MASTER'S THESIS IN FINANCE – STOCKHOLM SCHOOL OF ECONOMICS

Nordic Hedge Funds

An evaluation of the Nordic hedge fund market

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Abstract

This paper is investigating the Nordic hedge fund market. The sample that has been used consists of 85 hedge funds from Sweden, Finland, Norway and Denmark. The first question to be answered is: Do Nordic hedge funds produce abnormal returns without high correlation to the market? A single-factor and a three-factor regression model show that positive alphas are generated together with relatively low betas. Hence, the hedge funds give positive returns to a low correlation with the market. The second question is: Are there any differences in hedge fund performance between the Nordic countries? Based on Sharpe-ratios, Treynor-ratios and average returns the paper finds that there are differences between the Nordic countries. Norway is slightly outperforming Sweden, while Finland and Denmark are clearly lagging behind. The third question is: Do explanatory factors have influence on the performance of Nordic hedge funds? We find little evidence of explanatory value in the specific fund attributes. We find indications of that the level of incentive fee and the level of management fee are related to fund performance, though the results are not significant at a satisfying level.

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1.0 Introduction

The Nordic equity markets have never attracted so much foreign capital as today. Returns during the last years have been in the forefront globally and the region is in numerous rankings considered to be one of the leading technology innovators. One obvious proof is the battle between Nasdaq, Dubai Stock Exchange and Qatar Stock Exchange for the Swedish stock market operator OMX. At the same time the number of hedge funds available to investors has literally exploded since the dot.com crash in 2000. The concept of hedging was introduced in the U.S. and has been used for 60 years. In the Nordic region the first hedge funds entered the market in the middle of the 1990s and have since then increased in popularity rapidly. With this increased popularity the focus and exposure of hedge funds in media has become more intensified. Lately there has been reporting of hedge funds closing down due to bad performance but also funds heavily oversubscribed and closed for new capital. Clearly there is a divided picture on how well hedge funds are performing.

In this paper we are aiming at presenting the Nordic[1] hedge fund market in a complete an accurate way. Based on performance data from a large sample of 85 Nordic hedge funds, we want to see if they generate abnormal return to an attractive level of risk. We will evaluate the Nordic market as one group by performing regressions and evaluate the funds by different performance measures. Furthermore, this paper is aiming at distinguish good performing countries from bad performing ones in the Nordic region. Finally this paper will investigate if explanatory factors (the different factors are age, size, number of funds, minimum investment, management fee and performance fee) affect Nordic hedge fund performance. We also want future investors to be able to use our conclusions when deciding where to invest, based on their risk/return preferences when looking at the Nordic hedge fund market.

1.1 Contribution

One could say that our purpose with this thesis is twofold. First of all we want to extend the amount of academic research available today regarding hedge funds. We want to test if the theories that have been expressed so far, mostly relating to the U.S. market, are applicable in the Nordic region as well. Since we are using a larger sample than previous studies, covering the Nordic region, as well as more up-to-date performance data, our paper will provide the academic

[1] In the Nordic market we include the countries of Sweden, Finland, Norway and Denmark.

field with more accurate findings. Our second approach is to provide future hedge fund investors with a guide concerning where to invest in the Nordic region based on risk and return preferences.

The growing interest in hedge funds has created a number of research papers, mostly investigating the U.S. market and the main drivers affecting performance. In this paper, the Nordic hedge fund market will be examined. The main contribution of this thesis is that a vast and broad sample of hedge funds is used. Previous studies have used a smaller set of data when it comes to number of funds and period of time. Finding accurate data of hedge funds is difficult and therefore makes our extensive Nordic data sample relevant and of an academic interest.

Secondly we evaluate fund attributes and try to find relationships between them and performance. In previous research, e.g. Anderberg and Cederholm (2007), single variable regressions are performed between period alphas and descriptive factors. In this paper however, we are running regressions both between alphas and descriptive factors and excess returns and descriptive factors. We argue that the excess return regressions will provide us with more accurate results since not all the hedge funds in the sample are exposed to the same markets. Hence, the choice of benchmarks directly affects the alpha- and beta values. Hence, in this area our findings will provide existing research with additional power.

Our third contribution to previous research is that comparisons between the Nordic countries are conducted. In previous research papers investigating the Nordic hedge funds market, the region as one entity is examined and not country by country. This makes the paper of interest to an investor who is evaluating the Nordic hedge fund market.

The final contribution of this paper is that the performance data is up-to-date. This is important since the markets have been extremely volatile the last year due to the hype in China and the credit turmoil in the U.S. The last couple of years a large number of Nordic hedge funds have been started which makes it even more interesting to use as up-to-date data as possible.

1.2 Outline

The outline of this paper is as follows; in chapter 2 we give a brief introduction about the main concepts surrounding hedge funds and an overview of the Nordic hedge fund market will be presented. Thereafter, in chapter 3, we present our theoretical framework which consists of different asset pricing models and performance measures. Chapter 4 is a presentation of previous research in the area and the main findings that can be drawn from them. Our research questions will be presented in chapter 5 which is followed by a methodology section and data description in chapter 6. Based on our regressions performed and our different performance measures we will

present the results in chapter 7. Conclusions will be drawn upon our findings and answers to our research questions will be presented in chapter 8. Finally we give our view of what could be of interest for further research in the area of hedge funds in chapter 9.

2.0 Nordic hedge fund background

Since the inception of hedge funds in the Nordic region a lot has happened to the financial markets in general and to the Nordic hedge fund market in particular. In this chapter we will present the history of hedging, a definition regarding what it is all about and give an overview of the Nordic hedge fund market. Different hedge fund strategies will be discussed since these differ substantially between the funds. Finally the chapter gives an overview of the Nordic hedge fund market when it comes to number of funds, size, age and average performance.

2.1 History of hedging

One could say that the birth of the concept of hedge funds actually has its origin during the stock market crash in the late 1920s where long-only investors got hurt severely as many of the biggest corporations in the U.S. defaulted or at least entered into states of financial distress. Even though the markets started to recover soon after the trough it took a long time before the old highs were reached again. The skepticism regarding the risks investors in the financial markets were exposed to had come to stay. As the general business climate improved and the available technology became more advanced, the financial products and strategies also developed and became more sophisticated.

Alfred Winslow Jones, a sociologist from Colombia University introduced the concept of a hedge fund. He was a reporter at the Fortune magazine and in 1949 he wrote an article about different investment strategies on Wall Street. Soon after he developed his own model where the idea was to protect long-term investments that he thought were undervalued with short-term investments in assets he thought were overvalued. In that way he was able to receive a positive development of his portfolio both in positive and negative market environments. The issue that made Jones' portfolio special was that he both took long positions and short positions. He also began with an innovative fee structure model. The clients had to pay a pre-determined percentage of the absolute return. The strategy Jones used is called market neutral and implies taking long positions in undervalues stocks and short positions in overvalued stocks. This would create a levered position that would be hedged, thereby its name (Edwards, Franklin (1999)).

In the U.S., hedge funds were previously defined by their freedom from regulatory controls. This originated from the Investment Company Act of 1940. Since these funds were considered to be riskier than mutual funds, they had a 100 investor limit and also requirements regarding the wealth of the investors (Getmansky (2004)). Another reason for why hedge funds

had to limit themselves to 100 investors was that mutual funds were not allowed to use leverage and short-selling. By limiting the number of investor this restraint could be dismissed (Fung, Hsieh (1999)). In 1996, the 100 investor limit was abandoned by the National Securities Markets Improvement Act and the new wealth requirement for individual investors investing in hedge funds was decided to be $ 5 million and for institutions $ 25 million (Getmansky (2004)).

Around the year of 1990 hedge funds used most of the opportunistic strategies that were available. However, the most prominent strategy was macro, like the Quantum fund of George Soros and Tiger Asset Management of Julian Robertson. At that time, these two funds represented 70 percent of the assets invested in hedge funds. The fall of Long-Term Capital Management, a fund founded in 1993 by famous fixed income traders and Nobel Prize winners, made investors more skeptical about the few restraints that were associated with hedge funds. Hence, the demand for more regulation and specialization of these funds became apparent. Therefore, managers started to invest mostly in those areas where they had proved and exhibit an expertise (Anderlind, Eidolf, Holm, Sommerlou, Dotevall (2003)).

Especially since the beginning of the 21st century, investors have been offered more options concerning investment opportunities than ever before. Based on risk preference an investor now has the possibility to create a diversified portfolio with assets that are uncorrelated with each other and exposed to the majority of the financial markets. As investors get more sophisticated the demand for more advanced products such as alternative investments increases. One of these asset classes is hedge funds. Even though this asset class has become a popular and accepted investment tool in general, it is still widely discussed and often criticized for being too little transparent and taking too high fees.

2.2 Hedge fund definition

The definition of a hedge fund has changed since its inception. Originally these funds were supposed to reduce the overall risk exposure by taking offsetting positions in assets, thus always taking a short position when already having a long. The investor would receive a portfolio with a purpose of delivering absolute performance. Hence, during bull markets in theory the long positions in undervalued stocks should increase more in value than the overvalued stocks and the same pattern should prevail during bear markets. The result of this strategy should be an absolute performance during all market environments. As this investment tool became popular among both investors and fund managers, new strategies evaporated that also came to belong to the hedge

fund field since they all shared the same fundamental belief of delivering absolute returns. These could be investing in distressed securities, relative value, merger arbitrage and event driven situations.

Hedge funds have different fee structures than mutual funds. Normally, hedge funds have a fixed fee of 1-3 percent of the assets-under-management and then an incentive fee, 15-25 percent of the profits that exceed a predetermined hurdle rate. The hurdle rate is normally a 30- or 90-day liquid fixed income security. The hurdle rate is chosen since the hedge funds have the absolute return objective. This rather lucrative fee structure (if the fund performs well) has made it common for the managers to invest a lot of their own wealth as well in the funds. Hedge funds also use a concept that is known as "high watermark" which requires that the fund manager make up for previous losses before receiving the incentive fee (Edwards, Franklin (1999)). An advantage with hedge funds when incorporating it in a diversified portfolio is that the correlation between the fund and the other assets involved is low. This can be seen in the appendix as well, section 11.8, where we show the correlation between an unweighted return index of our Nordic hedge fund sample and the returns of the Carnegie Nordic Total Cap index. The correlation between the two indices is 0,171.

The fact that hedge funds show low correlation with other asset classes and in particular with equities which we mentioned, hedge funds have become a popular asset class when it comes to creating a diversified portfolio with more assets than solely stocks and bonds. Basic research shows that by replacing some of the money invested in stocks and bonds with hedge funds will reduce the overall standard deviation of the portfolio while keeping the expected return on the same level as before. Based on monthly data from 1994 to 2001 a portfolio of 50 percent stocks and 50 percent bonds had a mean return of 0,95 percent. When adding hedge funds to the portfolio the return moved towards 0,99 percent when 100 percent was invested in hedge funds. When it comes to standard deviation, the portfolio started at 2,49 percent when the assets were divided into 50 percent stocks and 50 percent bonds but moved towards 2,44 percent when 100 percent was invested in hedge funds (Amin, Kat (2002)). One aspect the investor has to bear in mind when replacing the money invested in bonds with hedge funds is the skewness and kurtosis distribution that is received. When comparing a portfolio with 50 percent stocks and 50 percent bonds with a portfolio consisting of 50 percent stocks and 50 percent hedge funds the net effect is that the probability of a large loss or a large return is increased in the latter case. The probability of a smaller positive or negative return is reduced. The investor will hence face a trade-off

between potential profits and losses (Amin, Kat (2002)). Of course the importance of finding the most skilled manager will also be crucial, especially since funds with the same strategy seem to be clustered in time. In the early 1990s macro funds were popular and in the late 1990s long/short funds were popular. Therefore an investor has to take into account the limitations of hedge funds available when constructing a diversified portfolio (Lhabitant, Learned (2002)).

2.3 Overview of the Nordic hedge fund market

In September 2007, there were 9500 hedge funds in the world (www.hedgenordic.com). Our Nordic sample consists of 85 hedge funds distributed 49 in Sweden, 15 in Finland, 10 in Norway and 11 in Denmark. During 2006, the number of hedge funds in Sweden increased with 24 percent. Hedge funds are often compared with mutual funds, both from a return- and fee perspective. In this paper we will get back to that issue later on. It is however important to show the difference in assets-under-management between mutual funds and hedge funds, since the difference is substantial. In May 2007, the total assets-under-management for the Swedish population was SEK 1663bn. Of this sum, SEK 80bn was invested in hedge funds (www.morningstar.se). *Table 1* shows the descriptive data of our data sample.

Table 1: Descriptive data of the Nordic hedge fund market (funds in sample)

	Nr of Funds	AUM (MEUR)*	Age(years)*	Mean yearly return (%)*
Sweden	49	210,6	4,1	9,5
Finland	15	81,6	4,1	4,9
Norway	10	118,7	4,7	14,3
Denmark	11	101,0	2,7	3,5
Total Nordic	85	170,7	4,0	8,5

* = unweighted average

2.4 Hedge fund strategies

Since the first definition of a hedge fund, a number of strategies have evolved, each having the goal of maximizing performance to lowest level of risk. One of the most popular features with hedge funds is the fact that they show weak correlation with the rest of the market. Therefore, in order to get as diversified portfolio as possible, buy-and-hold strategies have in many occasions been replaced by these other "offsetting positions." The general measure of superior performance

is called alpha and will be discussed in the theoretical framework section. Since there are a vast number of strategies available this measure is now considered to be explained by "style" and "skill". General market movements are reflected in the "style" part whereas the skill of the manager is reflected in the "skill" part (Fung, Hsieh (1998)).

Fung and Hsieh (1999) make a comparison with seven different hedge fund strategies. According to their article, the category "sectors" had the best performance during their sample period (1990-1997), 29,6 percent per annum. The standard deviation was however rather high, 15,9 percent. This can be compared with the "event-driven" strategy that had a performance of 18,9 percent with a standard deviation of 5,9 percent.

Figure 1: Distribution of hedge fun strategies (funds in sample)

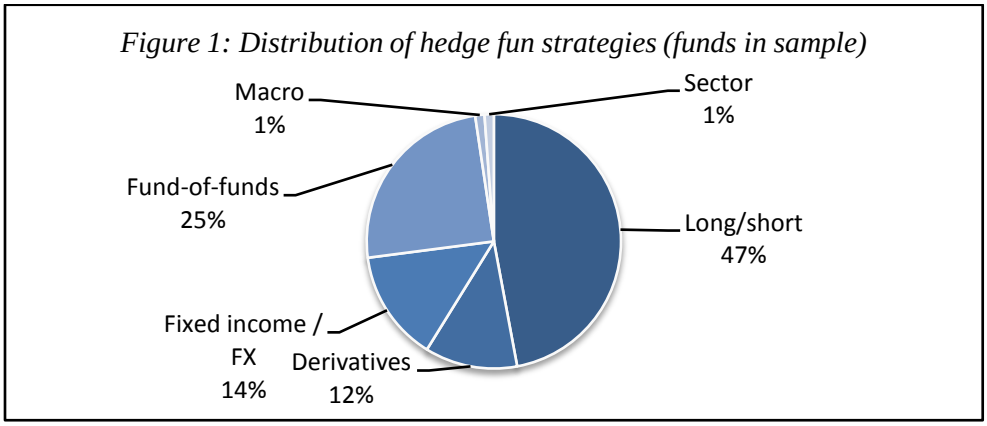


Table 2: Hedge fund strategies (Anderlind, Eidolf, Holm, Sommerlou, Dotevall, (2003))

Cash/futures arbitrage	Long (short) position in stocks belonging to an index and at the same time long (short) position in the index futures contract
Collateralized loans	Position in securitized bank loans, earn positive carry over the funding rate
Convertible arbitrage	Position in convertible bonds while hedging out certain market risks
Discretionary trading	Positions in the currency, equity, commodity and bond markets. Models are often computerized
Distressed securities	Positions in illiquid securities (debt or equity) in or near bankruptcy in hopes of a recovery
Emerging equity long/short	Positions in securities in emerging markets, betting on information inefficiencies
Equity arbitrage	Exploit mispricings of equity and equity derivative securities
Equity options arbitrage	Exploit mispricings in equity derivates
Event driven	Exploit a specific capital markets transaction

Fixed income arbitrage	Exploit mispricings in the global fixed income markets
Fixed income long/short	Hedge out interest rate risk on government and corporate debt investments
Global macro (global opportunistic)	Top-down macroeconomic approach, when investing internationally
Long/short	Long positions in securities that are expected to increase in value and short positions in securities that are expected to decrease in value
Market timing	Long/short exposures are varied in response to market factors
MBS arbitrage	Exploit mispricings in the U.S. mortgage-backed securities market
Merger arbitrage (risk arbitrage)	Exploit opportunities in the case of takeovers and mergers. Typically, managers take a long position in the acquired firm and short position in the acquirer
Regional funds	Exploit opportunities in specific geographical regions
Regulation arbitrage	Profit from appreciation in the value of short-term investments in the firms that need to raise capital quickly
Relative value	Try to isolate returns specific to assets while hedging out systematic factors driving the returns
Sector funds	Invests in specific industries and segments of the economy
Short selling	Take short positions in assets that are expected to decrease in value
Special situations	Event-driven strategy where the event might relate to a spin-off, corporate reorganization etc
Systematic trading	Positions based on computer models
Tactical trading	Strategy reflecting a focus on systematic factors like inflation or interest rates

3.0 Theoretical framework

In the financial world investors want to benefit from taking on risk. Hence, a riskier strategy will only be used if the expected return is higher than otherwise. In this section, we will present different performance and risk measures. However, we will start off with describing a single-factor asset pricing model and the Fama-French three-factor model. Finally, we will describe the test of any relation between some specific attributes of the funds and their performance, also referred to as explanatory factors. These asset pricing models and performance measures will be used later on in order to evaluate the hedge funds and answer our research questions.

3.1 Asset pricing models

Asset pricing models capture fundamental risk components and the asset's sensitivity towards specific factors. Both a single-factor asset pricing model and a multi-factor asset pricing model, based on the Fama-French framework are presented.[2]

3.1.1 Single-factor model

The single-factor asset pricing model is the basic approach when analyzing the risk and return of financial assets. It is based on the concept of systematic and firm-specific risk. In the traditional form, the expected excess return of an asset is given by its exposure to systematic risk which is denoted beta, β, times the excess return of the market portfolio.

$$E(\tilde{R}_P) = \gamma_1 \beta_P$$

where

$E(\tilde{R}_P) = return\ of\ portfolio$

γ_1= *excess return of market portfolio*

$\beta_P = beta\ of\ portfolio$

The basic formula above is however dependent on a number of assumptions. Normally, the assumption regarding the availability of riskless borrowing and lending is relaxed. In this case we will end up with a formula where we calculate the excess return of the market portfolio together

[2] We refer to these models as "the single-factor model" and "the multi-factor model".

with the beta and also the excess return of the "investor portfolio" (Black, Jensen, Scholes (1972)).[3]

$$E(\tilde{R}_p) = E(\tilde{r}_{rf}) + \beta_p[E(\tilde{r}_m) - E(\tilde{r}_{rf})]$$

where

$E(\tilde{R}_p) = return\ of\ portfolio$

$E(\tilde{r}_{rf}) = risk - free\ rate\ of\ return$

$E(\tilde{r}_m) = return\ of\ market$

$\beta_p = beta\ of\ portfolio$

3.1.2 Fama-French three-factor model

The second asset pricing model presented is the multi-factor model called the Fama-French three-factor model. Fama & French (1992) developed the Fama-French three-factor model in order to better explain asset returns over time. In the single-factor model all risk factors are aggregated into one variable. The Fama-French three factor model takes into account further measures of risk. This should improve the explanatory power of the model. In the model the factors "value risk" and "size risk" are added.

The SMB in the formula below stands for small (cap) minus big and represents the premium which has been received in the past for investing in small capitalization stocks compared with larger companies.

The HML stands for high (book/market) minus low and indicates the premium that has been received in the past for investing in companies with high book-to-market values compared to companies with low values.

$$r_p = r_f + \beta_{1,p}(r_m - r_f) + \beta_{2,p}SMB + \beta_{3,p}HML$$

where

$r_p = return\ of\ portfolio$

$r_f = riskfree\ rate\ of\ return$

$r_m = return\ of\ market$

[3] $E(\tilde{R}_p) = E(\tilde{r}_{rf}) + \beta_p[E(\tilde{r}_m) - E(\tilde{r}_{rf})]$, this formula is also referred to as the Capital Asset Pricing Model (CAPM)

$$SMB = small\ [cap]\ minus\ big$$

$$HML = high\ \frac{book}{price}\ minus\ low$$

In the formula, $\beta_{1,p}$ is still the exposure to market risk in the same way as in the single-factor model. The exposure to size risk is indicated by $\beta_{2,p}$ and the exposure to value risk by $\beta_{3,p}$. In the article from 1992 Fama & French argue that the three-factor model is superior to the single-factor model in explaining asset returns. Further more Fama & French (1995 & 1996) argue that firm-specific factors are proxies for exposure to underlying risk factors that are rationally priced in the market[4].

3.2 Performance measures

When evaluating the hedge fund sample in terms of risk and return, we will conduct a number of performance measures in order to be able to compare the funds. These measures will be described below. In the next section we will also present our explanatory factors, or fund attributes. These will be regressed against the excess returns and alphas of the hedge funds. Hence, we will end up with information about which are the most important factors affecting hedge fund performance.

3.2.1 Jensen's alpha

Jensen´s alpha was developed in 1967 by Michael Jensen. His purpose in deriving the measure was to create a risk-adjusted measure of portfolio performance which estimates how much a manager´s forecasting ability contributes to the fund´s returns (Jensen (1967)).

Jensen´s alpha measures whether a portfolio is earning sufficient return in relation to its risk. Simply the Jensen´s alpha measures the difference between the return of the portfolio to the expected return from the single-factor model, given the portfolio beta and the market portfolio return. This implies that the return of the portfolio is in line with the single-factor model if alpha is close to zero. While the beta-value is the exposure to market risk, the alpha value reflects the skills of the fund manager (Borchert, Ensz, Knijn, Pope, Smith (2003)).

$$E[R_p] - R_f = \alpha_p + \beta_p(E[R_m] - R_f)$$

[4] See appendix 11.9 for a complete construction of the Fama-French factors.

$where$

$E[R_p] = return\ of\ portfolio$

$R_f = risk - free\ rate\ of\ return$

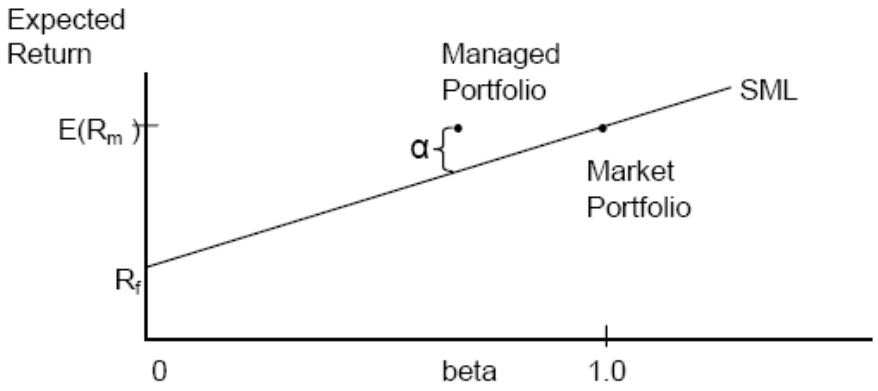
$\alpha_p = Jensen´s\ alpha$

$\beta_p = beta\ of\ the\ portfolio$

$E[R_m] = return\ of\ market$

A positive Jensen´s alpha represents the return that is obtained due to other factors than market exposure such as the skills of the fund manager. Hence, according to the single-factor model, in equilibrium, portfolios with the same beta should offer the same expected return. The positive deviation from this rule implies superior performance (Amin, Kat, (2002)).

Figure 2: SML graph displaying Risk and Return



3.2.2 Sharpe-ratio

The Sharpe-ratio was first developed in 1966. The ratio measures the excess return for a portfolio over a predetermined benchmark such as the risk-free rate to the standard deviation of the portfolio. Hence, this will tell you how much return the investor will earn per extra unit of risk. When having a number of investment decisions, the Sharpe-ratio will tell you which one is the most "optimal" given that the correlations of the funds to the benchmark are rather similar (Sharpe (1994)).

One negative aspect with the Sharpe-ratio is that it is a two-sided measure. This means that the deviation from the mean can be either positive or negative. In reality, the positive deviation is appreciated by the investor but not the negative one (Leggio, Lien, (2003)). According to the single-factor model, when assuming that all assets are normally distributed, in equilibrium the highest Sharpe-ratio is that of the market index. Therefore a ratio that is higher represents superior performance and a lower ratio represents weaker performance. When it comes to hedge funds, the normality assumption is not fully correct since many of these funds invest in other, more advanced instruments than equities and cash (Amin, Kat, (2002)).

$$Sharpe - ratio = \frac{r_p - r_f}{\sigma_p}$$

$where$

$r_p = return\ of\ portfolio$

$r_f = risk - free\ rate\ of\ return$

$\sigma_p = standard\ deviation\ of\ portfolio$

3.2.3 Treynor-ratio

The Treynor-ratio was first developed by Jack Treynor (Treynor, (1965)). The Treynor-ratio measures the excess return to systematic risk exposure, which is expressed in terms of beta (Hübner (2003)). Hence, while the Sharpe—ratio only takes the amount of total risk into account, the Treynor-ratio incorporates the market risk component. The ratio is computed as the excess return of the portfolio divided by the beta of the portfolio.

$$Treynor - ratio = \frac{r_p - r_f}{\beta_p}$$

$where$

$r_p - r_f = excess\ return\ of\ portfolio$

$\beta_p = beta\ of\ portfolio$

3.3 Explanatory factors

Except for measuring the pure performance of different hedge funds, this paper will also investigate how different fund characteristics, factors, might affect performance. The factors examined are fund size, fund age, performance fee, management fee, minimum required investment and the number of funds in the managing company. These factors are intuitive to examine since they clearly can improve or restrain the investment universe of the investment manager. Minimum investment and especially the number of funds have not been examined to any larger extent before. *Table 3* summarizes the findings in previous studies, which are described further in section 4.

In previous research, tests of relations are performed between fund characteristics and hedge fund performance in terms of alpha. For example, Anderberg and Cederholm (2007) find that funds with higher management fees have higher alphas whereas size does not appear to affect alphas at all. In this paper, regressions between hedge fund characteristics and alphas will also be conducted. However, we will also perform regressions between hedge fund characteristics and the funds' excess returns over the risk-free interest rates, since hedge funds cannot be assumed to be investing in assets accurately reflected in the same benchmarks. Hence, using a benchmark not appropriate for the certain hedge fund will provide us with misleading alpha- and beta values, thereby affecting the reliability of the results negatively.

Table 3: Factors potentially affecting hedge fund performance

Variable	**General results in previous studies (See section 4)**
Size	Negative relationship between fund size and return
Age	Younger funds tend to perform better than older funds
Performance fee	The higher the incentive fee, the better the performance
Management fee	The higher the management fee, the better the performance
Minimum investment	---
Number of funds	---

4.0 Previous studies

This chapter provides an overview of previous research in the area of hedge funds. We start with presenting more general research in the field. Thereafter, we present research of fund attributes which potentially affect the hedge fund performance. *Table 4* summarizes the main findings from previous research in the area.

Table 4: Main findings from previous studies

Fama (1970)	In perfect markets there should be no information asymmetry and thus today's stock price should reflect the true value
Liang (1998)	Hedge funds have low betas to the market, more leverage, more sophisticated strategies, absolute return purpose, risk-free rate as benchmark
Ammann & Moerth (2005)	Negative relationship between fund size and return. Too small funds underperform due to too high expense ratio
Getmansky (2004)	Rather obvious, positive relationship between performance and cash flow into the fund. However, this is a concave relationship
Howell (2001)	Younger funds outperform older funds
Liang (2000)	Average survivorship bias is 2 percent per year
Ackerman, McEnally & Ravenscraft (1999)	Hedge fund's incentive fees explain some of the outperformance relative to mutual funds
Liang (1998)	Average management fee is 1,36 percent while the average performance fee is 16,24 percent
Dahlquist, Engström & Söderlind (2000)	Performance is negatively related to fees for mutual funds

4.1 Efficient markets

The theory regarding efficient financial markets says that all information available and thus the expected returns should be fully reflected in today's stock price. This definition would imply that all successive price changes would be independent and a random walk model would be created for future returns. Fama (1970) presents a number of conditions that have to prevail in order to have fully efficient markets. There should be no transaction costs when trading different

securities, there should be no information asymmetry among investors and the information should also be costlessly available to everyone. However, in real life it is difficult, if not impossible, to find markets where these conditions are met (Fama (1970)). The conclusion that can be drawn from this research paper is that if the financial markets would be fully efficient, there would be no arbitrage opportunities available and hence, the possibility of creating alpha would be limited or zero.

4.2 Hedge funds vs. mutual funds

Liang (1999) discusses differences between hedge funds and mutual funds. He concludes, after having performed a factor model evaluation of hedge fund performance, that the low betas received with the U.S. equity market as benchmark, indicate that these funds are less correlated than mutual funds with the traditional stock market. Hedge funds use leverage, more sophisticated investment products and "move quickly among different markets". A second finding worth mentioning is that many non-zero betas were observed in the hedge fund sample indicating that the funds are not as market neutral as was the desire in the original definition of hedge funds. At first, hedged positions were only aimed at combining long and short positions and in that way neutralize market risk. In general however as Liang puts it, hedge funds apply dynamic trading in order to capture profits and this strategy does not neutralize market risk. One obvious difference between hedge funds and mutual funds is that mutual funds often use relative targets when measuring performance such as equity indices. Hedge funds, however, as been previously mentioned, are absolute performers and hence they are compared with the risk-free interest rate. Therefore, Liang looked at the Sharpe-ratio between hedge funds and mutual funds and found that the highest ratios were found among the hedge funds. This would imply that hedge funds in general generate better performance relative to the level of risk than mutual funds.

4.3 Does hedge fund size affect performance?

Ammann & Moerth (2005) presents ideas about fund size and its effect on performance. A hedge fund has one fixed fee component and one performance fee component. The performance fee is a percentage of the profit generated and it thus depending on two variables: the size of the fund and the performance of the fund. The article finds that there is a negative relationship between fund size and return. Therefore, it is important that the hedge fund manager decides how big the asset base should be. Smaller funds outperform bigger funds. However, too small funds underperform

because of higher total expense ratios. This becomes a dilemma for the hedge funder manager since it is difficult to decide the optimal size of the fund.

Getmansky (2004) argues that better performing funds are likely to attract more money and hence increase its size faster than poorly performing funds. The average sized fund in the market seems to grow faster relative to large funds.

4.4 Does hedge fund age affect performance?

Howell (2001) draws the conclusion in his article about hedge funds and their age that younger funds tend to perform better than older ones. He finds that the youngest deciles have a return of 23,2 percent while the more matured ones have a return of 13,4 percent. Young funds are usually those with a track record of less than three years. The proportion of failure by age reaches a maximum after 28 months and then has a small gradual decline of 2-3 percent per annum. Surviving funds outperform non-surviving funds by 2,1 percent per year and large hedge funds tend to survive longer than smaller ones (Gregoriou (2002)). This is somewhat of a contrast to the article presented above by Ammann and Moerth where they argue that smaller funds generally outperform bigger funds.

Even though the growth in number of hedge funds globally has increased by more than 25 percent per year since 1980, the annual liquidation rate among these funds is substantially higher than among mutual funds. The liquidation numbers are 7,1 percent and 1,0 percent respectively.

4.5 Do fees affect performance?

Ackerman, McEnally & Ravenscraft (1999) examined the performance of hedge funds and especially the incentive fees. They used a large data sample of hedge funds and their performance from 1988-1995. Compared to mutual funds which mainly use a management fee independent of performance Ackerman, McEnally & Ravenscraft finds that hedge fund's incentive fees explain some of the better performance.

Liang (1998) also investigates how incentives affect performance. Covering a large sample of American hedge funds he finds an average annual management fee of 1,36 percent. The average performance fee was 16,24 percent giving the fund managers high incentives to perform well. Results from the analysis shows that the incentive fees provide managers with strong incentive schemes: the higher the incentive fee, the better the fund performance. In fact, a 1

percent increase in the incentive fee will increase the average yearly return by 1,3 percent. Looking at Swedish mutual funds Dahlquist, Engström & Söderlind (2000) find the opposite conclusion. Their results show that performance is negatively related to fees. Hence high fee funds should not perform a well as low fee funds.

Agarwal, Daniel & Naik (2004) examine the role of managerial incentives and discretion in hedge fund performance. The results show that hedge funds with greater managerial incentives, managerial ownership and high-water mark provisions, are associated with superior performance. From the regressions they find with statistical significance that managerial incentives are positively related to the funds' alphas.

4.6 Survivorship bias

When evaluating funds and their performance it is possible to choose two ways in doing so. Either one can look at all funds that have been operating during the sample period, or one could decide to examine only those that were alive at the end. By using the latter approach, performance will be biased towards the surviving, and probably better performing funds. The topic concerning survivorship bias has become a popular research field, since depending on how the results are presented they will not appear the same. The survivorship bias is defined as the performance difference between surviving funds and all funds.

Liang (2000) finds that the average survivorship bias in his hedge fund sample is over 2 percent per year and that number is consistent with other studies as well. The sample consists of 1162 hedge funds, including 1052 survived funds and 110 dissolved funds. Another interesting finding is that the funds display declining performance when getting closer to liquidation date. This can be seen as an indication of that funds disappear due to poor performance.

5.0 Research questions

This paper has three research questions. The first one is aiming at investigating the total Nordic hedge fund market and how well the funds perform in terms of risk and return. Our first research question is:

1. *Do Nordic hedge funds produce abnormal returns without high correlation to the market?*

We will continue our study by looking at differences in performance between the Nordic countries. Our second research question is:

2. *Are there any differences in hedge fund performance between the Nordic countries?*

Finally, we will test if there are some attributes, explanatory factors, related to the funds' performance. The choice of factors to be tested is mainly based on previous studies. Thus, our third research question is:

3. *Do explanatory factors have influence on the performance of Nordic hedge funds?*

6.0 Methodology and data

In order to test our research questions we have used a quantitative method which analyzes data and statistical relationships between fund performance and different benchmarks. This means that our research method is focused on numerical data and statistics and thus not relying on interviews and questionnaires. The strength of using a quantitative research method is that it produces quantifiable and reliable data which could be generalized to a larger population. An important part of the quantitative method, in our case, is the data sample which is unique.

6.1 Test of performance

In order to analyze the fund performance we have performed different regressions with monthly return data. The regression models are presented in the following sub-sections. To measure performance across the Nordic countries we analyze the data with Jensen´s alpha, Sharpe-ratio and the Treynor-ratio. The comparison between the countries will be performed on both individually country based benchmarks and to one common Nordic benchmark.

6.1.1 Single-factor regression model

The model used to test for abnormal returns under the single-factor framework is:

$$r_p - r_f = \alpha_p + \beta_p[r_m - r_f] + \varepsilon_p$$

6.1.2 Multi-factor regression model

We have also performed regressions based on the Fama-French three-factor model. In this case, more variables are added which should generate more robustness to the study. The regression model used to test abnormal returns under the multi-factor framework is the following:

$$r_p - r_f = \alpha_p + \beta_{1,p}[r_m - r_f] + \beta_{2,p}SMB + \beta_{3,p}HML + \varepsilon_p$$

6.1.3 Explanatory factors regression models

In order to evaluate the effect of certain fund attributes on the funds' performance, we have performed regressions where we measure the impact from different hedge fund related factors. This is performed as single-factor regressions between the explanatory factors and the alphas, as

well as between the explanatory factors and the excess returns. The regression models used for the single-factor regressions are the following:

$$\alpha_p = \alpha_x + \beta_x Factor_x + \varepsilon_x$$

and

$$r_p - r_f = \alpha_x + \beta_x Factor_x + \varepsilon_x$$

We have also performed multi-factor/simultaneous regressions for the explanatory factors to improve the robustness of the results. The explanatory factors included in the test are presented in section 3.3. The regression models used for the multi-factor regressions are the following:

$$\alpha_p = \alpha_x + \beta_{1,x} Factor_{1,x} + \beta_{2,x} Factor_{2,x} + \cdots + \beta_{6,x} Factor_{6,x} + \varepsilon_x$$

and

$$r_p - r_f = \alpha_x + \beta_{1,x} Factor_{1,x} + \beta_{2,x} Factor_{2,x} + \cdots + \beta_{6,x} Factor_{6,x} + \varepsilon_x$$

Note that we use the terms single-factor and multi-factor regressions both for the asset pricing models and for the explanatory factors regression models.

6.2 Benchmarks used in tests

When performing the asset pricing model regressions and calculating the performance ratios we have used different interest rates and equity indices depending on which country the hedge fund is belonging to. 30-days Treasury-bills from Sweden, Finland, Denmark and Norway are used as the risk-free interest rates and OMX Stockholm, OMX Helsinki, OMX Copenhagen and Oslo Exchange All Share are used as market portfolios. In *Table 5* the benchmarks that have been used when making the single-factor model regressions are presented.

Table 5: Overview of benchmarks used under single-factor regressions

Country	R_m	R_f
Sweden	OMX STOCKHOLM (OMXS)	Swedish 30 Day T-bill
	Carnegie Nordic Total Cap (CTXNORDIC)	Swedish 30 Day T-bill
Finland	OMX HELSINKI (OMXH)	Finish 30 Day T-bill
	Carnegie Nordic Total Cap (CTXNORDIC)	Finish 30 Day T-bill
Norway	Oslo Exchange All Share (OSEAX)	Norwegian 30 Day T-bill
	Carnegie Nordic Total Cap (CTXNORDIC)	Norwegian 30 Day T-bill
Denmark	OMX COPENHAGEN (OMXC)	Danish 30 Day T-bill
	Carnegie Nordic Total Cap (CTXNORDIC)	Danish 30 Day T-bill

However, to be able to make comparisons, we also perform regressions where we use the Carnegie Nordic Total Cap. as the market portfolio. By using the same market portfolio and changing the interest rates in accordance with each country it will be possible to better compare the alphas and betas across all Nordic hedge funds. When analyzing benchmarks it is also important to be aware of the correlations between the different indices.

As can be seen in *Table 6* OMX Stockholm is the benchmark with the highest correlation to Carnegie Nordic Total Cap. which is logic since it is the largest Nordic market.

Table 6: Correlation between benchmarks

	OMXC	OMXH	OMXS	OSEAX	CTXNORDIC
OMX COPENHAGEN	1	0,499	0,705	0,739	0,729
OMX HELSINKI	0,499	1	0,737	0,509	0,885
OMX STOCKHOLM	0,705	0,737	1	0,691	0,935
OSLO EXCHANGE ALL SHARE	0,739	0,509	0,691	1	0,745
CARNEGIE NORDIC TOTAL CAP	0,729	0,885	0,935	0,745	1

**Correlation is significant at the 0.01 level*

To add robustness to the study, we have also evaluated the performance of the funds under the Fama-French three-factor framework. We have used both U.S. and domestic benchmarks for the market return and U.S. and domestic interest rates. More specifically we have used a value-weighted return on all NYSE, AMEX and NASDAQ stocks as a proxy for the U.S.' R_m and the same benchmarks as in the single-factor regressions for the domestic benchmarks. For the risk-free interest rate, R_f, we have used one-month Treasury-bill rates. The portfolios of SMB

(Small Cap minus Big) and HML (High market/book minus Low) are formed of U.S. market data[5].

Performing multi-factor model regressions rather than only the single-factor model regressions will improve the robustness of the results. This should be the case when using our data sample even though American data is used for the SMB and HML factors. Thus, one might assume that our received results would be comparing "apples and pears". However, in our view, since the financial markets have become increasingly more integrated than in the past, these American numbers should be able to work as a proxy for the Nordic and European regions as well.

Table 7: Overview of benchmarks used under multi-factor model regressions (Fama-French)

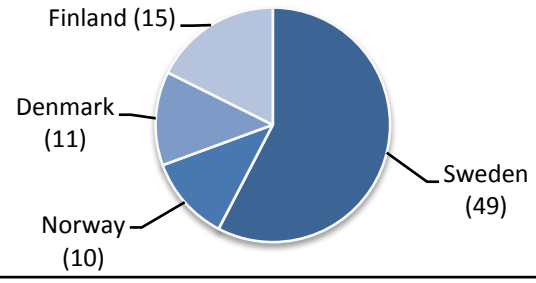
Country	**R_m**	**R_f**
Sweden	OMX STOCKHOLM (OMXS)	Swedish 30 Day T-bill
	Value weighted (NYSE, AMEX & NASDAQ)	US 30 Day T-bill
Finland	OMX HELSINKI (OMXH)	Finish 30 Day T-bill
	Value weighted (NYSE, AMEX & NASDAQ)	US 30 Day T-bill
Norway	Oslo Exchange All Share (OSEAX)	Norwegian 30 Day T-bill
	Value weighted (NYSE, AMEX & NASDAQ)	US 30 Day T-bill
Denmark	OMX COPENHAGEN (OMXC)	Danish 30 Day T-bill
	Value weighted (NYSE, AMEX & NASDAQ)	US 30 Day T-bill

[5] See appendix 11.9 for further information about the construction of the Fama-French factors.

6.3 Data sample

In this thesis we are using monthly Nordic hedge fund performance data after fees have been deducted. The sample is based on the numerous hedge fund strategies presented in section 2.4. Since we want to base our analysis on own-collected proprietary data we created our own data sample by manually collecting the figures from the hedge funds' reporting. In total we have collected monthly returns from 85 Nordic hedge funds. This number represents 72% of the total number of hedge funds available in the Hedge Nordic database. The reason for why we do not use the complete sample is because it is not publicly available. Therefore we have, as mentioned before, used the list of funds included in the Hedge Nordic database and manually collected the performance data. The return data has primarily been collected from each funds homepage but individual requests were also sent out to those funds which did not reveal the information needed. Lack of transparency is the most obvious reason for why we do not have found data for all funds in their reporting. For the funds we have also collected data on age, size (assets under management), level of incentive fee, level of management fee, minimum investment and the number of funds in the managing company. These values are static which means that the last numbers reported are present in our data sample.

Figure 3: Regional distribution of the Nordic hedge funds (funds in sample)



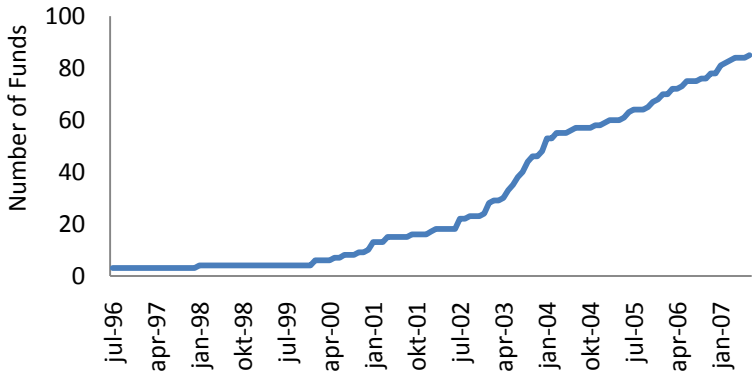
Our benchmarks and market indices data are collected from Datastream. Again, the data is on a monthly basis. Since investors are more likely to invest in their home country due to lower transaction costs than in foreign countries, we decided to use both individual country indices and a common Nordic index as market portfolios. An overview of the benchmarks is presented in *Table 5* and *7*.

We consider the data that we have collected to be reliable. We have only used data from hedge funds that have reported performance each month, therefore there should not be a risk that underperforming funds are excluded from our sample. Survivorship bias, which we mention in the previous studies section, is unfortunately present in the data sample. Data for funds that have been dissolved is hard to find and this issue should not affect our findings in a dramatic way as mentioned by Liang (2000).

Some critique regarding our hedge fund sample would first and foremost be that we only have data regarding 72% of the Nordic hedge fund universe. Differences in regulation between countries may make it possible for funds to report performance numbers that perhaps not are fully analogous. Previous papers, e.g. Anderberg and Cederholm (2007), use the Hedge Nordic database when constructing a hedge fund data sample. Hence, the fact that we use the Hedge Nordic website when selecting the hedge fund sample for this paper seems relevant and reliable. This will also enable us to compare our results with previous studies.

As can be see in Figure 4 the number of hedge funds has increased substantially the last couple of years. For the hedge fund sample, the average age is 4 years.

Figure 4: Age structure of Nordic hedge funds (funds in sample)



7.0 Results and discussion

In the first part of this section, we discuss the performance indications of the funds. In section 7.2 we present the result from the single-factor model and in section 7.3 the results from the multi-factor model are presented. Thereafter we present the performance measure results in section 7.4 and finally the results from the explanatory factor regressions in section 7.5.

7.1 Performance indication

This section will provide empirical results of the tests and calculations that have been performed. The single-factor model regressions and multi-factor model regressions provide us with alpha- and beta-values for the hedge funds. These two figures, together with Sharpe- and Treynor-ratios will make it possible to evaluate which of the Nordic hedge fund markets is the most attractive in terms of risk and return and hence in which hedge fund market should an investor invest.

When evaluating funds in general there is always a risk that there will exist some kind of bias in the data depending on for example age and size. As can be seen in *Table 1* in the beginning where some descriptive data is presented, the age is rather constant across the Nordic countries. The average is four years and the highest value can be observed in Norway (4,7 years) and the lowest value can be observed in Denmark (2,7 years). Hence, the relatively small difference in hedge fund age will not affect the results substantially.

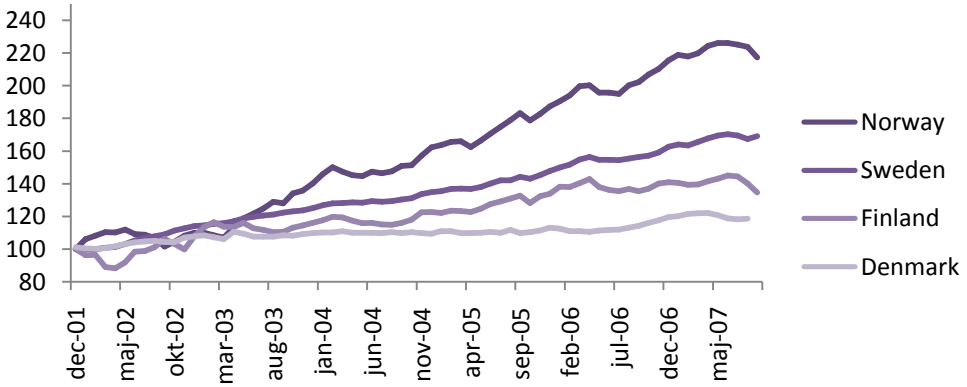
When examining the descriptive data it is obvious that the Swedish hedge fund market is the biggest one in the Nordic region, where the funds have an average AUM of MEUR 211. The Nordic average is MEUR 171. Since the number of funds in the Nordic region is clearly tilted towards Sweden and the average amount of AUM also is tilted towards Sweden there is a risk that the results will be biased as well. This is an issue that one has to take into account when examining the results.

Table 8: Summary of return data

Country	Average Return p.a. (%)	Median Return p.a. (%)	Standard Deviation p.a. (%)
Swedish Funds	9,5	7,7	8,1
Finish Funds	4,9	5,1	2,4
Norwegian Funds	14,3	12,0	8,2
Danish Funds	3,5	4,1	6,6
Total Nordic Funds	8,5	7,0	7,8

When analyzing *Table 8* it is clear that the Norwegian hedge funds have generated the highest average return of the Nordic countries, 14,3 percent p.a. The worst performing country, when looking at average return, is Denmark which is only generating 3,5 percent in return p.a.

Figure 5 : Performance of Nordic hedge funds, funds in sample equally weighted



As concluded above, Norway is the best performing country when only looking at returns. *Figure 5* displays the accumulated equally weighted return for each country. Clearly Norway is the best performing country while Denmark is lagging behind.

7.2 Single-factor regression model results

In the tables below, the results from the single-factor model regressions are presented. As mentioned in the methodology section, the regressions are performed both with respect to each hedge fund's home country equity index and with respect to the Carnegie Nordic Total Cap. index. The alpha values are annualized. When including observations at all significance levels

Sweden has the highest alpha value, with a mean of 0,0421 when the domestic OMXS index is used and 0,0382 when the Carnegie Nordic Total Cap. index is used. However, when we use the Carnegie Nordic Total Cap. index Norway is the best performing country with a mean alpha of 0,0492. An interpretation would be that the Swedish and Norwegian hedge fund managers are more skilled than managers from the other Nordic countries when it comes to asset picking. The Nordic mean is 0,0264 when the domestic indices are used and 0,0243 when the Carnegie Nordic index is used, including observations at all significance levels.

Table 9: Single-factor model regression results when observations at all significance levels are included (annualized alpha)

		Domestic Index					Carnegie Nordic Total Cap.		
		Alpha (p.a.)	Beta	R2			Alpha (p.a.)	Beta	R2
Sweden	Mean	0,0421	0,1323	0,186	OMXS		0,0382	0,1462	0,211
	Median	0,0360	0,1090	0,121			0,0240	0,1120	0,131
Finland	Mean	0,0080	0,0942	0,080	OMXH		-0,0064	0,1679	0,161
	Median	0,0000	0,0680	0,073			0,0000	0,1390	0,174
Norway	Mean	0,0324	0,2859	0,344	OEAS		0,0492	0,3506	0,386
	Median	0,0300	0,2100	0,357			0,0300	0,2675	0,372
Denmark	Mean	-0,0240	0,1346	0,086	OMXC		-0,0185	0,1219	0,118
	Median	-0,0120	0,1350	0,093			-0,0120	0,1110	0,119
Total Nordic	Mean	0,0264	0,1440	0,173			0,0243	0,1709	0,211
	Median	0,0240	0,1110	0,115			0,0120	0,1310	0,161

When looking at the beta values in the table above, where observations at all significance levels are included, we can conclude that the hedge funds belonging to Norway has the highest market risk exposure among the Nordic countries with an average beta of 0,2859. This is aggressively higher than the Nordic average of 0,1440. These values are regressed with the countries' domestic equity indices. The beta value for Norway becomes even higher when the Carnegie Nordic Total Cap. is used. The Nordic average is 0,1709 and the value for Norway is 0,3506. The betas values for Sweden and Denmark do not change substantially depending on which market index one uses. Finland however, and Norway as previously mentioned increase their beta values from 0,0942 to 0,1679 and 0,2859 to 0,3506 respectively. Interesting is that Denmark produces negative alphas both when comparing to domestic index and to the Nordic index.

Table 10: Single-factor model regression results when non-significant observations at the 5% level are excluded (annualized alpha)

		Domestic Index					Carnegie Nordic Total Cap.		
		Alpha (p.a.)	Beta	R2			Alpha (p.a.)	Beta	R2
Sweden	Mean	0,0300	0,1914	0,263	OMXS		0,0240	0,2135	0,309
	Median	0,0240	0,1650	0,233			0,0240	0,1700	0,308
Finland	Mean	0,0060	0,1918	0,109	OMXH		-0,0255	0,2601	0,233
	Median	0,0060	0,1030	0,105			-0,0120	0,1665	0,249
Norway	Mean	0,0225	0,3439	0,412	OEAS		0,0427	0,3981	0,427
	Median	0,0060	0,2685	0,382			0,0240	0,2700	0,376
Denmark	Mean	-0,0120	0,1365	0,151	OMXC		-0,0060	0,1823	0,147
	Median	-0,0120	0,1365	0,151			-0,0120	0,1155	0,149
Total Nordic	Mean	0,0248	0,2156	0,271			0,0173	0,2503	0,305
	Median	0,0180	0,1670	0,233			0,0120	0,1975	0,259

When comparing *Table 9 and 10*, one can observe that the average alpha values are somewhat higher in the table where all observations are included while the average beta values are slightly higher in the table where the non-significant observations at the 5 percent level are excluded. The R2-values become substantially higher in the table where only significant observations are included.

One notable remark is that the results differ rather aggressively when changing market portfolio. One could assume that the Nordic stock markets should be so integrated so that it would not matter if using a domestic or overall-looking index. Our results however show that this is not the case. Selecting the appropriate market portfolio is still important.

7.3 Multi-factor regression model results

In order to get more robustness to the results we have also performed regressions according to the Fama-French three-factor model framework, where the regression model is presented in section 6.1.2. Summarized results are presented below in *Table 11* and *12*.

Table 11: Multi-factor model regression results

(US market premium, annualized alphas)

		US Market Premium Index (All Sig. Levels Included)					US Market Premium Index (5% Sig. (Alpha))				
		Alpha (p.a.)	Beta	SMB	HML	R2	Alpha (p.a.)	Beta	SMB	HML	R2
Swden	Mean	0,048	0,152	0,087	0,078	0,2378	0,116	0,144	0,112	-0,011	0,2101
	Median	0,036	0,145	0,059	0,059	0,2055	0,084	0,096	0,067	-0,020	0,1480
Finland	Mean	0,002	0,061	0,250	0,127	0,2279	N/A	N/A	N/A	N/A	N/A
	Median	0,000	0,067	0,105	0,120	0,1850	N/A	N/A	N/A	N/A	N/A
Norway	Mean	0,054	0,438	0,110	0,156	0,3542	0,088	0,454	0,158	0,278	0,4427
	Median	0,048	0,355	0,087	0,184	0,3705	0,084	0,385	0,115	0,279	0,4470
Denmark	Mean	-0,031	0,204	-0,054	0,291	0,2630	-0,192	-0,161	0,159	0,259	0,0640
	Median	-0,024	0,170	-0,035	0,239	0,1990	-0,192	-0,161	0,159	0,259	0,0640
Total Nordic	Mean	0,030	0,177	0,100	0,124	0,2532	0,097	0,176	0,121	0,046	0,2377
	Median	0,024	0,145	0,064	0,128	0,2090	0,078	0,111	0,069	0,022	0,1830

Table 12: Multi-factor model regression results

(Domestic market premiums, annualized alphas)

		Domestic Market Premium Index (All Sig. Levels Included)						Domestic Market Premium Index (5% Sig. (Alpha))				
		Alpha (p.a.)	Beta	SMB	HML	R2		Alpha (p.a.)	Beta	SMB	HML	R2
Swden	Mean	0,039	0,139	0,117	0,063	0,299	OMXS	0,100	0,148	0,102	0,017	0,284
	Median	0,030	0,115	0,065	0,059	0,240		0,072	0,087	0,018	0,028	0,214
Finland	Mean	0,006	0,054	0,218	0,169	0,210	OMXH	N/A	N/A	N/A	N/A	N/A
	Median	0,012	0,041	0,154	0,181	0,169		N/A	N/A	N/A	N/A	N/A
Norway	Mean	0,035	0,279	0,067	-0,100	0,409	OEAS	0,084	0,244	0,096	0,010	0,453
	Median	0,036	0,003	0,022	-0,077	0,430		0,084	0,244	0,096	0,010	0,453
Denmark	Mean	-0,022	0,110	0,010	0,324	0,194	OMXC	-0,072	-0,005	0,078	0,183	0,058
	Median	-0,012	0,044	0,024	0,268	0,160		-0,072	-0,005	0,078	0,183	0,058
Total Nordic	Mean	0,025	0,137	0,115	0,097	0,282		0,082	0,142	0,099	0,032	0,278
	Median	0,024	0,096	0,069	0,114	0,223		0,060	0,087	0,069	0,043	0,214

When analyzing the multi-factor model regression results we see that the R2 values are higher than under the single-factor model regressions. This is expected when using the domestic indices as benchmarks, since this implies the same market risk premium index as under the single-factor model regressions, and more variables are included. We also find just a slightly lower R2 value for the U.S. market risk premium index, which indicates that there is no larger difference in explanatory power between the domestic benchmarks and the U.S.. The relative performance

between the countries, in terms of alpha, shows similar results as when using the single-factor model, for both benchmarks. Again, we see that Denmark shows negative alpha under both U.S. and domestic benchmarks.

The mean coefficient value for SMB is 0,115 under the domestic benchmarks at all significance levels and 0,099 when only considering alphas significant at the 5 percent level. The mean coefficient value for HML is 0,097 at all significance levels and 0,032 at the 5 percent level, under the domestic benchmarks. The coefficients for SMB and HML seem to be both positive and negative, rather randomly distributed over the data sample. This implies that we cannot conclude whether fund managers prefer to invest in small or big companies and low or high book-to-market companies. There are a higher number significant HML coefficients than SMB coefficients, which imply that the HML factor has more explanatory power than the SMB factor.

Summarizing; the overall result in terms of relative performance, when performing the regressions under the multi-factor model, is rather similar to the result under the single-factor framework. As expected, the R2 values are higher under the multi-factor model.

7.4 Performance measures results

We start this section by presenting the performance measure results. These are calculated for each country and for the Nordic region as one entity.

Table 13: Summary of performance measures

		Performance Measure	
		Sharpe-ratio	**Treynor-ratio***
Sweden	Mean	1,226	0,246
	Median	1,304	0,266
Finland	Mean	0,249	0,192
	Median	0,252	0,214
Norway	Mean	1,257	0,361
	Median	1,150	0,361
Denmark	Mean	0,116	0,132
	Median	0,247	0,132
Total Nordic	Mean	0,910	0,256
	Median	0,876	0,258

* Treynor-ratios only for funds with significant betas at the 5 percent level (Single-factor model – Domestic benchmarks)

The negative aspect regarding the Sharpe-ratio is the one mentioned in the empirical framework section, which is that the measure gives a two-sided result. In reality an investor is interested in the downside risk. As can be observed in the table above, for the Nordic region as an entity, our data sample even provides investors with less than one percent extra return per extra percent of standard deviation when looking at the Sharpe-ratio. The ratio has a mean of 0,910 for the region. Sweden and Norway however, have performed well and have Sharpe-ratios of 1,226 and 1,257 respectively.

While the Sharpe-ratio measures excessive return to risk, the Treynor-ratio measures excessive return to market risk, i.e. systematic risk. According to this measure, Norway is the clear outperformer with a Treynor-ratio of 0,361 while Sweden, who is slightly after, has a mean ratio of 0,246. Denmark is the obvious underperformer with a mean Treynor-ratio of 0,132.

7.5 Explanatory factors results

In this section we will present the results from the tests of relations between the explanatory factors and the performance of the funds, both in terms of alpha and excess return. We have performed both single-factor regressions and multi-factor/simultaneous regressions, according to the regression models presented in section 6.1.3. Again, note that we use the terms single-factor and multi-factor regressions both for the asset pricing models and for the explanatory factors regression models. Do also note that in this section we are only presenting four tables over the test results. However, full regression results are found in the appendix.

7.5.1 Explanatory factors regression results – Alpha

In *Tables 14* and *15*, regression results are presented, both against the single-factor and the multi-factor asset pricing model generated alpha values. The common conclusion from the explanatory factors regression results is that there is low explanatory value in the tested factors on the affect of fund performance. In general, there are few significant factors and the R2 values are rather low.

Table 14: Explanatory factors regression results - single-factor regressions against alphas (single-factor model alphas)

	Alpha - Single-factor model (Nordic Benchmark - All Included)			**Alpha - Single-factor model (Nordic Benchmark - 5% Sig.)**		
	Beta	Sig.	R2	Beta	Sig.	R2
Size	0,000	0,011	0,138	0,000	0,843	0,004
Age	0,000	0,000	0,160	0,000	0,465	0,030
Performance Fee	0,023	0,223	0,023	0,140	0,120	0,144
Management Fee	0,235	0,169	0,028	0,368	0,179	0,117
Minimum Investment	0,000	0,923	0,000	0,000	0,725	0,012
Number of Funds	0,001	0,151	0,025	0,001	0,112	0,134

Table 15: Explanatory factors regression results - single-factor regressions against alphas (multi-factor model alphas)

	Alpha – Multi-factor model (Fama-French) (Regional Benchmarks - All Included)			**Alpha - Multi-factor model (Fama-French) (Regional Benchmarks - 5% Sig.)**		
	Beta	Sig.	R2	Beta	Sig.	R2
Size	0,000	0,046	0,089	0,000	0,985	0,000
Age	0,000	0,023	0,062	0,000	0,944	0,000
Performance Fee	0,025	0,194	0,026	0,048	0,383	0,045
Management Fee	0,137	0,428	0,010	0,357	0,394	0,046
Minimum Investment	0,000	0,499	0,009	0,000	0,821	0,004
Number of Funds	0,000	0,319	0,012	0,001	0,319	0,052

The size factor show no or low predictive power. This result is significant under tests with both the single-factor and the multi-factor model generated alphas. Previous studies have shown a negative relation between fund size and performance.

The age factor of the fund doesn't affect performance, this at a significant level. Other studies have shown that younger funds seem to outperform older.

The performance fee and management fee seem to be the variables with the most influence on the funds' performance, with beta values of 0,023 and 0,235 respectively under the single-factor model alphas at all significance levels. For significant alpha values the factor betas are 0,140 and 0,368 respectively. The same relationship between fees and fund performance occurs against the multi-factor model generated alpha values. The relationships are positive which are in line with previous research saying that higher fees should imply better performance. Again, our results are not significant at any reasonable level.

The minimum investment amount does not have predictive power on the fund performance. Reasons for an effect on performance from the size of the minimum investment are for example lower administrative costs associated to a higher minimum investment amount. The significance and the explanatory power are very low for the minimum investment factor.

The number of funds seems to weakly affect the fund performance in a positive direction. This can be due to a higher professionalism and experience within a fund manager house with several funds under management. Though, the significance and R2 values are rather low.

When performing the multi-factor regression against the alpha values the significance levels are considerably lower, see appendix section 11.6 for full results.

7.5.2 Explanatory factors regression results – Excess return

As have been discussed previously, the choice of benchmarks might substantially affect the alpha values and provide misleading results. Because of this, we have tested if there is any relation between the explanatory factors and the funds' performance in terms of excess return over the risk-free rate. This will give us results unaffected of choice of benchmark.

Thus, as can be seen in *Table 16* and *17*, we find rather similar results in explanatory power between certain fund attributes and performance, when using excess return instead of alpha. The magnitudes of the beta values are strikingly similar, with an exception in the higher beta value for the management fee in the multi-factor regression, 0,697. Overall, the significance is still weak, having no significant betas at the 5 percent level. The R2 values are lower when performing regressions against excess returns instead of alphas.

Table 16: Explanatory factors regression results - single-factor regressions against excess returns

	Excess Return (R_p - R_f) (All funds)		
	Beta	**Sig.**	**R2**
Size	0,000	0,207	0,036
Age	0,000	0,088	0,035
Performance Fee	0,017	0,370	0,012
Management Fee	0,253	0,165	0,029
Minimum Investment	0,000	0,353	0,017
Number of Funds	0,000	0,334	0,011

Table 17: Explanatory factors regression results - multi-factor regressions against excess returns

	Excess Return (R_p - R_f) (All funds)	
	Beta	**Sig.**
Size	0,000	0,362
Age	0,000	0,516
Performance Fee	0,017	0,626
Management Fee	0,697	0,118
Minimum Investment	0,000	0,288
Number of Funds	0,000	0,894
R2	0,186	

Summarizing the results, in accordance to previous research we can conclude that incentive fees and management fees have positive beta values, implying that they affect performance in a positive way. For size, age, minimum investment and the fund manager's total number of funds we find no or weak relations to performance. In general, the significance and R2 values are relatively low across the explanatory factors.

8.0 Conclusion

This paper is aiming at investigating the Nordic hedge fund market and how well the funds are performing in terms of return and risk. By analyzing monthly returns from 85 Nordic hedge funds we have performed regressions and analyzed data in order to answer our three research questions.

Our first research question is highlighting if Nordic hedge funds produce abnormal returns in terms of positive alphas and also to look at their exposure and correlation with the market. The overall finding from our single-factor regression model is that Nordic hedge funds produce positive alphas. The average alpha for the Nordic hedge funds investigated is 2,48 percent per year under the single-factor model. Overall the hedge funds seem to follow the market to a fairly low extent which is supported by the low beta of 0,215. These figures are implying that Nordic hedge funds are performing well and give an abnormal return in relation to a fairly low risk towards the market movements. Using the multi-factor model, based on the Fama-French framework, the alpha is 2,45 percent per year together with a beta value of 0,137.[6]

Our second research question is aiming at investigating if there are any differences between the Nordic countries in terms of hedge fund performance. From our results we see that there are differences between the countries in the Nordic market. When looking at average returns and the performance ratios overall, the Norwegian funds seem to be the better ones, slightly outperforming the Swedish funds. The Finish and Danish funds show substantially lower Sharpe-ratios as well as lower Treynor-ratios and average returns. In terms of alpha we can conclude that the Norwegian funds seem to be the best ones when using the Nordic index (Carnegie Nordic Total Cap.). Using country specific indices the Swedish funds seem to be the better ones, which indicates that the choice of benchmark index is important and can lead to different conclusions. The Danish funds seem to be underperforming and are producing negative alphas under regressions with both domestic and Nordic indices. Again, for some countries the number of funds is relatively small, which could affect the robustness of the results.

Our third and last question is examining different fund attributes, which are chosen based on previous studies. We find that the level of incentive fee and the level of management fee have the largest impact on the fund performance, though the results are not significant. These results are in line with previous research saying that funds with higher fees give more incentives for the managers to perform well.

[6] Note: The multi-factor model results are for all significance levels. The single-factor model at the 5% significance level.

Summarizing our results, we find that Nordic hedge funds produce abnormal returns with relative low correlation with the market. There seem to be significant differences in performance between different countries' hedge funds. Furthermore, we find low predictive power in certain fund characteristics, their explanatory factors.

9.0 Further research

Of further interest could be to use a multi-factor model with even more factors than what is used in this paper. One example would be to use the Fama-French model with a momentum factor added, as well as SMB and HML portfolios constructed of Nordic assets.

Since hedge funds work with different strategies it would also be of interest to use benchmarks that are more diversified than only equity- or bond indices. This would be of interest when evaluating our Nordic hedge fund sample as well since the majority of the Danish hedge funds, for instance, are using fixed income strategies and thus the possible returns are lower than for countries using derivatives or equity strategies. It would be difficult however to construct this kind of analysis with our data sample since the limited transparency reduces the information available.

Our study shows that there are differences between the countries, but we don't investigate why. A more qualitative study analyzing the specific factors causing the performance differences between the Nordic countries could therefore be of interest.

It would also be of interest to do a more explicit comparison between the Nordic hedge fund market and the Nordic mutual fund market. This would be of great help to investors and would also prove if hedge funds are justified their more expensive fee structure.

In this paper we mention how hedge funds behave in a well diversified portfolio of stocks and bonds. However, further research regarding portfolio optimization where Nordic hedge funds are included could be of interest and would be a great contribution to the academic world of portfolio theory.

10.0 References

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11.0 Appendix

11.1 Single-factor model regression results (monthly alpha)

Country	Hedge Fund	Domestic Index - OMX Stockholm						
		Alpha	Sig.	Beta	Sig	R2	Adj. R2	Std error of estimate
Sweden	Zenit	0,015	0,000	-0,005	0,923	0,000	-0,008	0,03967
	Futuris	0,010	0,001	-0,046	0,340	0,012	-0,001	0,02591
	Lynx	0,010	0,015	-0,201	0,040	0,094	0,083	0,03753
	Manticore	0,001	0,610	0,024	0,478	0,006	-0,006	0,01829
	Avenir	0,005	0,002	0,079	0,003	0,110	0,098	0,01370
	Erik Penser Hedgefond	0,003	0,103	0,196	0,000	0,306	0,293	0,01147
	Lancelot Excalibur	0,002	0,202	-0,051	0,278	0,022	0,009	0,01979
	Atlant Edge	0,017	0,002	0,311	0,002	0,152	0,138	0,03924
	Atlant Explora	0,002	0,306	0,239	0,000	0,448	0,439	0,01418
	Atlant Libra	-0,001	0,692	0,019	0,711	0,003	-0,019	0,01220
	Atlant Scorpio	-0,003	0,377	0,229	0,013	0,216	0,186	0,01701
	Atlant Sharp	-0,012	-0,243	0,000	0,000	0,000	0,000	0,00000
	GMM a	0,004	0,054	0,111	0,031	0,097	0,077	0,01228
	Aktieansvar Graal	0,005	0,000	0,053	0,005	0,121	0,107	0,00757
	HQ Nordic Hedge	0,001	0,484	0,118	0,001	0,194	0,178	0,00863
	HQ Global Hedge	-0,001	0,755	0,182	0,000	0,241	0,226	0,01160
	HQ Solid	0,000	0,756	0,169	0,000	0,295	0,281	0,00936
	Nordic Absolute Return Fund	0,001	0,800	0,339	0,000	0,292	0,279	0,02022
	Öhman WhisperHedge	0,005	0,093	-0,007	0,935	0,001	-0,165	0,00750
	Thyra	0,009	0,022	0,042	0,641	0,029	-0,093	0,00998
	Alcur	0,006	0,089	0,109	0,326	0,160	0,020	0,00872
	Ram	0,001	0,732	0,216	0,001	0,178	0,163	0,01805
	Eikos	0,008	0,000	0,081	0,005	0,083	0,073	0,01644
	Gladiator	0,007	0,047	0,560	0,000	0,632	0,619	0,01651
	Merlin	0,003	0,238	-0,100	0,016	0,070	0,059	0,02205
	Tanglin	0,007	0,000	0,050	0,091	0,034	0,022	0,01611
	Northern Spirit Fund	0,001	0,703	-0,018	0,733	0,012	-0,087	0,00641
	OPM Alfa	0,001	0,311	0,161	0,000	0,348	0,330	0,00802
	PN Idea	0,003	0,369	0,503	0,000	0,762	0,749	0,01216
	PN Yield	0,003	0,000	0,066	0,000	0,469	0,460	0,00300
	SEB Fixed Income	0,002	0,032	-0,048	0,005	0,100	0,088	0,00844
	Shepherd Energy Fund	0,003	0,591	-0,171	0,225	0,032	0,011	0,03412
	Stella Nova Hedgefond	0,006	0,000	-0,014	0,637	0,005	-0,017	0,00700
	Whitebeam Multihedge	0,002	0,116	0,132	0,002	0,225	0,206	0,00867
	Whitebeam Structured	-0,004	0,237	0,069	0,575	0,116	-0,179	0,00651
	Ohman Multi Manager	0,003	0,218	0,239	0,000	0,320	0,303	0,01233
	Adapto Nordic 100	0,002	0,596	0,086	0,383	0,045	-0,011	0,01669
	Agenta Hedge	-0,003	0,343	0,227	0,030	0,313	0,261	0,01205
	AMDT Hedge	0,013	0,005	-0,036	0,760	0,002	-0,024	0,02571
	Catella Hedgefond	0,003	0,002	0,207	0,000	0,632	0,623	0,00556
	DLG Aktiefond	0,016	0,036	0,976	0,000	0,598	0,579	0,03229
	DnB NOR Equity Hedgefund Primus	0,001	0,511	0,129	0,003	0,151	0,135	0,01177
	DnB NOR Prisma	0,004	0,018	0,017	0,581	0,005	-0,012	0,01169
	Nektar	0,008	0,000	-0,073	0,010	0,057	0,049	0,01830
	Magnitud	-0,001	0,644	0,179	0,004	0,294	0,264	0,01104
	Horisont	0,001	0,239	0,120	0,000	0,388	0,373	0,00536
	Radar	0,014	0,002	0,172	0,095	0,122	0,082	0,01828
	BPfonder Småbolag	-0,010	0,410	0,699	0,028	0,241	0,199	0,05101
	Consepio	-0,001	0,668	0,144	0,010	0,096	0,082	0,02404

Country	Hedge Fund	Carnegie Nordic Total Cap						
		Alpha	Sig.	Beta	Sig	R2	Adj. R2	Std error of estimate
Sweden	Zenit	0,015	0,000	0,005	0,930	0,000	-0,008	0,03967
	Futuris	0,010	0,001	-0,067	0,165	0,025	0,012	0,02574
	Lynx	0,010	0,017	-0,158	0,023	0,059	0,048	0,03823
	Manticore	0,001	0,606	0,020	0,560	0,004	-0,008	0,01831
	Avenir	0,005	0,001	0,090	0,001	0,142	0,131	0,01345
	Erik Penser Hedgefond	0,003	0,098	0,201	0,000	0,348	0,336	0,01113
	Lancelot Excalibur	0,002	0,305	-0,021	0,483	0,007	-0,007	0,01994
	Atlant Edge	0,016	0,002	0,303	0,004	0,131	0,117	0,03973
	Atlant Explora	0,002	0,335	0,227	0,000	0,365	0,355	0,01521
	Atlant Libra	-0,001	0,625	0,029	0,561	0,008	-0,014	0,01217
	Atlant Scorpio	-0,003	0,397	0,218	0,031	0,167	0,135	0,01754
	Atlant Sharp	-0,010	0,000	-0,196	0,000	1,000	0,000	0,00000
	GMM a	0,004	0,060	0,112	0,026	0,104	0,084	0,01223
	Aktieansvar Graal	0,005	0,000	0,048	0,016	0,092	0,077	0,00770
	HQ Nordic Hedge	0,001	0,471	0,113	0,002	0,182	0,166	0,00870
	HQ Global Hedge	-0,002	0,346	0,233	0,000	0,404	0,392	0,01028
	HQ Solid	0,000	0,919	0,199	0,000	0,419	0,408	0,00850
	Nordic Absolute Return Fund	0,001	0,654	0,296	0,000	0,229	0,214	0,02111
	Öhman WhisperHedge	0,005	0,095	-0,018	0,855	0,006	-0,160	0,00748
	Thyra	0,009	0,037	0,074	0,485	0,063	-0,054	0,00981
	Alcur	0,006	0,117	0,138	0,227	0,232	0,104	0,00834
	Ram	0,002	0,537	0,169	0,010	0,118	0,101	0,01869
	Eikos	0,008	0,000	0,071	0,016	0,063	0,053	0,01662
	Gladiator	0,007	0,101	0,523	0,000	0,493	0,476	0,01937
	Merlin	0,003	0,229	-0,103	0,012	0,076	0,065	0,02198
	Tanglin	0,007	0,000	0,050	0,086	0,035	0,023	0,01610
	Northern Spirit Fund	0,000	0,860	0,007	0,916	0,001	-0,099	0,00644
	OPM Alfa	0,001	0,496	0,170	0,000	0,371	0,354	0,00788
	PN Idea	0,001	0,837	0,597	0,000	0,715	0,700	0,01331
	PN Yield	0,003	0,000	0,057	0,000	0,362	0,350	0,00329
	SEB Fixed Income	0,002	0,040	-0,037	0,034	0,059	0,046	0,00863
	Shepherd Energy Fund	0,001	0,892	-0,029	0,833	0,001	-0,021	0,03466
	Stella Nova Hedgefond	0,006	0,000	-0,026	0,346	0,019	-0,002	0,00695
	Whitebeam Multihedge	0,002	0,191	0,159	0,000	0,339	0,323	0,00801
	Whitebeam Structured	-0,005	0,210	0,050	0,702	0,056	-0,259	0,00673
	Ohman Multi Manager	0,002	0,380	0,273	0,000	0,437	0,423	0,01122
	Adapto Nordic 100	0,001	0,766	0,131	0,247	0,078	0,024	0,01640
	Agenta Hedge	-0,005	0,102	0,354	0,002	0,525	0,488	0,01002
	AMDT Hedge	0,013	0,008	-0,015	0,898	0,000	-0,026	0,02574
	Catella Hedgefond	0,003	0,006	0,196	0,000	0,581	0,571	0,00593
	DLG Aktiefond	0,015	0,053	1,063	0,000	0,609	0,590	0,03185
	DnB NOR Equity Hedgefund Primus	0,001	0,632	0,145	0,001	0,197	0,182	0,01145
	DnB NOR Prisma	0,003	0,033	0,046	0,141	0,037	0,020	0,01151
	Nektar	0,008	0,000	-0,043	0,116	0,021	0,013	0,01864
	Magnitud	-0,002	0,422	0,218	0,001	0,357	0,330	0,01053
	Horisont	0,001	0,235	0,105	0,000	0,308	0,292	0,00569
	Radar	0,013	0,004	0,213	0,052	0,161	0,123	0,01787
	BPfonder Småbolag	-0,013	0,295	0,830	0,024	0,251	0,210	0,05065
	Consepio	-0,001	0,625	0,144	0,014	0,088	0,074	0,02415

Country	Hedge Fund	Domestic Index - OMX Helsinki						
		Alpha	Sig.	Beta	Sig	R2	Adj. R2	Std error of estimate
Finland	Eufex Hedge	-0,001	0,862	0,057	0,695	0,023	-0,116	0,01099
	Global Markets	0,004	0,285	-0,012	0,762	0,001	-0,007	0,03941
	Global XL	0,007	0,319	-0,022	0,769	0,001	-0,007	0,07751
	Eliksir	0,001	0,438	0,041	0,015	0,104	0,087	0,00628
	Avenir B	0,000	0,789	0,029	0,384	0,016	-0,005	0,01111
	TREC Alpha Long Short Hedge Fund	-0,001	0,772	0,045	0,225	0,027	0,009	0,01424
	TREC Edge	0,002	0,286	0,068	0,153	0,047	0,025	0,01446
	Abacus	-0,001	0,532	0,089	0,031	0,106	0,085	0,01214
	Celeres Pension	0,002	0,491	0,117	0,015	0,130	0,110	0,01440
	Celeres Summa	0,000	0,978	0,114	0,134	0,135	0,081	0,01001
	RAM Partners Fixed Income Fund	-0,005	0,317	0,139	0,345	0,294	0,058	0,00769
	OKO Equity Hedge	0,003	0,363	0,108	0,151	0,078	0,042	0,01284
	FIM Maltti	0,002	0,173	0,041	0,069	0,066	0,047	0,00759
	FIM MultiHedge	-0,003	0,200	0,079	0,329	0,073	0,002	0,00749
	Altos	0,000	0,992	0,520	0,033	0,095	0,076	0,07720

Country	Hedge Fund	Carnegie Nordic Total Cap						
		Alpha	Sig.	Beta	Sig	R2	Adj. R2	Std error of estimate
Finland	Eufex Hedge	0,000	0,974	0,062	0,649	0,031	-0,107	0,01095
	Global Markets	0,004	0,288	-0,016	0,776	0,001	-0,007	0,03941
	Global XL	0,007	0,312	-0,044	0,679	0,001	-0,006	0,07748
	Eliksir	0,000	0,828	0,084	0,000	0,256	0,243	0,00572
	Avenir B	0,000	0,841	0,069	0,111	0,052	0,032	0,01090
	TREC Alpha Long Short Hedge Fund	-0,002	0,284	0,129	0,006	0,128	0,112	0,01348
	TREC Edge	0,001	0,769	0,172	0,004	0,174	0,155	0,01346
	Abacus	-0,003	0,145	0,174	0,001	0,242	0,224	0,01118
	Celeres Pension	0,000	0,842	0,220	0,000	0,261	0,244	0,01327
	Celeres Summa	0,000	0,836	0,161	0,017	0,309	0,266	0,00894
	RAM Partners Fixed Income Fund	-0,005	0,311	0,178	0,332	0,308	0,077	0,00761
	OKO Equity Hedge	0,002	0,418	0,139	0,056	0,133	0,100	0,01245
	FIM Maltti	0,001	0,306	0,050	0,101	0,035	0,008	0,00764
	FIM MultiHedge	-0,004	0,066	0,141	0,038	0,290	0,236	0,00656
	Altos	-0,009	0,439	1,000	0,001	0,201	0,184	0,07254

Country	Hedge Fund	Domestic Index - Oslo Exchange All Share						
		Alpha	Sig.	Beta	Sig	R2	Adj. R2	Std error of estimate
Norway	FMG Scandinavia Fund	-0,002	0,373	0,351	0,000	0,605	0,596	0,01382
	FMG Combo Fund	0,007	0,006	0,294	0,000	0,366	0,358	0,02253
	FMG Hi Tech	-0,004	0,277	0,243	0,000	0,161	0,151	0,03155
	WarrenWicklund Nordic Hedge 1	-0,001	0,515	0,157	0,000	0,398	0,386	0,00959
	Interkraft Energy Fund	0,009	0,073	-0,033	0,685	0,002	-0,012	0,04009
	Nordic Alpha plc	0,002	0,294	0,165	0,000	0,256	0,240	0,01412
	Nordic Orkla plc	0,003	0,422	0,141	0,101	0,135	0,090	0,01677
	WarrenWicklund Hedge Basket	0,003	0,025	0,177	0,000	0,537	0,527	0,00821
	WarrenWicklund Utbytte	0,011	0,008	0,352	0,000	0,347	0,334	0,02383
	WarrenWicklund Alpha	-0,001	0,876	1,012	0,000	0,629	0,623	0,04359

Country	Hedge Fund	Carnegie Nordic Total Cap						
		Alpha	Sig.	Beta	Sig	R2	Adj. R2	Std error of estimate
Norway	FMG Scandinavia Fund	-0,001	0,579	0,514	0,000	0,705	0,698	0,01195
	FMG Combo Fund	0,010	0,000	0,211	0,000	0,211	0,200	0,02514
	FMG Hi Tech	-0,001	0,693	0,219	0,000	0,152	0,143	0,03171
	WarrenWicklund Nordic Hedge 1	0,000	0,909	0,204	0,000	0,367	0,354	0,00984
	Interkraft Energy Fund	0,009	0,062	-0,077	0,376	0,011	-0,003	0,03991
	Nordic Alpha plc	0,002	0,249	0,270	0,000	0,376	0,362	0,01294
	Nordic Orkla plc	0,002	0,613	0,271	0,011	0,297	0,260	0,01512
	WarrenWicklund Hedge Basket	0,003	0,005	0,265	0,000	0,671	0,664	0,00693
	WarrenWicklund Utbytte	0,010	0,003	0,547	0,000	0,470	0,459	0,02148
	WarrenWicklund Alpha	0,007	0,256	1,082	0,000	0,596	0,590	0,04548

Country	Hedge Fund	Domestic Index - OMX Copenhagen						
		Alpha	Sig.	Beta	Sig	R2	Adj. R2	Std error of estimate
Denmark	Scandium Absolute Return Fund	-0,004	0,586	0,286	0,213	0,186	0,084	0,01691
	Scandium Fund Limited	0,005	0,005	0,031	0,386	0,011	-0,004	0,01265
	Carnegie WorldWide Long Short	-0,015	0,000	-0,011	0,892	0,000	-0,020	0,02042
	Danske Hedge ENMortage Arbitrage	-0,003	0,594	0,235	0,157	0,093	0,050	0,02265
	Danske Hedge Fixed Income Strategies	0,000	0,896	0,037	0,328	0,031	0,000	0,00669
	Danske Hedge Mortgage Arbitrage	-0,002	0,242	0,138	0,003	0,184	0,165	0,00970
	Nordea Fixed Income Hedge Fund	0,000	0,934	0,135	0,048	0,117	0,089	0,01180
	Nordic Leveraged Bond Fund	-0,002	0,805	0,018	0,926	0,001	-0,066	0,02308
	HP Hedge	-0,001	0,873	0,194	0,273	0,195	0,061	0,01157
	AAAsgard Fixed Income Fund I	0,000	0,989	0,389	0,084	0,115	0,079	0,03427
	Asgard Fixed Income Fund	0,000	0,898	0,029	0,510	0,009	-0,012	0,01115

Country	Hedge Fund	Carnegie Nordic Total Cap						
		Alpha	Sig.	Beta	Sig	R2	Adj. R2	Std error of estimate
Denmark	Scandium Absolute Return Fund	-0,003	0,628	0,296	0,108	0,291	0,202	0,01578
	Scandium Fund Limited	0,005	0,003	0,019	0,524	0,006	-0,009	0,01269
	Carnegie WorldWide Long Short	-0,016	0,000	0,020	0,806	0,001	-0,020	0,02041
	Danske Hedge ENMortage Arbitrage	-0,001	0,802	0,116	0,439	0,029	-0,018	0,02344
	Danske Hedge Fixed Income Strategies	-0,001	0,670	0,077	0,021	0,161	0,134	0,00622
	Danske Hedge Mortgage Arbitrage	-0,001	0,380	0,111	0,012	0,137	0,117	0,00998
	Nordea Fixed Income Hedge Fund	0,001	0,812	0,120	0,045	0,119	0,092	0,01178
	Nordic Leveraged Bond Fund	0,000	0,982	-0,124	0,451	0,038	-0,026	0,02264
	HP Hedge	0,000	0,905	0,216	0,162	0,297	0,180	0,01082
	AAAsgard Fixed Income Fund I	-0,001	0,917	0,421	0,033	0,170	0,137	0,03318
	Asgard Fixed Income Fund	0,000	0,795	0,069	0,111	0,052	0,032	0,01090

11.2 Multi-factor model regression results (US market risk premium, monthly alpha)

Country	Hedge Fund	U.S. Market Premium Index										
		Alpha	Sig.	Beta	Sig.	SMB Beta	Sig.	HML Beta	Sig.	R2	Adjusted R2	Std error of estimate
Sweden	Zenit	0,016	0,000	-0,132	0,146	-0,072	0,446	-0,048	0,691	0,025	0,002	0,03936
	Futuris	0,008	0,013	-0,042	0,599	0,060	0,562	0,277	0,014	0,109	0,073	0,02493
	Lynx	0,007	0,125	-0,157	0,182	0,207	0,148	0,239	0,096	0,090	0,057	0,03805
	Manticore	0,000	0,882	0,055	0,346	0,046	0,546	0,159	0,049	0,054	0,016	0,01809
	Avenir	0,003	0,033	0,100	0,023	0,137	0,016	0,090	0,117	0,168	0,136	0,01341
	Erik Penser Hedgefond	0,003	0,143	0,173	0,021	0,163	0,061	0,213	0,035	0,322	0,283	0,01156
	Lancelot Excalibur	0,003	0,186	-0,019	0,769	-0,162	0,060	-0,012	0,905	0,058	0,019	0,01968
	Atlant Edge	0,019	0,000	0,384	0,024	0,008	0,974	-0,618	0,021	0,198	0,156	0,03883
	Atlant Explora	0,003	0,163	0,223	0,003	0,006	0,598	-0,127	0,275	0,217	0,176	0,01718
	Atlant Libra	-0,002	0,246	0,104	0,258	-0,035	0,731	0,170	0,124	0,084	0,020	0,01196
	Atlant Scorpio	0,000	0,908	0,157	0,383	0,325	0,101	-0,224	0,267	0,299	0,212	0,01675
	Atlant Sharp											
	GMM a	0,005	0,027	0,121	0,202	0,070	0,504	-0,046	0,685	0,105	0,044	0,01249
	Aktieansvar Graal	0,005	0,000	0,041	0,217	-0,018	0,703	-0,094	0,079	0,089	0,042	0,00784
	HQ Nordic Hedge	0,001	0,454	0,079	0,227	0,101	0,146	0,122	0,126	0,186	0,135	0,00860
	HQ Global Hedge	-0,002	0,380	0,226	0,006	0,101	0,238	0,245	0,014	0,359	0,319	0,01088
	HQ Solid	0,000	0,843	0,226	0,001	0,032	0,650	0,207	0,013	0,365	0,325	0,00907
	Nordic Absolute Return Fund	0,004	0,329	0,319	0,043	-0,127	0,474	0,046	0,823	0,088	0,032	0,02342
	Öhman WhisperHedge	0,002	0,636	0,147	0,327	0,308	0,344	-0,463	0,243	0,342	-0,152	0,00746
	Thyra	0,008	0,071	0,206	0,225	-0,139	0,642	-0,151	0,557	0,292	-0,062	0,00984
	Alcur	0,006	0,204	0,160	0,335	-0,323	0,368	0,155	0,701	0,494	0,114	0,00829
	Ram	0,004	0,204	0,130	0,308	-0,088	0,553	-0,102	0,552	0,025	-0,031	0,02003
	Eikos	0,005	0,007	0,147	0,001	0,086	0,062	0,233	0,000	0,186	0,158	0,01566
	Gladiator	0,013	0,010	0,575	0,023	0,067	0,794	-0,234	0,379	0,304	0,226	0,02354
	Merlin	0,003	0,245	-0,192	0,008	0,048	0,600	-0,038	0,667	0,097	0,062	0,02201
	Tanglin	0,006	0,002	0,058	0,250	0,067	0,315	0,026	0,678	0,040	0,005	0,01625
	Northern Spirit Fund	0,002	0,500	-0,045	0,637	0,180	0,295	0,063	0,695	0,209	-0,087	0,00641
	OPM Alfa	0,001	0,449	0,235	0,003	0,014	0,859	0,222	0,008	0,398	0,345	0,00793
	PN Idea	0,005	0,347	0,609	0,032	0,054	0,843	-0,119	0,685	0,336	0,212	0,02155
	PN Yield	0,003	0,000	0,069	0,001	0,034	0,180	0,007	0,815	0,335	0,297	0,00342
	SEB Fixed Income	0,002	0,036	-0,093	0,001	0,056	0,123	-0,038	0,393	0,139	0,103	0,00837
	Shepherd Energy Fund	-0,003	0,608	0,092	0,724	-0,040	0,891	0,422	0,186	0,043	-0,023	0,03470
	Stella Nova Hedgefond	0,005	0,000	0,092	0,073	-0,136	0,019	0,018	0,765	0,128	0,069	0,00670
	Whitebeam Multihedge	0,002	0,105	0,170	0,029	0,073	0,371	0,137	0,094	0,299	0,244	0,00846
	Whitebeam Structured	-0,011	0,069	0,261	0,060	0,200	0,135	-0,436	0,107	0,992	0,969	0,00106
	Ohman Multi Manager	0,004	0,028	0,253	0,003	0,337	0,000	0,154	0,079	0,645	0,619	0,00912
	Adapto Nordic 100	0,005	0,258	0,020	0,913	0,425	0,067	0,054	0,802	0,221	0,066	0,01605
	Agenta Hedge	-0,002	0,573	0,328	0,069	0,058	0,801	0,278	0,188	0,399	0,235	0,01225
	AMDT Hedge	0,015	0,003	-0,185	0,419	0,104	0,667	-0,179	0,479	0,026	-0,055	0,02610
	Catella Hedgefond	0,005	0,000	0,143	0,017	0,160	0,013	0,084	0,200	0,451	0,408	0,00696
	DLG Aktiefond	0,026	0,016	0,610	0,228	0,903	0,116	-0,062	0,915	0,310	0,201	0,04448
	DnB NOR Equity Hedgefund Primus	0,001	0,507	0,103	0,199	0,070	0,448	0,157	0,136	0,121	0,070	0,01221
	DnB NOR Prisma	0,002	0,147	0,064	0,188	0,125	0,061	0,215	0,007	0,202	0,159	0,01066
	Nektar	0,008	0,000	-0,068	0,128	-0,104	0,026	-0,067	0,242	0,065	0,041	0,01837
	Magnitud	-0,001	0,630	0,315	0,016	-0,075	0,588	0,265	0,076	0,329	0,238	0,01124
	Horisont	0,002	0,131	0,168	0,003	-0,028	0,624	0,035	0,542	0,265	0,210	0,00601
	Radar	0,014	0,010	0,290	0,091	0,180	0,334	0,517	0,018	0,364	0,269	0,01631
	BPfonder Småbolag	-0,010	0,411	0,551	0,340	0,720	0,231	1,838	0,010	0,433	0,327	0,04674
	Consepio	-0,002	0,471	0,241	0,011	-0,001	0,991	0,134	0,387	0,108	0,066	0,02426

Country	Hedge Fund	U.S. Market Premium Index										
		Alpha	Sig.	Beta	Sig.	SMB Beta	Sig.	HML Beta	Sig.	R2	Adjusted R2	Std error of estimate
Finland	Eufex Hedge	-0,004	0,532	0,133	0,527	-0,024	0,961	-0,264	0,646	0,181	-0,311	0,01230
	Global Markets	0,002	0,514	-0,019	0,831	0,103	0,277	0,120	0,318	0,015	-0,008	0,03938
	Global XL	0,004	0,522	-0,064	0,717	0,238	0,198	0,276	0,135	0,022	0,000	0,07722
	Eliksir	0,000	0,820	0,065	0,084	0,054	0,211	0,072	0,163	0,174	0,127	0,00616
	Avenir B	-0,003	0,111	0,196	0,010	-0,082	0,295	0,267	0,004	0,274	0,227	0,00991
	TREC Alpha Long Short Hedge Fund	-0,002	0,266	0,020	0,799	0,187	0,048	0,286	0,011	0,185	0,139	0,01320
	TREC Edge	0,002	0,409	0,007	0,944	0,319	0,006	0,269	0,025	0,306	0,255	0,01259
	Abacus	-0,002	0,238	0,187	0,075	0,085	0,441	0,113	0,310	0,206	0,146	0,01171
	Celeres Pension	0,000	0,828	0,067	0,528	0,275	0,021	0,287	0,026	0,269	0,215	0,01348
	Celeres Summa	-0,001	0,825	0,139	0,301	0,089	0,585	0,120	0,437	0,154	-0,027	0,01066
	RAM Partners Fixed Income Fund	-0,001	0,866	0,158	0,525	0,366	0,502	-0,032	0,965	0,879	0,516	0,00542
	OKO Equity Hedge	0,003	0,306	0,089	0,452	0,274	0,038	0,101	0,467	0,267	0,176	0,01186
	FIM Maltti	0,001	0,412	0,035	0,530	0,105	0,077	0,022	0,736	0,140	0,085	0,00749
	FIM MultiHedge	-0,004	0,116	0,115	0,289	-0,022	0,879	0,067	0,602	0,137	-0,098	0,00774
	Altos	0,008	0,513	-0,214	0,689	1,785	0,004	0,203	0,755	0,209	0,155	0,07382

Country	Hedge Fund	U.S. Market Premium Index										
		Alpha	Sig.	Beta	Sig.	SMB Beta	Sig.	HML Beta	Sig.	R2	Adjusted R2	Std error of estimate
Norway	FMG Scandinavia Fund	0,002	0,572	0,473	0,002	0,105	0,505	0,229	0,179	0,345	0,297	0,01824
	FMG Combo Fund	0,007	0,006	0,385	0,000	0,339	0,000	0,279	0,004	0,447	0,425	0,0213
	FMG Hi Tech	-0,001	0,843	0,214	0,002	0,365	0,000	-0,158	0,067	0,534	0,518	0,0236
	WarrenWicklund Nordic Hedge 1	-0,001	0,667	0,270	0,001	0,033	0,676	0,241	0,010	0,377	0,338	0,01016
	Interkraft Energy Fund	0,008	0,107	0,001	0,992	-0,058	0,759	0,371	0,109	0,042	0,000	0,04021
	Nordic Alpha plc	0,004	0,090	0,200	0,076	0,180	0,151	0,055	0,683	0,230	0,177	0,01474
	Nordic Orkla plc	0,003	0,534	0,368	0,093	-0,071	0,745	-0,013	0,958	0,172	0,026	0,01727
	WarrenWicklund Hedge Basket	0,004	0,015	0,341	0,000	0,019	0,790	0,138	0,083	0,517	0,485	0,00864
	WarrenWicklund Utbytte	0,011	0,007	0,636	0,001	0,115	0,543	0,416	0,054	0,364	0,323	0,02417
	WarrenWicklund Alpha	0,008	0,235	1,488	0,000	0,068	0,824	-0,001	0,998	0,514	0,489	0,05063

Country	Hedge Fund	U.S. Market Premium Index										
		Alpha	Sig.	Beta	Sig.	SMB Beta	Sig.	HML Beta	Sig.	R2	Adjusted R2	Std error of estimate
Denmark	Scandium Absolute Return Fund	0,003	0,690	-0,039	0,889	-0,363	0,491	0,741	0,131	0,360	0,039	0,01719
	Scandium Fund Limited	0,004	0,019	0,055	0,238	0,074	0,243	0,138	0,077	0,096	0,053	0,01224
	Carnegie WorldWide Long Short	-0,016	0,000	-0,161	0,287	0,159	0,318	0,259	0,153	0,064	0,003	0,02015
	Danske Hedge European Nordic Mortage Arbitrage	-0,006	0,296	0,486	0,053	-0,294	0,253	0,212	0,457	0,199	0,073	0,02236
	Danske Hedge Fixed Income Strategies	-0,001	0,573	0,063	0,299	0,046	0,485	0,091	0,198	0,130	0,040	0,00654
	Danske Hedge Mortgage Arbitrage	-0,002	0,224	0,170	0,049	-0,079	0,377	0,180	0,064	0,140	0,078	0,01026
	Nordea Fixed Income Hedge Fund	-0,002	0,376	0,295	0,004	-0,035	0,740	0,291	0,010	0,397	0,337	0,01000
	Nordic Leveraged Bond Fund	-0,001	0,855	-0,085	0,756	0,051	0,897	0,163	0,644	0,028	-0,196	0,02412
	HP Hedge	0,000	0,957	0,339	0,036	-0,114	0,686	0,239	0,479	0,815	0,676	0,00684
	AAAsgard Fixed Income Fund I	-0,004	0,576	0,926	0,007	0,048	0,889	0,624	0,089	0,390	0,311	0,02961
	Asgard Fixed Income Fund	-0,003	0,111	0,196	0,010	-0,082	0,295	0,267	0,004	0,274	0,227	0,00991

11.3 Multi-factor model regression results (Domestic market risk premium, monthly alpha)

Country	Hedge Fund	Domestic Market Premium Index - OMX Stockholm										
		Alpha	Sig.	Beta	Sig.	SMB Beta	Sig.	HML Beta	Sig.	R2	Adjusted R2	Std error of estimate
Sweden	Zenit	0,015	0,000	0,023	0,715	-0,071	0,458	0,054	0,636	0,010	-0,013	0,03977
	Futuris	0,007	0,017	0,011	0,831	0,043	0,677	0,309	0,006	0,106	0,070	0,02496
	Lynx	0,007	0,107	-0,172	0,021	0,183	0,180	0,213	0,114	0,127	0,096	0,03725
	Manticore	0,000	0,832	0,054	0,153	0,047	0,524	0,174	0,030	0,068	0,031	0,01795
	Avenir	0,003	0,036	0,087	0,002	0,144	0,008	0,111	0,051	0,214	0,183	0,01304
	Erik Penser Hedgefond	0,002	0,233	0,152	0,001	0,171	0,022	0,191	0,044	0,401	0,367	0,01086
	Lancelot Excalibur	0,003	0,157	-0,038	0,361	-0,155	0,063	-0,033	0,755	0,067	0,029	0,01958
	Atlant Edge	0,019	0,000	0,268	0,009	0,055	0,801	-0,587	0,026	0,222	0,182	0,03824
	Atlant Explora	0,002	0,260	0,230	0,000	0,031	0,708	-0,075	0,439	0,455	0,426	0,01434
	Atlant Libra	-0,002	0,433	0,008	0,886	0,028	0,767	0,173	0,125	0,057	-0,009	0,01214
	Atlant Scorpio	-0,002	0,590	0,158	0,082	0,307	0,072	-0,221	0,252	0,363	0,284	0,01596
	Atlant Sharp											
	GMM a	0,004	0,038	0,089	0,124	0,083	0,362	-0,058	0,611	0,121	0,061	0,01239
	Aktieansvar Graal	0,005	0,000	0,053	0,008	-0,031	0,466	-0,081	0,108	0,170	0,127	0,00748
	HQ Nordic Hedge	0,000	0,769	0,093	0,016	0,089	0,128	0,114	0,133	0,256	0,210	0,00846
	HQ Global Hedge	-0,002	0,330	0,139	0,006	0,154	0,042	0,241	0,015	0,362	0,322	0,01086
	HQ Solid	-0,001	0,684	0,147	0,000	0,079	0,196	0,202	0,013	0,389	0,351	0,00890
	Nordic Absolute Return Fund	0,000	0,885	0,389	0,000	-0,189	0,170	0,020	0,912	0,321	0,280	0,02021
	Öhman WhisperHedge	-0,003	0,521	0,340	0,096	0,936	0,082	-1,183	0,070	0,603	0,306	0,00579
	Thyra	0,007	0,170	0,162	0,513	0,145	0,810	-0,382	0,527	0,145	-0,283	0,01082
	Alcur	0,011	0,161	-0,128	0,632	-0,755	0,304	0,736	0,388	0,384	-0,079	0,00915
	Ram	0,002	0,557	0,263	0,000	-0,189	0,118	-0,159	0,301	0,224	0,179	0,01787
	Eikos	0,005	0,005	0,133	0,000	0,069	0,113	0,239	0,000	0,264	0,238	0,01490
	Gladiator	0,008	0,029	0,554	0,000	0,006	0,969	-0,267	0,156	0,659	0,621	0,01646
	Merlin	0,003	0,272	-0,104	0,027	0,014	0,880	-0,011	0,897	0,071	0,035	0,02232
	Tanglin	0,006	0,002	0,048	0,152	0,071	0,273	0,028	0,640	0,049	0,014	0,01618
	Northern Spirit Fund	0,002	0,521	-0,038	0,695	0,120	0,603	0,119	0,649	0,202	-0,097	0,00644
	OPM Alfa	0,001	0,628	0,149	0,001	0,061	0,369	0,184	0,019	0,449	0,400	0,00759
	PN Idea	0,003	0,372	0,520	0,000	0,060	0,685	-0,004	0,980	0,765	0,721	0,01283
	PN Yield	0,003	0,000	0,058	0,000	0,038	0,054	0,008	0,752	0,506	0,478	0,00295
	SEB Fixed Income	0,002	0,037	-0,058	0,002	0,043	0,230	-0,041	0,355	0,130	0,094	0,00841
	Shepherd Energy Fund	0,001	0,875	-0,229	0,147	0,194	0,455	0,464	0,139	0,085	0,023	0,03300
	Stella Nova Hedgefond	0,005	0,000	0,009	0,788	-0,082	0,127	0,020	0,756	0,063	-0,001	0,00695
	Whitebeam Multihedge	0,002	0,140	0,099	0,025	0,117	0,099	0,115	0,157	0,304	0,249	0,00843
	Whitebeam Structured	-0,011	0,361	0,534	0,345	0,993	0,350	-1,132	0,396	0,767	0,068	0,00579
	Ohman Multi Manager	0,004	0,033	0,116	0,019	0,422	0,000	0,119	0,187	0,614	0,586	0,00951
	Adapto Nordic 100	0,005	0,250	0,013	0,897	0,419	0,085	0,051	0,812	0,222	0,066	0,01604
	Agenta Hedge	-0,002	0,571	0,197	0,070	0,151	0,498	0,230	0,281	0,398	0,234	0,01226
	AMDT Hedge	0,014	0,006	-0,045	0,744	0,022	0,920	-0,132	0,595	0,011	-0,071	0,02630
	Catella Hedgefond	0,003	0,000	0,171	0,000	0,120	0,006	0,043	0,366	0,699	0,676	0,00515
	DLG Aktiefond	0,018	0,016	0,863	0,000	0,720	0,051	0,064	0,873	0,673	0,622	0,03061
	DnB NOR Equity Hedgefund Primus	0,001	0,754	0,113	0,019	0,058	0,462	0,141	0,168	0,186	0,139	0,01175
	DnB NOR Prisma	0,002	0,111	0,020	0,484	0,147	0,024	0,203	0,011	0,184	0,140	0,01078
	Nektar	0,008	0,000	-0,075	0,018	-0,092	0,046	-0,075	0,167	0,093	0,068	0,01811
	Magnitud	-0,002	0,414	0,193	0,003	-0,008	0,945	0,288	0,040	0,423	0,345	0,01042
	Horisont	0,001	0,301	0,122	0,000	-0,007	0,884	0,007	0,896	0,388	0,342	0,00549
	Radar	0,014	0,001	0,151	0,126	0,211	0,256	0,494	0,024	0,347	0,250	0,01653
	BPfonder Småbolag	-0,014	0,140	0,691	0,009	0,600	0,192	1,973	0,002	0,611	0,538	0,03875
	Consepio	-0,002	0,513	0,152	0,010	0,026	0,833	0,133	0,391	0,108	0,066	0,02426

Country	Hedge Fund	Domestic Market Premium Index - OMX Helsinki										
		Alpha	Sig.	Beta	Sig.	SMB Beta	Sig.	HML Beta	Sig.	R2	Adjusted R2	Std error of estimate
Finland	Eufex Hedge	-0,002	0,773	0,041	0,841	-0,138	0,786	-0,106	0,852	0,107	-0,428	0,01243
	Global Markets	0,002	0,494	0,011	0,798	0,102	0,286	0,143	0,229	0,014	-0,009	0,03945
	Global XL	0,004	0,602	0,037	0,675	0,247	0,185	0,361	0,121	0,022	0,000	0,07726
	Eliksir	0,000	0,695	0,030	0,086	0,058	0,151	0,065	0,209	0,156	0,108	0,00621
	Avenir B	-0,001	0,528	0,028	0,430	-0,001	0,994	0,264	0,006	0,169	0,115	0,01043
	TREC Alpha Long Short Hedge Fund	-0,002	0,321	0,012	0,756	0,179	0,041	0,284	0,013	0,176	0,129	0,01335
	TREC Edge	0,002	0,259	0,000	0,997	0,323	0,003	0,267	0,025	0,301	0,250	0,01268
	Abacus	-0,001	0,559	0,052	0,259	0,154	0,130	0,085	0,455	0,163	0,100	0,01204
	Celeres Pension	0,001	0,712	0,061	0,231	0,245	0,032	0,276	0,030	0,282	0,230	0,01339
	Celeres Summa	-0,001	0,839	0,131	0,148	0,048	0,766	0,181	0,231	0,222	0,056	0,01014
	RAM Partners Fixed Income Fund	0,001	0,943	0,065	0,844	0,218	0,768	0,270	0,805	0,790	0,159	0,00727
	OKO Equity Hedge	0,003	0,233	0,066	0,375	0,282	0,025	0,121	0,387	0,277	0,186	0,01184
	FIM Maltti	0,001	0,201	0,019	0,465	0,098	0,079	0,012	0,859	0,126	0,071	0,00749
	FIM MultiHedge	-0,003	0,244	0,085	0,332	-0,004	0,978	0,104	0,428	0,129	-0,109	0,00790
	Altos	0,004	0,741	0,171	0,521	1,461	0,014	0,213	0,743	0,213	0,159	0,07362

Country	Hedge Fund	Domestic Market Premium Index - Oslo Exchange All Share										
		Alpha	Sig.	Beta	Sig.	SMB Beta	Sig.	HML Beta	Sig.	R2	Adjusted R2	Std error of estimate
Norway	FMG Scandinavia Fund	-0,002	0,408	0,396	0,000	-0,086	0,470	-0,237	0,103	0,631	0,604	0,01370
	FMG Combo Fund	0,006	0,032	0,251	0,000	0,301	0,001	0,080	0,356	0,448	0,426	0,02130
	FMG Hi Tech	-0,002	0,512	0,144	0,003	0,317	0,000	-0,258	0,002	0,518	0,501	0,02419
	WarrenWicklund Nordic Hedge 1	-0,001	0,432	0,146	0,000	0,012	0,869	0,094	0,324	0,411	0,374	0,00969
	Interkraft Energy Fund	0,007	0,144	-0,031	0,727	-0,044	0,816	0,381	0,090	0,047	0,005	0,03976
	Nordic Alpha plc	0,003	0,157	0,150	0,006	0,127	0,265	-0,116	0,411	0,302	0,254	0,01399
	Nordic Orkla plc	0,003	0,516	0,169	0,128	-0,089	0,704	-0,097	0,701	0,147	-0,004	0,01761
	WarrenWicklund Hedge Basket	0,003	0,018	0,177	0,000	0,031	0,642	-0,056	0,496	0,547	0,517	0,00830
	WarrenWicklund Utbytte	0,011	0,008	0,311	0,001	0,160	0,383	0,075	0,742	0,358	0,317	0,02414
	WarrenWicklund Alpha	0,001	0,887	1,073	0,000	-0,057	0,815	-0,861	0,003	0,682	0,666	0,04105

Country	Hedge Fund	Domestic Market Premium Index - OMX Copenhagen										
		Alpha	Sig.	Beta	Sig.	SMB Beta	Sig.	HML Beta	Sig.	R2	Adjusted R2	Std error of estimate
Denmark	Scandium Absolute Return Fund	0,000	0,984	0,179	0,643	-0,045	0,957	0,547	0,348	0,388	0,082	0,01693
	Scandium Fund Limited	0,004	0,023	0,023	0,510	0,086	0,164	0,113	0,141	0,075	0,031	0,01243
	Carnegie WorldWide Long Short	-0,016	0,000	-0,033	0,693	0,069	0,616	0,252	0,174	0,041	-0,021	0,02043
	Danske Hedge European Nordic Mortage Arbitrage	-0,004	0,456	0,294	0,101	-0,134	0,582	0,291	0,338	0,154	0,020	0,02301
	Danske Hedge Fixed Income Strategies	0,000	0,855	0,024	0,544	0,076	0,206	0,085	0,225	0,120	0,029	0,00659
	Danske Hedge Mortgage Arbitrage	-0,003	0,127	0,146	0,003	-0,052	0,475	0,122	0,171	0,234	0,178	0,00962
	Nordea Fixed Income Hedge Fund	-0,001	0,768	0,116	0,086	0,115	0,237	0,276	0,025	0,276	0,203	0,01104
	Nordic Leveraged Bond Fund	-0,002	0,814	0,044	0,835	0,013	0,973	0,213	0,554	0,028	-0,196	0,02445
	HP Hedge	0,005	0,497	0,018	0,949	-0,509	0,460	0,705	0,325	0,391	-0,066	0,01233
	AAAsgard Fixed Income Fund I	-0,002	0,775	0,388	0,079	0,467	0,162	0,688	0,090	0,269	0,173	0,03248
	Asgard Fixed Income Fund	-0,001	0,534	0,014	0,746	0,024	0,735	0,268	0,006	0,160	0,105	0,01048

11.4 Performance measures results

Country	Hedge Fund	Performance Measure		Average Return p.a.
		Sharpe ratio	Treynor ratio	
Sweden	Zenit	1,372		**0,222**
	Futuris	1,328		**0,149**
	Lynx	0,878	-0,594	**0,149**
	Manticore	0,192		**0,041**
	Avenir	1,301	0,820	**0,094**
	Erik Penser Hedgefond	1,572	0,377	**0,098**
	Lancelot Excalibur	0,358		**0,053**
	Atlant Edge	1,803	0,852	**0,291**
	Atlant Explora	0,873	0,239	**0,083**
	Atlant Libra	-0,159		**0,016**
	Atlant Scorpio	0,128	0,036	**0,032**
	Atlant Sharp			**-0,041**
	GMM a	1,540	0,620	**0,092**
	Aktieansvar Graal	2,289	1,232	**0,091**
	HQ Nordic hedge	1,091	0,302	**0,059**
	HQ Global hedge	0,653	0,164	**0,053**
	HQ Solid	1,055	0,237	**0,063**
	Nordic Absolute Return Fund	1,063	0,258	**0,111**
	Öhman WhisperHedge	2,772		**0,100**
	Thyra	3,777		**0,157**
	Alcur	2,818		**0,118**
	Ram	0,773	0,244	**0,077**
	Eikos	1,628	1,192	**0,127**
	Gladiator	2,236	0,369	**0,230**
	Merlin	0,390	-0,308	**0,060**
	Tanglin	1,478		**0,114**
	Northern Spirit Fund	0,279		**0,037**
	OPM Alfa	1,428	0,298	**0,070**
	PN Idea	1,306	0,219	**0,137**
	PN Yield	3,290	0,719	**0,072**
	SEB Fixed Income	0,720	-0,462	**0,051**
	Shepherd Energy Fund	-0,030		**0,019**
	Stella Nova Hedgefond	2,919		**0,094**
	Whitebeam Multihedge	1,512	0,382	**0,073**
	Whitebeam Structured	-2,705		**-0,022**
	Ohman Multi Manager	1,490	0,317	**0,098**
	Adapto Nordic 100	0,608		**0,063**
	Agenta Hedge	-0,028	-0,006	**0,028**
	AMDT Hedge	1,832		**0,184**
	Catella Hedgefond	2,326	0,348	**0,095**
	DLG Aktiefond	2,336	0,412	**0,427**
	DnB NOR Equity Hedgefund Primus	0,942	0,319	**0,065**
	DnB NOR Prisma	1,247		**0,075**
	Nektar	1,390	-1,247	**0,122**
	Magnitud	0,446	0,111	**0,044**
	Horisont	1,387	0,266	**0,058**
	Radar	3,209		**0,234**
	BPFonder Småbolag	-0,210	-0,059	**-0,015**
	Consepio	-0,073	-0,044	**0,021**

Country	Hedge Fund	Performance Measure		Average Return p.a.
		Sharpe ratio	Treynor ratio	
Finland	Eufex Hedge	**0,156**		**0,046**
	Global Markets	**0,255**		**0,066**
	Global XL	**0,166**		**0,076**
	Eliksir	**0,634**	0,348	**0,041**
	Avenir B	**0,252**		**0,036**
	TREC Alpha Long Short Hedge Fund	**-0,026**		**0,025**
	TREC Edge	**0,617**		**0,054**
	Abacus	**-0,013**	-0,006	**0,026**
	Celeres Pension	**0,691**	0,308	**0,063**
	Celeres Summa	**0,458**		**0,051**
	RAM Partners Fixed Income Fund	**-1,007**		**0,012**
	OKO Equity Hedge	**1,271**		**0,088**
	FIM Maltti	**0,945**		**0,051**
	FIM MultiHedge	**-0,890**		**0,013**
	Altos	**0,222**	0,119	**0,088**

Country	Hedge Fund	Performance Measure		Average Return p.a.
		Sharpe ratio	Treynor ratio	
Norway	FMG Scandinavia Fund	**1,131**	**0,241**	**0,114**
	FMG Combo fund	**1,410**	**0,466**	**0,181**
	FMG Hi Tech	**-0,191**	**-0,092**	**0,025**
	WarrenWicklund Nordic Hedge 1	**0,966**	0,256	**0,070**
	Interkraft Energy Fund	**0,713**		**0,140**
	Nordic Alpha plc	**1,474**	0,500	**0,111**
	Nordic Orkla plc	**1,169**		**0,106**
	WarrenWicklund Hedge Basket	**2,353**	0,546	**0,126**
	WarrenWicklund Utbytte	**2,622**	0,748	**0,293**
	WarrenWicklund Alpha	**0,926**	**0,224**	**0,263**

Country	Hedge Fund	Performance Measure		Average Return p.a.
		Sharpe ratio	Treynor ratio	
Denmark	Scandium Absolute Return Fund	**0,247**		**0,056**
	Scandium Fund Limited	**1,419**		**0,090**
	Carnegie WorldWide Long Short	**-2,527**		**-0,150**
	Danske Hedge ENMortage Arbitrage	**0,043**		**0,038**
	Danske Hedge Fixed Income Strategies	**0,422**		**0,041**
	Danske Hedge Mortgage Arbitrage	**0,094**	0,025	**0,032**
	Nordea Fixed Income Hedge Fund	**0,757**	0,239	**0,062**
	Nordic Leveraged Bond Fund	**-0,246**		**0,019**
	HP Hedge	**0,279**		**0,054**
	AAAsgard Fixed Income Fund I	**0,574**		**0,103**
	Asgard Fixed Income Fund	**0,217**		**0,036**

11.5 Explanatory factors regression results – Alpha (Single-factor regressions)

	Alpha - Single-factor model (Regional Benchmarks) (All Included)			Alpha - Single-factor model (Regional Benchmarks) (5% Sig.)		
	Beta	Sig.	R2	Beta	Sig.	R2
Size	0,000	0,017	0,123	0,000	0,811	0,005
Age	0,000	0,000	0,141	0,000	0,843	0,002
Performance Fee	-0,001	0,294	0,017	0,039	0,489	0,025
Management Fee	0,146	0,391	0,011	0,303	0,286	0,063
Minimum Investment	0,000	0,716	0,003	0,000	0,943	0,000
Number of Funds	0,000	0,37	0,010	0,001	0,372	0,038

	Alpha - Single-factor model (Nordic Benchmark) (All Included)			Alpha - Single-factor model (Nordic Benchmark) (5% Sig.)		
	Beta	Sig.	R2	Beta	Sig.	R2
Size	0,000	0,011	0,138	0,000	0,843	0,004
Age	0,000	0,000	0,160	0,000	0,465	0,030
Performance Fee	0,023	0,223	0,023	0,140	0,120	0,144
Management Fee	0,235	0,169	0,028	0,368	0,179	0,117
Minimum Investment	0,000	0,923	0,000	0,000	0,725	0,012
Number of Funds	0,001	0,151	0,025	0,001	0,112	0,134

	Alpha - Multi-factor model (F-F) (Regional Benchmarks) (All Included)			Alpha - Multi-factor model (F-F) (Regional Benchmarks) (5% Sig.)		
	Beta	Sig.	R2	Beta	Sig.	R2
Size	0,000	0,046	0,089	0,000	0,985	0,000
Age	0,000	0,023	0,062	0,000	0,944	0,000
Performance Fee	0,025	0,194	0,026	0,048	0,383	0,045
Management Fee	0,137	0,428	0,010	0,357	0,394	0,046
Minimum Investment	0,000	0,499	0,009	0,000	0,821	0,004
Number of Funds	0,000	0,319	0,012	0,001	0,319	0,052

	Alpha - Multi-factor model (F-F) (US Benchmark) (All Included)			Alpha - Multi-factor model (F-F) (US Benchmark) (5% Sig.)		
	Beta	Sig.	R2	Beta	Sig.	R2
Size	0,000	0,130	0,052	0,000	0,278	0,106
Age	0,000	0,030	0,056	0,000	0,795	0,004
Performance Fee	0,027	0,187	0,027	-0,044	0,355	0,057
Management Fee	0,228	0,217	0,023	-0,757	0,197	0,108
Minimum Investment	0,000	0,606	0,005	0,000	0,574	0,027
Number of Funds	0,000	0,338	0,011	0,001	0,582	0,017

11.6 Explanatory factors regression results – Alpha (Multi-factor regressions)

	Alpha - Single-factor model (Regional Benchmarks) (Alpha 5% Sig.)	
	Beta	Sig.
Size	0,000	0,199
Age	0,000	0,289
Performance Fee	0,011	0,884
Management Fee	8,074	0,201
Minimum Investment	0,000	0,251
Number of Funds	-0,001	0,628
R2	0,521	

	Alpha - Single-factor model (Nordic Benchmark) (Alpha 5% Sig.)	
	Beta	Sig.
Size	0,000	0,746
Age	0,000	0,373
Performance Fee	-	-
Management Fee	-0,470	0,922
Minimum Investment	0,000	0,515
Number of Funds	0,000	0,626
R2	0,817	

	Alpha - Multi-factor model (F-F) (Regional Benchmarks) (Alpha 5% Sig.)	
	Beta	Sig.
Size	0,000	0,153
Age	0,000	0,317
Performance Fee	-0,042	0,529
Management Fee	9,742	0,132
Minimum Investment	0,000	0,947
Number of Funds	-0,001	0,501
R2	0,625	

	Alpha - Multi-factor model (F-F) (US Benchmark) (Alpha 5% Sig.)	
	Beta	Sig.
Size	0,000	0,397
Age	0,000	0,413
Performance Fee	-0,066	0,354
Management Fee	-8,226	0,249
Minimum Investment	0,000	0,349
Number of Funds	0,003	0,227
R2	0,750	

11.7 Skewness & Kurtosis analysis

Country	Hedge Fund	Skewness	Kurtosis	Mean Monthly Return
Sweden	Zenit	0,347	1,114	0,0149
	Futuris	-0,101	1,106	0,0096
	Lynx	-0,001	-0,453	0,0100
	Manticore	-0,569	0,512	0,0011
	Avenir	-1,274	5,787	0,0052
	Erik Penser Hedgefond	-0,068	2,373	0,0059
	Lancelot Excalibur	0,295	1,619	0,0022
	Atlant Edge	2,352	9,438	0,0202
	Atlant Explora	0,576	2,497	0,0047
	Atlant Libra	0,573	2,222	-0,0005
	Atlant Scorpio	-0,195	-0,246	0,0008
	Atlant Sharp	.	.	-0,0063
	GMM a	-0,354	0,668	0,0055
	Aktieansvar Graal	0,923	1,801	0,0052
	HQ Nordic Hedge	-0,142	0,061	0,0029
	HQ Global Hedge	-1,206	1,723	0,0025
	HQ Solid	-0,724	0,986	0,0033
	Nordic Absolute Return Fund	0,618	-0,154	0,0071
	Öhman WhisperHedge	0,986	-0,039	0,0053
	Thyra	1,059	1,429	0,0097
	Alcur	1,354	1,469	0,0067
	Ram	-0,509	0,728	0,0044
	Eikos	-0,077	1,406	0,0077
	Gladiator	-0,307	-0,157	0,0158
	Merlin	-0,083	1,068	0,0027
	Tanglin	0,598	0,839	0,0067
	Northern Spirit Fund	-0,251	0,371	0,0005
	OPM Alfa	-1,702	3,881	0,0039
	PN Idea	-1,201	4,009	0,0088
	PN Yield	-0,578	2,762	0,0038
	SEB Fixed Income	-0,033	4,024	0,0018
	Shepherd Energy Fund	0,300	2,637	0,0003
	Stella Nova Hedgefond	0,540	1,598	0,0057
	Whitebeam Multihedge	0,098	0,078	0,0041
	Whitebeam Structured	-0,531	-2,083	-0,0046
	Ohman Multi Manager	-0,356	-0,565	0,0061
	Adapto Nordic 100	0,385	0,526	0,0029
	Agenta Hedge	-0,805	0,793	0,0000
	AMDT Hedge	-0,473	-0,219	0,0126
	Catella Hedgefond	-0,574	0,354	0,0057
	DLG Aktiefond	-1,037	6,073	0,0292
	DnB NOR Equity Hedgefund Primus	-0,167	0,236	0,0034
	DnB NOR Prisma	-0,648	0,140	0,0041
	Nektar	0,049	0,182	0,0073
	Magnitud	-0,481	0,283	0,0017
	Horisont	-0,350	0,410	0,0028
	Radar	-0,902	0,854	0,0157
	BPfonder Småbolag	-0,488	1,430	-0,0019
	Consepio	-1,018	3,286	-0,0002

Country	Hedge Fund	Skewness	Kurtosis	Mean Monthly Return
Finland	Eufex Hedge	0,442	0,239	0,0005
	Global Markets	0,309	0,853	0,0035
	Global XL	0,264	0,750	0,0065
	Eliksir	-0,444	2,156	0,0012
	Avenir B	-0,219	-0,202	0,0008
	TREC Alpha Long Short Hedge Fund	-0,749	3,076	0,0000
	TREC Edge	0,012	0,439	0,0035
	Abacus	-0,860	0,586	0,0000
	Celeres Pension	-0,911	1,119	0,0030
	Celeres Summa	-0,228	-0,722	0,0014
	RAM Partners Fixed Income Fund	-2,205	4,884	-0,0022
	OKO Equity Hedge	0,149	-0,545	0,0046
	FIM Maltti	1,310	2,838	0,0021
	FIM MultiHedge	-0,893	0,937	-0,0018
	Altos	-0,705	0,308	0,0081

Country	Hedge Fund	Skewness	Kurtosis	Mean Monthly Return
Norway	FMG Scandinavia Fund	-0,734	0,942	0,0069
	FMG Combo Fund	-0,055	0,973	0,0107
	FMG Hi Tech	1,474	10,611	-0,0013
	WarrenWicklund Nordic Hedge 1	0,486	1,728	0,0033
	Interkraft Energy Fund	1,051	4,571	0,0084
	Nordic Alpha plc	0,049	0,822	0,0066
	Nordic Orkla plc	0,460	-0,456	0,0060
	WarrenWicklund Hedge Basket	-0,292	-0,241	0,0076
	WarrenWicklund Utbytte	0,150	0,073	0,0196
	WarrenWicklund Alpha	-0,252	0,904	0,0191

Country	Hedge Fund	Skewness	Kurtosis	Mean Monthly Return
Denmark	Scandium Absolute Return Fund	-2,650	7,548	0,0013
	Scandium Fund Limited	0,232	1,258	0,0049
	Carnegie WorldWide Long Short	0,596	1,169	-0,0155
	Danske Hedge EN Mortage Arbitrage	-0,892	1,370	0,0005
	Danske Hedge Fixed Income Strategies	-0,197	-0,511	0,0008
	Danske Hedge Mortgage Arbitrage	-0,361	-0,050	0,0003
	Nordea Fixed Income Hedge Fund	-0,897	1,821	0,0027
	Nordic Leveraged Bond Fund	-0,360	-0,739	-0,0013
	HP Hedge	0,088	-1,139	0,0010
	AAAsgard Fixed Income Fund I	-0,349	-0,204	0,0062
	Asgard Fixed Income Fund	-0,218	-0,198	0,0007

11.8 Correlation between hedge funds and Nordic index

Correlation between Carnegie Nordic Total Cap and Equally Weighted Fund Index

	Carnegie Nordic Total Cap	Equally Weighted Fund Index
Carnegie Nordic Total Cap	1	0,171
Equally Weighted Fund Index	0,171	1

*Correlation is significant at the 5% level

11.9 Description of Fama-French model factors

Construction: The Fama-French factors are constructed using the 6 value-weight portfolios formed on size and book-to-market. (See the description of the 6 size/book-to-market portfolios.)

SMB (Small Minus Big) is the average return on the three small portfolios minus the average return on the three big portfolios,

SMB =1/3 (Small Value + Small Neutral + Small Growth)
- 1/3 (Big Value + Big Neutral + Big Growth).

HML (High Minus Low) is the average return on the two value portfolios minus the average return on the two growth portfolios,

HML =1/2 (Small Value + Big Value)
- 1/2 (Small Growth + Big Growth).

Rm-Rf, the excess return on the market, is the value-weight return on all NYSE, AMEX, and NASDAQ stocks (from CRSP) minus the one-month Treasury bill rate (from Ibbotson Associates).

See Fama and French, 1993, "Common Risk Factors in the Returns on Stocks and Bonds," *Journal of Financial Economics*, for a complete description of the factor returns.

Stocks: Rm-Rf includes all NYSE, AMEX, and NASDAQ firms. SMB and HML for July of year t to June of t+1 include all NYSE, AMEX, and NASDAQ stocks for which we have market equity data for December of t-1 and June of t, and (positive) book equity data for t-1.

Source: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/index.html, 2007-11-12