEUFOND	1,60	-0,202	0,3901	-0,9897
HRADIOH SS	HANDELSBANKEN RADIOHJÄLPFOND	1,50	-1,1835	-0,1689	-2,4958
HSMABOL SS	HANDELSBANKEN SVENSKA SMÁBOLAG	1,50	-0,0066	-0,1481	0,028
HASVINE SS	HANDELSBANKEN SVERIGE IND ET	0,65	-0,1109	-0,1472	-0,0648
HANDAKI SS	HANDELSBANKEN SVERIGE INDEX	0,65	-0,1023	0,2073	-0,1246
HSVERIG SS	HANDELSBANKEN SVERIGE/VÄRLDEN	1,50	-0,3861	-0,1729	-0,3742
HREAVIN SS	HANDELSBANKEN SVERIGEFOND	1,50	1,0525	-0,0101	0,0322
HTILLVA SS	HANDELSBANKEN TILLVÄXTMARKNAD	1,60	-0,1998	0,0467	-0,6216
HEALVAL SS	HEALTHINVEST VALUE FUND-A	1,04	0,5108		1,1168
BANHUMA SS	HUMANFONDEN	1,42	-0,3583	-0,1433	-0,2925
KAUPBAS SS	KAUPTHING BAS	1,40	-0,7216	-0,6049	
KAUPI50 SS	KAUPTHING EUROPA INDEX 50	0,70	0,1594	0,2268	
KAUPSTR SS	KAUPTHING STRATEGI	1,60	-0,9998	-0,8665	
LANSMAA SS	LANNEBO SMÁBOLAG	0,71	0,2552	0,1657	0,2054
LANNORA SS	LANNEBO SVERIGE	1,61	-0,1075	-0,1779	0,1827
LANVISA SS	LANNEBO VISION	1,62	-0,3747	-0,3432	-0,2305
MERNOAL SS	NORDEA ALLEMANSFOND ALFA	1,41	-0,2747	-0,0507	-0,1586
MERNOBE SS	NORDEA ALLEMANSFOND BETA	1,41	-0,3757	-0,1357	0,2184
MERNOOL SS	NORDEA ALLEMANSFOND OLYMPIA	1,50	-0,2742	-0,0247	-0,1897
MERNOEU SS	NORDEA EUROPAFOND	1,53	-0,6218	-0,1338	-0,7867
MERNOFJ SS	NORDEA FJÄRRAN ÖSTERNFOND	1,60	-0,0768	0,2683	-0,4865
MERNOPA SS	NORDEA JAPANFOND	1,60	-0,5024	0,1731	-0,6109
MERNOLA SS	NORDEA LATINAMERIKAFOND	1,75	0,1172	0,3855	-0,0308
MERNORN SS	NORDEA NORDAMERIKAFOND	1,58	-0,2953	-0,3658	-0,6306
MERNONO SS	NORDEA NORDENFOND	1,42	-0,2345	-0,0718	-0,4647
MERNOOS SS	NORDEA ÖSTEUFOND	1,75	-0,1782	0,4012	-0,9631
MERNOSP SS	NORDEA SELEKTA EUROPA	1,55	-0,4515	-0,0579	-0,609
MERNOSE SS	NORDEA SELEKTA SVERIGE	1,60	-0,3475	-0,2116	-0,0859
TRETI SS	NORDEA SWEDISH STARS	1,50	-0,1488		
MERNOSV SS	NORDEA SVERIGEFOND	1,41	-0,2317	-0,0927	-0,0194
MERNOTI SS	NORDEA TILLVÄXTBOLAGSFOND	1,54	-0,7189	-0,3303	-0,9153
NEQSTRA SS	NORDIC EQUITIES STRATEGY	1,50	-0,2486	-0,0481	-0,1514
BANSAMA SS	SAMARITFONDEN	1,70	-0,4967	-0,1211	-0,4234
SEBAKTI SS	SEB AKTIESPARFOND	1,40	-0,2525	-0,0416	-0,2821
SEBASIE SS	SEB ASIENFOND EXKL JAPAN	1,75	-0,0753	0,2299	-0,2908
SEBCANC SS	SEB CANCERFONDEN	1,40	-0,6422	0,2303	-1,3286
SEBNOSM SS	SEB CHOICE NORDAMERI SMÁBOLAG	1,75	-0,0402	0,166	-0,0129
SEBEMMK SS	SEB EMERGING MARKETSFOND	1,75	-0,1643	0,2644	-0,5725
SEBETGL SS	SEB ETISK GLOBALFOND	1,50	-0,3843	0,0046	-0,5878
SEBETGU SS	SEB ETISK GLOBALFOND-UTD	1,50	-0,6028		-0,5204
SEBEUSM SS	SEB EUROPA SMÁBOLAGSFOND	1,75	0,0182	0,6672	-0,6179
SEBEURO SS	SEB EUROPAFOND	1,40	-0,4691	0,3297	-1,0382
SEBOPEU SS	SEB EUROPAFOND OFFENSIV	1,75	-0,6823	-0,2836	-0,7836
SEBLOB SS	SEB GLOBALFOND CHANS/RISK	1,50	3,9067	0,0956	0,0265
SEBGUTD SS	SEB GLOBALFOND CHANS/RSK-UTD	1,50	-0,5376	-0,1839	-0,7029
SEBINTE SS	SEB INTERNETFOND	1,50	-0,2602	0,1441	-0,0122
SEBJAPN SS	SEB JAPANFOND	1,50	-0,5379	-0,3297	-0,2891
SEBLAKE SS	SEB LÅKEMEDELAFOND	1,50	0,0405	0,0733	-0,6653
SEBLATN SS	SEB LATINAMERIKAFOND	1,75	0,103	0,5699	-0,4314
SEBNORD SS	SEB NORDAMERIKA FOND	1,50	-0,2686	0,3493	-0,0245
SEBNOMB SS	SEB NORDAMERIKAFOND MED BOLA	1,75	-0,1828	-0,0847	-0,16
SEBNRDN SS	SEB NORDENFOND	1,30	-0,3086	-0,0238	-0,6518
SEBNRDU SS	SEB NORDENFOND-UTD	1,30	0,45		
SEBOWWF SS	SEB ÖSTERSJÖFOND/WWF	1,50	-0,2642	-0,0232	0,3646
SEBOSTE SS	SEB ÖSTEUFOND	1,75	-0,1088	0,46	-0,8452
SEBSVAK SS	SEB PRIV BK SVENSK AKTIEPO-D	1,15	-0,3628	-0,3211	-0,31
SEBPBEA SS	SEB PRIVATE BANK EURO AKTIEP	1,15	-0,7666	0,2176	-1,3829
SEBPBGL SS	SEB PRIVATE BANKING GLOBAL	1,10	-0,6911	-0,0282	-0,0473
SEBSCHW SS	SEB SCHWEIZFOND	1,40	-0,032	0,586	-0,4273

Fund Characteristics		Fund Alphas			
Ticker Code	Fund Name	Mgmt Fee	2004 -> 2013	2004 -> 2007	2008 -> 2011
SEBSKAL SS	SEB SKF ALLEMANSFOND	1,00	-0,4151	-0,7102	
SEBSCSV SS	SEB SPEC CLIENT SVERIGEFOND	0,80	-0,4366		-0,4241
SEBSEBD SS	SEB SWEDISH ETHICAL BETA-D	0,25	-0,2815	-0,0668	-0,1517
SEBSWFO SS	SEB SWEDISH FOCUS FUND	1,50	0,122	-0,3251	-0,0038
SEBSUTD SS	SEB SWEDISH FOCUS FUND-UTD	1,50	-0,2872	-0,0565	0,4323
SEBSWVF SS	SEB SWEDISH VALUE FUND	1,50	0,2548		
SEBSCRS SS	SEB SVERIFOND SMÁBOLAG CH/RSK	1,50	1,9412	0,3134	-0,0298
SEBSVCR SS	SEB SVERIGE CHANS/RISK	1,30	-0,0725	-0,0881	0,2229
SEBSBIN SS	SEB SVERIGE INDEXFOND-D	0,40	-0,106	-0,1284	0,0822
SEBSBIU SS	SEB SVERIGE INDEXFOND-UTD	0,40	-0,0927		-0,124
SEBSSCR SS	SEB SVERIGE SMÁBOLAG CHANS/R	1,50	0,0553	-0,0954	0,3374
SEBSVSM SS	SEB SVERIGE SMÁBOLAGSFOND	1,50	-0,0146	-0,1415	0,1429
SEBSVSU SS	SEB SVERIGE SMÁBOLAGS-UTD	1,50	1,012		
SEBSVST SS	SEB SVERIGE STIFTELSEFOND	1,50	0,0085		
SEBSVA1 SS	SEB SVERIGEFOND	1,30	-0,1917	-0,1142	-0,0689
SEBSVA2 SS	SEB SVERIGEFOND STORA BOLAG	1,30	-0,1598	-0,0574	-0,1876
SEBTEKN SS	SEB TEKNOLOGIFOND	1,50	-0,2682		
SEBUTST SS	SEB UTLAND STIFTELSEFOND	1,40	-0,4657	0,0114	-0,7143
SIMAFRK SS	SIMPLICITY AFRIKA	1,97	-0,3928	0,9232	-0,5946
SIMASIE SS	SIMPLICITY ASIEN	2,01	-0,6887	0,9456	-1,4617
SIMINDI SS	SIMPLICITY INDIEN	0,20	-0,0862	0,7435	-2,0998
SIMNYAE SS	SIMPLICITY NYA EUROPA	2,01	-0,8605	0,587	-1,6076
SKAAKFE SS	SKANDIA ASIEN	1,65	-0,3599	-0,0775	-0,6078
SKABRIC SS	SKANDIA BRIC	2,50	-0,8931		-1,2415
CARCANC SS	SKANDIA CANCERFONDEN	1,70	-0,1527	-0,1174	0,132
SKAKTEU SS	SKANDIA EUROPA EXPONERING	1,41	-0,4434	0,0831	-0,7631
SKAAIDL SS	SKANDIA IDEER FOR LIVET	1,40	-0,0635	-0,1947	-0,2229
SKAAJPN SS	SKANDIA JAPAN	1,40	-0,3924	0,1837	-0,5372
SKAASME SS	SKANDIA SMÁBOLAG EUROPA	1,40	-0,4077	0,1762	-1,2919
SKAASMS SS	SKANDIA SMÁBOLAG SVERIGE	1,40	0,143	-0,1375	0,2902
SKASWST SS	SKANDIA SWEDISH STAR	1,70	-0,5327		-0,4314
SKAASVE SS	SKANDIA SVERIGE	1,40	-0,1562	-0,083	0,0124
SKATIGA SS	SKANDIA TIME GLOBAL	1,40	-0,0271	-0,2264	0,0606
SKAAUSA SS	SKANDIA USA	1,41	-0,2663	-0,3005	-0,2261
SKAVARL SS	SKANDIA VÄRLDEN	1,40	-0,3662	-0,0066	-0,4998
CARVARL SS	SKANDIA VÄRLDSNATURFONDEN	1,70	-0,1753	-0,0687	0,0328
SPPAKSV SS	SPP AKTIEFOND SVERIGE	0,70	-0,1599	-0,0288	-0,0712
SPPAKGS SS	SPP AKTIEINDEX GLOBAL SUST	0,30	-0,3357	-0,0335	-0,6018
SPPAKJA SS	SPP AKTIEINDEX JAPAN	0,20	-0,422	-0,0201	-0,7987
SPPAKTS SS	SPP AKTIEINDEX SVERIGE	0,20	-0,0422	-0,0832	0,0533
SPPAUSA SS	SPP AKTIEINDEX USA	0,20	-0,1496	-0,1972	-0,2116
SPPAKEU SS	SPP AKTIEINDEXFOND EUROPA	0,20	-0,2848	0,1354	-0,6335
CARNSMA SS	STELLA SMÁBOLAG	1,70	-0,0926	-0,0671	-0,3404
BANSVER SS	SWEDBANK ROBUR ETHICA SVERIG	1,42	-0,2787	-0,0664	-0,1969
ROBUTMA SS	SWEDBANK ROBUR GLOBALFOND MEGA	0,52	-0,2707	0,0183	-0,4238
SWIXASN SS	SWEDBANK ROBUR INDEXFOND ASIEN	0,43	-0,2548		-0,1073
BANINOV SS	SWEDBANK ROBUR NY TEKNIK	1,70	-0,0568	-1,3864	0,0265
ROBSVMA SS	SWEDBANK ROBUR SVERIGEFOND MEGA	0,52	-0,026	0,0611	0,0056
ROBIIIA SS	SWEDBANK ROBURS ALLEMANSFOND III	1,43	-0,2355	0,0936	-0,0605
ROBAIIA SS	SWEDBANK ROBURS ALLEMANSFOND II	1,43	-0,2419	0,0912	-0,0585
ROBAFIA SS	SWEDBANK ROBURS ALLEMANSFOND I	1,43	-0,2507	0,0921	-0,0758
ROBAFVA SS	SWEDBANK ROBURS ALLEMANSFOND V	1,43	-0,2478	0,0777	-0,0631
ROBEXPA SS	SWEDBANK ROBURS EXPORTFOND	1,42	-0,0806	0,1303	0,0947
TRETILL SS	TREVISE TILL VÄXTFOND	1,25	-0,3286	-0,2244	
VBSWDEQ SS	VALBAY SWEDISH EQUITY FUND	1,55	0,0564		0,5015
KAUPKIN SS	ÅLANDSBANKEN CHINA GROWTH	2,00	0,0229	1,5659	-1,1107
KAUPS30 SS	ÅLANDSBANKEN SWEDEN OMX30	0,40	-0,1185	0,3615	-0,7783
KAUSMAB SS	ÅLANDSBANKEN SWEDISH SMALL CAP	1,40	-0,206	-0,409	-0,1995
KAUPTIM SS	ÅLANDSBANKEN TIME	1,40	-0,5856	-0,8124	-0,3117

APPENDIX 2 – BLOOMBERG SEARCH CRITERIA

Bloomberg Search Criteria	
Selected Screening Criteria	Matches
Universe Criteria	480411
Market Status	480411
Country of Availability: Sweden	17187
Fund Type: Mutual Fund	3026
Currency: SEK	293
Fund Asset Class Focus: Equity	198
Fund Market Cap Focus	198
Analytic Criteria	198
Expense Ratio	198
Fund Manager Stated Fee	198
Fund Total Assets (mil)	198
History Length	198