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STARS OF THE NORTH?

A QUANTITATIVE STUDY OF ALPHA GENERATION IN NORDIC HEDGE FUNDS

MÅRTEN ANDERBERG (19932)
YLVA CEDERHOLM (19186)

Abstract

In this paper, we investigate whether the managers of Nordic hedge funds produce excess risk-adjusted returns in terms of alpha, and discuss other risk-adjusted return measures. We also test whether certain characteristics of the funds, such as size and leverage, affect their risk-adjusted performance. In our sample we find few significant alphas and low explanatory power of fund characteristics. We also find that a majority of the funds appear to have net exposure to market risk. Furthermore, we note that current data limitations put constraints on the analysis.

Tutor:	Stefan Engström, PhD.
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Venue:	Room 343
Discussants:	Alexandra Karlqvist (19406)
	Gabriela Rodriguez-Pérez (19091)

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1. Introduction

1.1 Motivation and Purpose

> *"Scandinavian and Nordic funds have continued an impressive run in the past 12 months, according to Bloomberg. Brummer Partners' Latitude Fund was the fourth best returning non-US macro fund in 12 months to 29 July (44.3%)…"* (Hedge Fund Review 2005).

The note above was published in the magazine Hedge Fund Review in October 2005. Less than one year later, Hedge Nordic wrote:

> *"After a year of disappointing returns and with a YTD of around -27%, the Swedish hedge fund company Brummer and Partners has decided to close down their global macro fund Latitude".* (Hedge Nordic 2006).

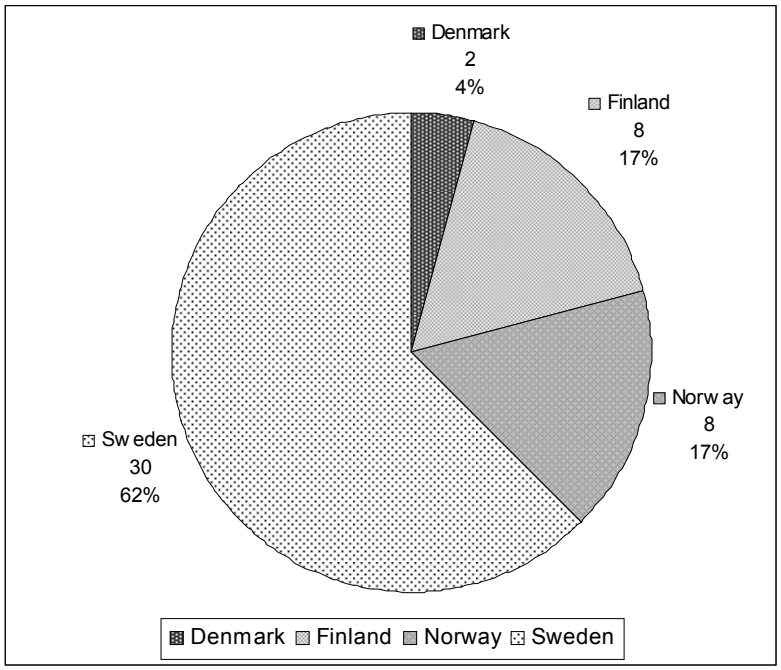
The event above shows how hedge funds are not necessarily hedged against market risk, and so illustrates the importance of a deeper understanding of hedge funds. The Nordic hedge fund market is relatively young and not well-covered in existing research. Therefore, we have decided to focus our efforts on analysing this particular market. We hope that this paper will contribute to a deeper knowledge of the area and serve as a source of inspiration for future research.

The purpose of this paper is to investigate the characteristics and performance of Nordic hedge funds through the use of available data and quantitative methods. We seek to determine whether managers have managed to produce excess risk-adjusted returns in terms of alpha and evaluate them using different risk-adjusted return measures. We will also test whether certain characteristics of the funds, such as size and leverage, affect their risk-adjusted performance.

1.2 Limitations and Definitions

The hedge funds studied are the set of currently active Nordic hedge funds, restricted to those having been active at least since January 2004. For the purposes of our analysis, Nordic hedge funds are defined as hedge funds with managers located in the Nordic region (i.e. funds can be both onshore and offshore), excluding Iceland, in accordance with the utilised fund database. We consider the Nordic region as one unit, rather than four individual countries, due to the relatively small amount of funds in each country and an uneven distribution of funds among the countries in our sample, as can be seen in figure 1.2.1.

Figure 1.2.1: Geographical Distribution of Hedge Funds



We have chosen to use the Hedge Nordic database for our study, as it is comprehensive and contains not only return data but also most of the fund characteristics used in the analysis.

The analysed characteristics of the funds are size, leverage, age, redemption period, high watermarks, hurdle rate, management fee, performance fee, front/back load, and minimum investment. Leverage is defined in the explicit,

narrow sense as borrowed capital. This is partly due to simplicity and partly the fact that there is no consensus in the literature about the definition of leverage. Size is defined as assets under management. Due to insufficient data on some fund characteristics, we do not consider all factors that could be of potential interest and we do not investigate hedge fund regulation in detail. Potential differences in regulation within the Nordic region are considered small and should not affect our results or hinder comparison with other regions.

As regards performance evaluation, a number of performance measures that may be appropriate when analysing hedge funds. We limit our discussion to alpha, beta, Sharpe ratio and Sortino ratio, the latter two are used to discuss a risk-return perspective and the implications of potential differences between them will be explained.

2. Introduction to Hedge Funds

2.1 Hedge Fund Concepts

There is no clear, generally accepted definition of a hedge fund. In the U.S.A., the following definition has been proposed:

> *"Although it is not statutorily defined, the term encompasses any pooled investment vehicle that is privately organized, administered by professional investment managers, and not widely available to the public"* (Ulriksen Thuesen 2006).

In a study of the exposure of the ECB to hedge funds, the following definition is used:

> *"A fund whose managers receive performance-related fees and generally have no or very limited restrictions on the use of various active investment strategies to achieve absolute positive returns. Such strategies often involve leverage, derivatives, long and short positions in securities or any other assets"* (Dierick and Garbaravicius 2005).

Thus, despite the lack of a clear definition, the private organization and limited restrictions appear to be typical for hedge funds in general.

The basic idea of hedge funds is to earn returns from the relative difference in values between different securities while hedged against the systematic risk factors of the investments, i.e. the market risk. For instance, if a manager buys undervalued stock and simultaneously goes short in overvalued stock, it is believed that in a bull market the price of the long undervalued stock should increase more than that of the short overvalued stock, while in a bear market the short overvalued stock should decrease more in price than the long, undervalued stock. Consequently, by using the above strategy the investor is theoretically protected, or hedged, against the market risk while earning a return from the difference in relative value of the securities. The relatively low risk of the fund would also allow for leverage, which in turn could allow for even higher returns. However, the word hedge fund can be misleading. The strategy described above may well be protected against market risk, but it still involves speculation in the relative values of different assets (Edwards 1999), and may be subject to other risk factors. Additionally, for those funds that take positive net positions, e.g. through derivatives exposure, not even the market risk is hedged against (Riksbanken 2006).

Some typical characteristics of hedge funds and their difference from other investment associations are listed below.

Table 2.1.1: Features of Hedge Fund versus Typical Investments Associations

Feature	Hedge Fund	Typical Investment Association
Target	Absolute yield (positive yield irrespective of market development).	Relative yield (in relation to a benchmark).
Investment Strategies and Instruments	Extensive freedom. Use of derivatives, gearing and short-selling.	Limited freedom. Limited opportunities to use derivatives, gearing and short-selling.
Liquidity	Restrictions on deposits and withdrawals, e.g. only once a month or quarter.	Investment certificates can be bought and sold on an ongoing basis.
Incentive Structure	Manager fee: typically 1-2% of assets per annum, plus 15-25% of monthly performance above certain threshold values.	Manager fee: fixed fee, e.g. fixed percentage of assets per annum.
Regulation	Limited regulation and supervision. No or few reporting and transparency requirements.	Regulated and under supervision. Reporting and transparency requirements.

Source: Ulriksen Thuesen (2006).

As seen in table 2.1.1, the return target for hedge funds is irrespective of market development, which can be attributed to the availability of instruments that can hedge systematic risk. Hedge funds are relatively free to choose investment strategies and financial instruments, and they are generally less liquid than typical investment associations. The incentive structure differs between different types of funds. While typical investment associations have a fixed management fee, hedge fund managers often receive their main fraction of payment in the form of performance-related fees.

2.2 Hedge Fund Strategies

There are many different strategies that hedge funds can use. Table 2.2.1 below gives a brief overview of some of the most common ones.

Table 2.2.1: Typical Strategies of Hedge Funds

DIRECTIONAL

Long/Short Equity Hedge	This strategy involves taking both long and short positions in equity without necessarily being market neutral. Options and futures may be used to hedge. Long/short equity funds tend to build and hold portfolios that are more concentrated than those of traditional long-only equity funds.
Dedicated Short Bias	The strategy is to maintain net short as opposed to pure short exposure. Short-biased managers take short positions in mostly equities and derivatives. The short bias of a manager's portfolio must be constantly greater than zero to be classified in this category.
Global Macro	Global macro managers carry long and short positions in any of the world's major capital or derivative markets. Thus, the positions reflect views on overall market direction. The portfolios of these funds can include stocks, bonds, currencies and commodities in the form of cash or derivatives instruments.
Emerging Markets	This strategy involves equity or fixed income investing in emerging markets. The strategy often employs a long-only strategy, since many emerging markets do not allow short-selling, nor offer viable futures or other derivative products with which to hedge.
Managed Futures	This strategy invests in listed financial and commodity futures markets and currency markets around the world.

EVENT DRIVEN

Distressed/High Yield Securities	Investments in the debt, equity or trade claims of companies in financial distress or default. The securities of these companies typically trade at substantial discounts to par value. Various strategies have been developed by which investors may take hedged or outright short positions in such claims, although this asset class is in general a long-only strategy.
Risk Arbitrage	Simultaneous long and short investments in companies involved in a merger or acquisition. Risk arbitrageurs are typically long in the stock of the acquired company and short in the stock of the acquirer. By shorting the stock of the acquirer, the manager hedges out market risk, and isolates his/her exposure to the outcome of the announced deal. The principal risk is deal risk, should the deal fail to close.

MARKET NEUTRAL

Fixed Income Arbitrage	The fixed income arbitrageur aims to profit from price anomalies between related interest rate securities, such as interest rate swaps and US and non-US bonds. Most managers trade globally.
Convertible Arbitrage	The manager uses hedged investing in convertible securities of a company. Typically the investment is long in the convertible bond and short in the common stock of the same company. Positions are meant to generate profits from the fixed income security as well as the short sale of stock, while protecting the investor from market moves.
Equity Market Neutral	This investment strategy is designed to exploit equity market inefficiencies and usually involves having simultaneously long and short matched equity portfolios of the same size within a country. The portfolios are designed to be either beta or currency neutral, or both. The portfolios are often leveraged in order to enhance returns.

MULTI-STRATEGY

Multi-Strategy funds are characterised by their ability to allocate capital dynamically among several traditional hedge fund strategies. The Multi-Strategy category also includes funds that employ unique strategies which do not fall under any of the other descriptions.

FUND OF FUNDS

A fund will employ the services of two or more trading advisors or hedge funds who/which will be allocated cash to trade on behalf of the fund.

Source: Garbaravicius and Dierick (2005).

As this section has shown, hedge funds can have a wide variety of characteristics and strategies. Later we will give an overview of the most common strategies of Nordic hedge funds. We will also analyze potential relationships between performance, fund characteristics and strategies.

2.3 Fees and Compensation Structure

Managers of hedge funds are compensated in two ways: a fixed management fee to cover expenses and an incentive fee to align interests, typically 20%-30% of the generated earnings above a certain hurdle rate (a risk-free benchmark such as a 1-month interbank rate). For a fund with so-called high water marks, investors are not required to pay incentive fees if the fund lies below its peak Net Asset

Value (NAV). High water marks ensure that investors do not pay incentive fees until any previous losses are made up for (Bernstein 2005).

3. Theoretical Background

3.1 Performance Measures

One of the most basic principles of capital markets is that investors want compensation for taking on risk, meaning that performance has two components; the return and the risk taken to achieve the return. While return is rather straightforward to measure, finding an appropriate risk measure is considerably more difficult. Below we present results from previous research on some of the most commonly used performance measures for the Nordic hedge funds.

3.1.1 Alpha and Beta

The terms alpha and beta derive from statistics where they denominate the coefficients in the basic linear regression model $y = \alpha + \beta x + \varepsilon$. Interpreting the above regression in terms of return on investment, y would be the return, α the intercept, β the exposure to x, x some market factor (some appropriate benchmark) and ε the error term. Applying this on the CAPM[1] (ignoring the error term by assuming zero-mean), we have $R_i - R_f = \alpha + \beta(R_m - R_f)$. This implicates that the excess return over the risk-free rate equals the market excess return times the investment's market exposure plus alpha. Alpha therefore represents

[1] CAPM: $R_i = R_f + \beta(R_m - R_f)$, where

R_i = Return on the investment

R_f = Risk-free rate of return

β = The beta of the investment

R_m = Market return

the return obtained due to factors other than market performance, e.g. manager skills. Rearranging this, we have the following expression for alpha: $\alpha = (R_i - R_f) - \beta(R_m - R_f)$. According to Schneeweis (1999), this is the preferred method of estimating alpha in order not to make too unrealistic assumptions about e.g. the beta or the risk-free rate. However, the model assumes that the market factor x exactly replicates the risk factor driving the returns of the strategy. This is somewhat inaccurate for hedge funds, since they are sometimes non-transparent with respect to their investments and have broad mandates, making it very difficult to find a perfect market benchmark. Instead, using multi-factor models[2] (Schneeweis 1999) or synthetic hedge funds (Kat & Palaro 2005), the replication of the statistical properties of hedge fund return/risk through futures trading, may prove useful.

Alpha (as defined in a single-factor model like the one above) has been used in several previous studies evaluating hedge funds, with different results. Asness, Krail and Liewi (2002) study the returns for the CSFB/Tremont hedge fund indices from 1994 to 2000 and find significantly positive average excess returns for most of the strategies. By contrast, examining U.S. offshore hedge funds between 1989 and 1995, Brown, Goetzmann and Ibbotson (1998) find that the funds on average underperformed the S&P500, i.e. had a negative alpha.

The beta[3] of an investment is the sensitivity of the investment to movements in the market return. Liang (1999) investigates the returns of 1162 hedge funds and uses a multi-factor model to explain the returns. He finds low beta values, suggesting that hedge funds manage to maintain a low systematic risk thanks to long-short strategies, concentrated investments in small asset bases, use of derivatives and holdings of broad asset classes in different markets. Other studies, such as Cochrane (2005), find the opposite results, namely that hedge

[2] Multi-factor models are models that allow for several variables, such as macroeconomic factors, to explain investment returns.

[3] $\beta_i = \frac{Cov(R_i, R_m)}{\sigma_m^2}$, where $Cov(R_i, R_m)$ = the covariance between the investment return and the market return, and σ_m^2 is the variance of the market returns.

fund returns do not have betas of zero. Therefore, lacking a straightforward answer, we seek to test whether the assumption of zero beta holds for the Nordic hedge funds. The beta measure assumes normally distributed returns and is therefore not necessarily appropriately applied on hedge fund returns (see section 3.1.2). However, we still consider the beta measure relevant, as it allows us to gain an insight into the potential market risk exposures of the hedge funds.

3.1.2 Mean-Variance Analysis and the Sharpe ratio

Harry M. Markowitz is well-known for his pioneer work in modern portfolio theory and the mean-variance analysis, which was essential to the development of the Capital Asset Pricing Model (CAPM). William Sharpe recognized the implications of the CAPM for measuring investment performance and developed the Sharpe measure, which divides the excess return by the standard deviation, i.e.

$\text{Sharpe Ratio} = \frac{E(r_i) - r_f}{\sigma_i}$, where

$E(r_i)$ = Expected return on the investment

r_f = Risk-free rate of return, and

σ = Standard deviation of returns on the investment.[4]

The Sharpe ratio offered a measure of excess return over the risk-free rate given the risk of return, i.e. a reward-to-risk measure (Bodie, Kane and Marcus 2005).

However, several scholars, including Markowitz himself, eventually realized the main shortcomings of performance measures based on the CAPM (Kaplan and Siegel 1994). The validity of the analysis depends on the assumption of either normally distributed returns or mean-variance preferences among investors. In

[4] $\sigma_i = \sqrt{\frac{\sum_{i=1}^{N} (r_i - \mu)^2}{N}}$, where N is the population size, r_i are the individual investment returns (i=1, 2, 3,…,N), and μ is the population mean.

reality, returns are rarely normally distributed, especially not those of dynamic investment strategies. Brooks and Kat (2001) found that hedge fund returns are skewed (asymmetric) in their distributions. Other studies, for instance Fung and Hsieh (1997), have found similar results and suggest that mean-variance analysis is inappropriate for performance evaluation of such investments. In addition, investors tend to distinguish upside from downside returns, i.e. they do not have mean-variance preferences (Benartzi and Thaler 1995). This so-called loss aversion implicates that an investor suffers more from a 10% loss than she enjoys an equally large gain. In terms of the risk measures in risk-adjusted performance evaluation, these shortcomings of the mean-variance analysis suggest that the use of standard deviation as a risk measure is invalid in many cases (Leland 1997). When using the standard deviation, investments with positive but variable returns are punished. To give a simple example, a fund with monthly returns of 10%, 4% and 15%, respectively would have the same monthly risk as one with returns of -10%, -4% and -15%, respectively. However, it seems rather clear that investors would consider the latter to be riskier than the first. Despite its faults, the Sharpe ratio is commonly used in practice (Leggio & Lien 2003). This is true also for Nordic hedge funds as can be seen in section 4.1.

3.1.3 Downside Risk – The Sortino Ratio

Around 1990, downside risk measures started to appear in the practitioner literature and one of their strongest supporters was Frank Sortino (Kaplan and Siegel 1994). He defined the Sortino ratio in the following way:

$$\text{Sortino Ratio} = \frac{E(r) - r_f}{\sigma_d}, \text{ where}$$

$E(r)$ = Expected return,

r_f = Risk-free rate of return, and

σ_d = Standard deviation below a certain Minimum Accepted Return (MAR), where MAR is set according to the investor's objectives.

The Sortino ratio has been widely proposed over the Sharpe ratio for ranking of funds and indices, e.g. by Leggio & Lien (2003). The idea is that if there is a minimum return that must be earned (MAR), then any returns below the MAR will produce unfavourable outcomes while any returns greater will produce good outcomes. Sortino and Price (1994) claim that risk is associated only with bad outcomes (investors do not have mean-variance preferences) and that only returns below the MAR should be viewed as risk.

Lien (2002) examined the relationship between Sortino ratio and Sharpe ratio, and showed that, assuming portfolio returns are normally distributed, Sortino ratio is a monotonically increasing function of the Sharpe ratio, i.e. the fund would have the same ranking irrespective of which measure one uses. Looking at the higher moments of the distribution and the effects of skewness and kurtosis, Lien shows that the above also holds in the presence of negative skewness or excess kurtosis. For all other cases, i.e. when there is positive skewness and/or no excess kurtosis, using the Sortino ratio would provide a fund ranking with an order opposite that of rankings provided using the Sharpe ratio.

3.2 Micro variables

Previous research suggests that the performance of investment funds is related to certain attributes of the fund. We will refer to these attributes throughout as micro factors or micro variables. Below we give an overview of results of previous studies on the topic.

Regarding the size of funds, previous research provides contradicting results. Gregoriou and Rouah (2003) find no significant relation between size and performance (as measured by Sharpe ratio and Traynor ratio) among the 204 hedge funds that they study. Hedges (2003) shows in his study that smaller funds have larger alphas than larger funds, and that mid-sized funds perform the worst. Dahlqvist, Engström and Söderlind (2000) study the relationship between alpha and micro variables for Swedish mutual funds and conclude that size

seems to matter little for most types of funds except for large equity funds. They suggest that the size of these funds may disable them to adopt aggressive trading strategies, thereby also limiting their alpha prospects. Others find a positive relationship between size and performance and Liang (1999) suggests economies of scale and/or attraction of capital for large hedge funds as possible explanations.

As regards leverage, Liang (1999) finds that leveraged funds slightly outperform unleveraged ones in terms of monthly returns, but the results lack statistical significance. In a study from 2005, Schneeweis, Karavas, Kazemi, and Martin (2005) do not find any systematic relationship between leverage and returns. They also point out that, at this point, little research has been dedicated to the topic.

Most of the previous research on the importance of the age of funds, such as Howell (2001), suggests that hedge fund performance deteriorates over time, even when the risk of failure is taken into account. One possible explanation is that managers become less motivated after they have already become wealthy as incentives become less attractive due to diminishing utility of money with increasing wealth, an argument from prospect theory (Kahneman & Tversky, 1979). In opposition to these results, Koh, Koh and Teo (2003) find no explanatory power of age for Asian hedge fund returns.

Most hedge funds restrict the liquidity of invested capital. The redemption period (time between giving notice on withdrawal of capital and receiving the money) is often suggested to be positively related to performance. This is because the redemption period gives the manager more freedom to invest and unwind positions in illiquid investments. (Agarwal, Naveen and Narayan 2006).

Most previous research finds a positive relationship between manager compensation and performance. Liang (1999) suggests that this is due to the incentive fee aligning the manager's interest with those of the investors.

However, he finds no relationship between management fees and performance, which he explains with the fact that management fees are fixed. With high water marks, managers collect performance fees only if they can make up for past losses such that the current NAV is above any previous peak NAV. Liang finds that funds with high water mark outperform those without, suggesting that high water marks seem to have fulfilled their purpose of aligning manager incentives with those of investors. However, he finds that the existence of a hurdle rate, a minimum monthly return that must be met before performance fees are charged, does not seem to be crucial for performance. The study finds that the funds with neither hurdle rate nor high water marks perform worse than those with both hurdle rate and water marks, which in turn perform worse than those with either hurdle rate or water mark. One restriction of management's compensation being better than two is explained with the fact that too many restrictions may be too burdensome and therefore not attract the best managers.

The front-end load of a fund is the initial charge paid by any introducing agent. The back-end load is a charge for selling shares in the fund (Oxford 2005). Some funds use these loads, and they do not seem to be a sign of quality according to most previous findings. Searching for research on the area, we exclusively find studies that find equal or better performance for no-load funds than load funds. One example of such a study is that of Morey (2001), which, after adjusting for loads in the returns of mutual funds, finds that no-load funds perform significantly better than load funds. He also finds that there is little difference in performance between load funds with different levels of load fees.

Research on the effect of minimum investment on performance is more difficult to come across than most other micro variables we have investigated. Koh, Koh and Teo (2003) examine the relationship between Asian hedge fund returns and the size of minimum investment but find no significant explanatory power. Gregoriou (2002) finds a positive relationship between minimum investment and survival. Theoretically, a positive relationship between returns and minimum investment may be expected due to e.g. smaller administration costs (e.g. assuming that a

fund with a minimum investment of SEK 100 will have more frequent subscriptions/redemptions than a fund with a minimum investment of SEK 1 million, as clients are less sophisticated), or alternatively, assuming that funds with high minimum investments attract relatively sophisticated investors and that sophisticated investors are better at selecting investments, one would expect a positive relationship between returns and minimum investment.

To summarize, the previous research provides us with various results concerning the existence and characteristics of relationships between fund characteristics and their effect on hedge fund performance. Due to the wide range of previous results, we find it interesting to test which, if any, of the previously found relationships hold for the Nordic hedge funds.

3.3 Research Questions

According to their conceptual foundation, one would expect hedge funds to produce positive alphas and near-zero betas and a hypothesis would build on those assumptions. In this paper, we address two questions:

1. *Do Nordic hedge funds produce positive alphas with near-zero betas?*
2. *Do micro factors affect fund performance and, if so, in what direction?*

4. Nordic Hedge Funds

Hedge funds are relatively young in the Nordic region. The oldest one is the Swedish fund Zenit, managed by Brummer and Partners, and started in 1996 (Brummer & Partners 2006). Although hedge funds are rather new in the Nordic region, some funds have already closed down and do no longer exist, e.g. the Latitude fund. Today, a total of 95 funds, 50 Swedish, 17 Norwegian, 16 Danish and 12 Finnish funds, are registered in the Hedge Nordic database (Hedge Nordic 2006). Our sample covers 48 of these funds.

4.1 Performance Metrics

Some of the largest fund rating providers in Sweden use standard deviation and Sharpe ratio when presenting risk profiles of hedge funds (Morningstar 2006, Nordnet 2006 and Avanza 2006). In addition, when reporting to the Swedish FSA (Finansinspektionen), hedge funds report standard deviation as a risk measurement (Ode 2006). Thus, it appears that the risk measures based on mean-variance analysis and standard deviation are frequently used in practice. Therefore, despite our discussion in section 3 about the potential inappropriateness of such performance measures, we do consider some of these measures in our analysis.

4.2 Fund Strategies and Characteristics

Of the 48 funds in our sample, a majority are Equity funds. The other two types of funds in our sample are Funds of Funds and Multi-Strategy funds. Thus, some strategies explained in section 2.2 such as Fixed Income and Managed Futures funds are not represented in our sample. This restriction was enforced in order to have representative benchmarks (see section 5.2). Additionally, the number of

funds in these categories is too small to make robust inter-group comparisons. The sample consists of those funds that started before January 2004 and among those a majority (77%) was set up after January 2002.

In the table below, average monthly returns are shown for the minimum sample period for the aggregate of funds as well as the respective strategies and countries.

Table 4.2.1: Average monthly returns (%) for full sample, strategies and countries

	2004	2005	2006	2004-2006
Full Sample	0,6172	0,8617	0,5597	0,6795
Equity	0,6166	0,9866	0,6921	0,7651
FoF & MS	0,6179	0,6868	0,3743	0,5597
Denmark	1,1617	1,5296	0,3583	1,0165
Finland	0,5682	0,9704	0,8252	0,7880
Norway	0,9305	0,9978	0,6604	0,8629
Sweden	0,5103	0,7519	0,4754	0,5792

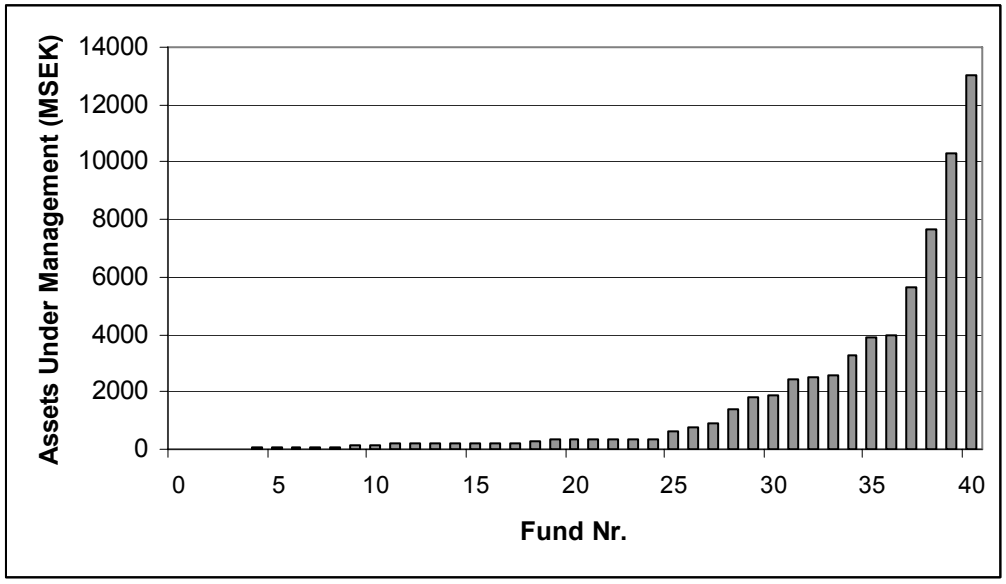
In terms of raw average returns, 2005 was the best year for all countries and strategies. Comparing the countries, Denmark was the best performer until 2006, when it was the weakest performer. However, the Danish sample only contains two funds so variance there can be expected to be larger than for the other countries. Over the full sample period, Denmark has had the strongest returns, while Sweden has had the weakest return. Equity funds have outperformed fund of funds & multi strategy funds during the past two years but slightly underperformed during 2004. We will not look at country performance in detail, but a closer statistical analysis of strategy performance is conducted in section 7.1.

Table 4.2.2: Micro Variables Descriptives for the Full Sample

	Average	Median	Highest	Lowest
AUM (SEK)	1639	324	13000	1
Performance fee (%)	18,26	20	30	10
Mgmt fee (%)	0,53	1	2,25	0,7
Subscriptions	35	12	250 (daily)	1 (yearly)
Redemptions	29	12	250 (daily)	4 (quarterly)
Annual Strd Dev	6,17	5,27	24,73	1,49
Min. Investm. (SEK)	517745	100000	5000000	100

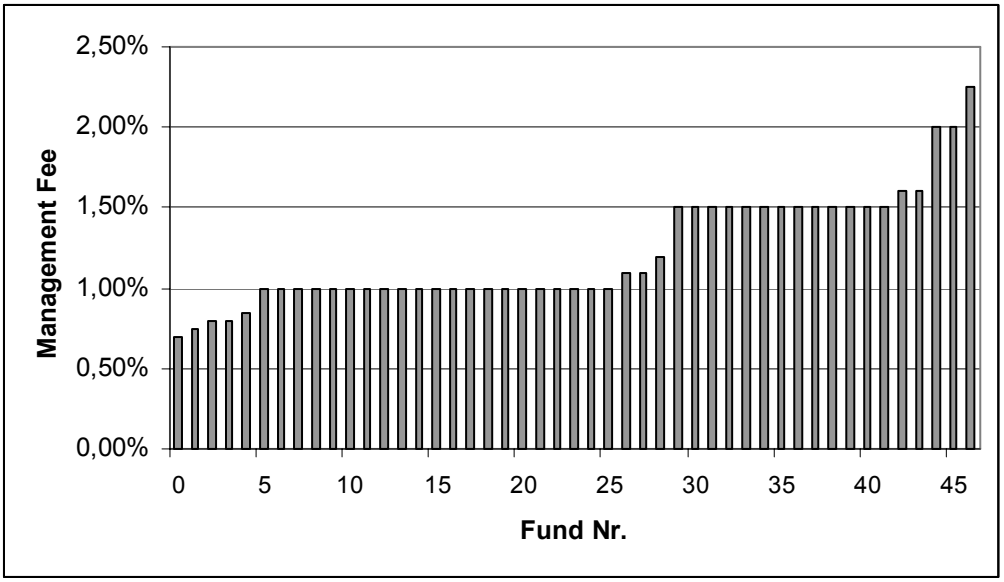
Table 4.2.2 shows some descriptive statistics for some of the micro variables. Assets Under Management (AUM) is the invested capital net debt, i.e. the size of the fund. In our sample, AUM is on average MSEK 1639. The median is significantly smaller (MSEK 324), which implies that there are some very large outliers. This is confirmed by the figure below. The range of AUM is very wide, with Nordic Absolute Return being the largest one (MSEK 13000) and Erik Penser Hedgefond being the smallest one (MSEK 1).

Figure 4.2.1: Distribution of Assets Under Management



As regards incentive structure, 42 of the funds have performance fees (most of them approximately 20% over a 30-day T-Bill benchmark) and 47 have management fees. Only one fund (Helios) has neither performance fees nor management fees, this due to it being a fund of other funds with the same manager. The distribution of management fees can be seen in figure 4.2.2 below. The average performance fee is 18.26% (although comparison is made difficult by differences in benchmarks) and the average management fee is 1.22%. 32 funds have both hurdle rate and high water mark, 12 have either hurdle rate or high water mark, and 4 funds have neither hurdle rate nor high water mark.

Figure 4.2.2: Distribution of Management Fees



As figure 4.2.2 shows, most management fees lie in the range 0.7% to 2.5%, with 1% being the most frequently used, followed by 1.5%. Fees below 1% and above 1.5% are exceptions, with only one fifth of funds having management fees lying beyond these values.

Most funds do not use leverage in the sense of borrowing capital, only 17% in our sample, but one should keep in mind that this does not include margin trading, e.g. investing through derivatives or use of short sales, which provides implicit leverage.

Redemptions can typically be made daily, monthly or quarterly. A majority of the funds (58%) use monthly redemptions. On average, the frequency with which one can redeem is 29 times per year, i.e. a bit less frequently than monthly. The median is 12 times per year and the difference between the average and the median is due to four of the funds having daily redemptions (250 times a year, weekends excluded), which naturally has a large positive effect on the average frequency. The average subscription frequency is 35 times per year, i.e. more often than redemptions on average. Again, the difference between the average and the median of 12 can be largely explained by a few large outliers (daily

subscriptions). 54% of the funds have some type of fee for redemption and/or subscription.

The annual standard deviation is on average 6.17% and it has a median (relatively close to the mean) of 5.27. The standard deviation varies significantly across funds, with P&N Yield having had an average of 1.49% and Altos having had an average of 24.73%.

The minimum investment varies greatly across funds. Nordea European Equity Hedge Fund has a minimum investment requirement of SEK 100, while RAM One requires a minimum investment of MSEK 5. The average minimum investment is KSEK 518 and the median is KSEK 100.

For full details on fund characteristics, see table 11.3 in Appendix.

5. Methodology

5.1 Research Methods

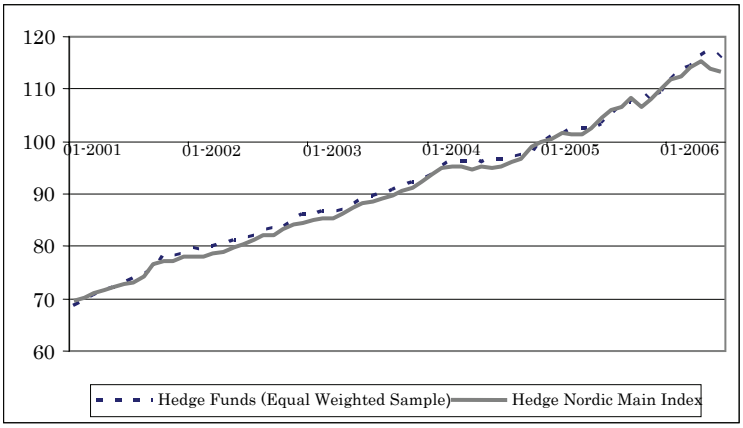
Our research is quantitative, i.e. we explain and analyze the area of research using quantitative data and statistical relationships. We have chosen to collect the information through interviews to as small an extent as possible in order to maintain an unbiased presentation of the existing data. The fund return data has been collected through the Hedge Nordic database, and the database also provides some information on the micro variables. For those variables for which information was unavailable at Hedge Nordic, information was collected via email correspondence with representatives from the respective hedge funds as well as from Morningstar.

5.2 Benchmarks, Sample, and Risk Metrics

While a multi-factor model along the lines of Schneeweis (1999) would have been preferable, our limited sample contains too few observations to allow for robust multi-factor analysis. Creating synthetic hedge funds through futures trading as suggested by Kat and Palaro (2005) would have been a complex a task that is outside the scope of this paper. Instead we utilize an industry benchmark commonly used in analyzing Swedish hedge funds: the SIX Portfolio Return Index (SIX PRX). However, as a significant amount of the funds in the sample have Nordic mandates, we repeated our analysis using two pan-Nordic indices to ascertain robustness, namely the FTSE NOREX 30 Index and Carnegie Nordic Small Cap Index (Euro Denominated). We consider our choices of equity index benchmarks to be justified since long-short Swedish/Nordic equity is by far the most common strategy in our sample.

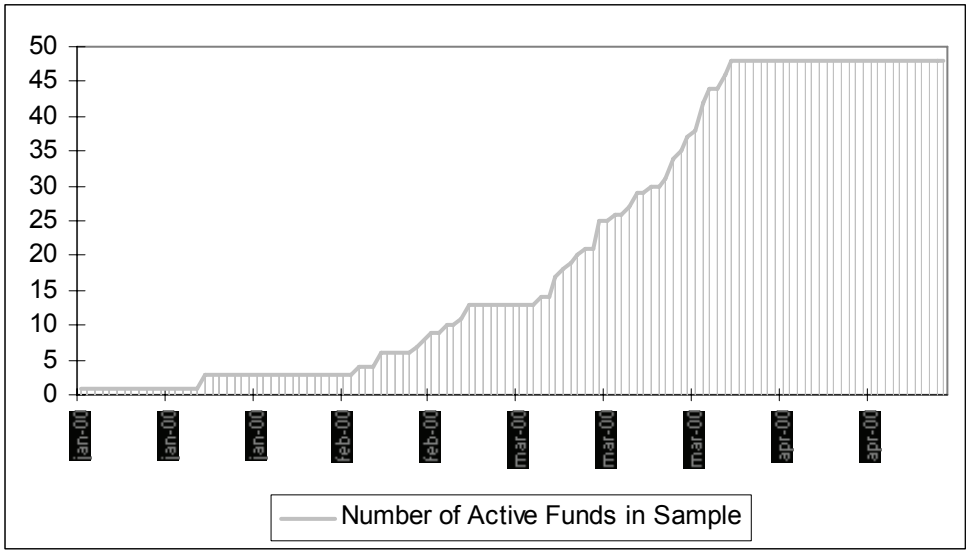
In our analysis, we removed pure Fixed Income strategies and Managed Futures strategies, as these funds trade in financial instruments with low correlation to stock markets, and thus are likely to have substantially different risk factor loadings. However, as seen in figure 5.2.1, an equal-weighted index of our restricted sample closely replicates the Hedge Nordic Index, indicating that our analysis should generalize well to the greater universe of Nordic hedge funds. There is a slight outperformance of the sample over the index. However, this is to be expected as the sample does not take into account fund failures during the period, i.e. it suffers slightly from survivorship bias. The shortened comparison period is due to the Hedge Nordic index only stretching back to January 2001, half our sample period.

Figure 5.2.1: Equal Weighted Sample vs. Hedge Nordic Index



Each fund in the sample had a minimum of 30 monthly observations, i.e. all funds in the sample were founded January 2004 or earlier. The full data period available was used in the regressions for each fund, with a cut-off at July 2006. Figure 5.2.2 below gives an overview of the distribution of sample lengths. For an overview of the entire sample together with benchmarks over various sample periods, see figures 11.1.1-11.1.3 in Appendix.

Figure 5.2.2: Fund Sample Length Overview



Sample Period Length (Months)							
Mean:	52	**Median:**	48	**Max:**	119	**Min:**	30

Some fund data, such as that for AUM and minimum investment, was reported in Euro, U.S. Dollar or Norwegian Kroner. This data was converted into Swedish

Kronor using end-of-period foreign exchange rates[5]. Returns for funds in denominations other than SEK were used as provided by the database, i.e. with no currency adjustment. Further descriptions of how we have managed our data are given below in section 6, where we present the results of our study.

6. Results

In order to determine the risk-adjusted performance of the funds, we ran single-factor regressions of the form

(1) $r_{p,t} - r_{f,t} = \alpha_p + \beta_p (r_{m,t} - r_{f,t}) + \varepsilon_{p,t}$

where

$r_{p,t}$ = Hedge Fund Return

$r_{f,t}$ = OMRX 30d T - Bill Index Return

$r_{m,t}$ = Market Benchmark Index Return

$\varepsilon_{p,t}$ = Error Term

t = Month

The regression was run separately for each fund, and against each of our three benchmarks, the summarized results of which can be found in tables 6.1 and 6.2 below. Per-fund data is available in table 11.1 in Appendix.

Table 6.1: Summarized Results of Single-Factor Regressions

[5] SEK/NOK=1.155, SEK/Euro=9.20, SEK/USD=7.19 as of end of June 2006.

Non-Significant at 5% Significance Level Treated as 0. Annualized Alpha.

		SIXPRX			NOREX30			CNG SMCAP (€)			MODEL AVG		
		α	β	R^2	α	β	R^2	α	β	R^2	α	β	R^2
Sample	Mean	1,41%	0,230	0,32	1,49%	0,178	0,25	-0,41%	0,218	0,38	0,83%	0,209	0,32
	Median	0,00%	0,200	0,34	0,00%	0,159	0,26	0,00%	0,195	0,41	0,00%	0,185	0,33
Equity	Mean	1,65%	0,243	0,28	1,71%	0,179	0,21	0,24%	0,227	0,34	1,20%	0,216	0,28
	Median	0,00%	0,212	0,31	0,00%	0,157	0,23	0,00%	0,185	0,36	0,00%	0,184	0,30
FoF & MS	Mean	1,09%	0,213	0,36	1,19%	0,176	0,31	-1,33%	0,205	0,45	0,32%	0,198	0,38
	Median	0,00%	0,196	0,37	0,00%	0,170	0,33	0,00%	0,202	0,46	0,00%	0,189	0,38

Only Significant Values at 5% Included. Annualized Alpha.

		SIXPRX			NOREX30			CNG SMCAP (€)			MODEL AVG		
		α	β	R^2	α	β	R^2	α	β	R^2	α	β	R^2
Sample	Mean	7,54%	0,263	0,32	7,97%	0,213	0,25	-2,46%	0,261	0,38	4,35%	0,246	0,32
	Median	6,01%	0,229	0,34	5,81%	0,184	0,26	-4,26%	0,221	0,41	2,52%	0,211	0,33
Equity	Mean	7,68%	0,283	0,28	7,97%	0,228	0,21	2,27%	0,288	0,34	5,97%	0,267	0,28
	Median	6,28%	0,239	0,31	6,47%	0,197	0,23	4,95%	0,237	0,36	5,90%	0,224	0,30
FoF & MS	Mean	7,27%	0,236	0,36	7,95%	0,195	0,31	-5,30%	0,228	0,45	3,31%	0,220	0,38
	Median	5,29%	0,202	0,37	5,81%	0,181	0,33	-5,40%	0,209	0,46	1,90%	0,197	0,38

Tables 6.1 and 6.2 show that the majority of funds have significant beta: 88% at the 5% significance level if one requires only one significant beta, and 65% at the 1% significance level if one requires the results to be robust to all three benchmark indices. The model average beta of the sample when setting non-significant betas to 0 is 0.209. It is notable that average alpha is positive against SIXPRX and NOREX30 with rather small differences, whereas average alpha is negative against the Carnegie Small Cap index.

Table 6.2: Percentage of Funds with Significant Coefficient

At 5% sig. level, in at least one model.

	α	α (+)	β
Sample	31%	19%	88%
Equity	25%	21%	86%
FoF & MS	40%	15%	90%

At 5% sig. level, in all three models.

	α	α (+)	β
Sample	4%	4%	79%
Equity	7%	7%	71%
FoF & MS	0%	0%	90%

At 1% sig. level, in at least one model.

	α	α (+)	β
Sample	17%	10%	81%
Equity	18%	14%	75%
FoF & MS	15%	5%	90%

At 1% sig. level, in all three models.

	α	α (+)	β
Sample	4%	4%	65%
Equity	7%	7%	54%
FoF & MS	0%	0%	80%

The proportion of significant positive alphas in the sample is much lower, 19% of the funds at 5% significance level, and only 4% at 1% significance if requiring robust results against all three indices.

Comparing the Sharpe ratio and the Sortino ratio, we find a mean difference at all reasonable significance levels. The mean Sortino ratio in the sample is 0.48, compared to a mean of 0.34 for the Sharpe ratio. Table 6.3 shows the complete statistics. The MAR for the Sortino ratio was set to the same risk-free benchmark (OMRX 30-Day T-Bill) for all funds for the sake of transparency, which implies a favourable zero-beta assumption, but does not implicitly introduce directional bias in the result, as it only determines the boundaries of positive and negative volatility. Per-fund results can be found in 11.2 in Appendix.

Table 6.3: Test of Mean Difference of Sortino and Sharpe Ratio

Variable	Obs	Mean	Std.Err	Std.Dev	95% Conf.Interval	
Sortino	48	0.4760344	0.0580054	0.4018733	0.3593426	0.5927263
Sharpe	48	0.3439256	0.0302893	0.2098501	0.2829915	0.4048597
Diff	48	0.1321088	0.0341061	0.2362942	0.0634961	0.2007215

Diff = Sortino – Sharpe. Null hypothesis: Mean (diff) = 0. t = 3.8735. Degrees of freedom = 47

Ha: Mean (diff) < 0	Ha: Mean(diff) ! = 0	Ha: Mean(diff) > 0
Pr(T < t) = 0.9998	Pr (|T| > |t|) = 0.0003	Pr (T > t) = 0.0002

Then, in order to investigate the relationship between alpha and fund attributes, we ran single variable regressions between period alpha and a number of descriptive factors, as seen in table 6.4. It would have been preferable to perform simultaneous analysis of all tested variables but sample size limitation renders such analysis impossible. For the purposes of this analysis, alphas not statistically significant at the 5% level were treated as 0, and both SIX alpha and model average alpha were tested for robustness.

Table 6.4: Description of Tested Alpha-Prediction Variables.

Variable Name	Variable	Data Type
years	Length of Fund Existence	In Years
fee_perf	Performance Fee	In %
fee_mgmt	Management Fee, Per Annum	In %
hurdle	Uses Hurdle Rate	Dummy (1 = Yes)
watermark	Uses High Water Mark	Dummy (1 = Yes)
hurdlewater	Uses Hurdle Rate & High Water Mark	Dummy (1 = Yes)
leverage	Uses Leverage	Dummy (1 = Yes)
redempt_length	Redemption Period Length	In Years
fee_subredempt	Uses Front and/or Back Load Fees	Dummy (1 = Yes)
min_invest	Minimum Investment	In MSEK
aum	Assets Under Management	In MSEK
beta	Beta	Period Beta

Table 6.5: Results of Single Micro-Factor Regressions.

	α (SIX)			α (Model Average)		
	Coef.	P>t	r2	Coef.	P>t	r2
years	0.0001	0.545	0.0080	0.0001	0.441	0.0130
fee_perf	-0.0096	0.151	0.0452	-0.0050	0.325	0.0215
fee_mgmt	0.3696	0.005*	0.1613	0.2204	0.029*	0.1018
hurdle	-0.0026	0.028*	0.1009	-0.0017	0.051	0.0803
watermark	-0.0013	0.247	0.0291	-0.0009	0.253	0.0284
hurdlewater	-0.0021	0.031*	0.0972	-0.0015	0.040*	0.0883
leverage	-0.0009	0.309	0.0280	-0.0007	0.364	0.0223
redempt_length	0.0067	0.214	0.0334	0.0055	0.171	0.0403
fee_subredempt	-0.0009	0.285	0.0248	-0.0008	0.247	0.0291
min_invest	0.0006	0.222	0.0371	0.0005	0.226	0.0364
aum	0.0000	0.767	0.0023	0.0000	0.745	0.0028
beta	-0.0006	0.766	0.0019	-0.0009	0.582	0.0066

Table 6.5 shows that the micro variables have significant explanatory power at the 5% level for management fees, hurdle rate, and hurdle rate & watermark. This is robust against the model average for all variables except hurdle rate, although its p-value of 0.051 lies very close to the required 5%.

7. Discussion

7.1 Fund Performance

Looking at risk-adjusted performance, it is clear that the majority (79%) of funds has significant net market exposure as measured by beta; 0.209 on average (taking non-significant as 0). It is also clear that only a small minority shows significant alphas even at the 5% significance level. In fact, only 4% of the funds show significant alpha if we require results to be robust for all three benchmarks. Our r^2 values are about what can be reasonably expected for a single-factor analysis, at an average of 0.32. We are somewhat surprised to see such high average beta values since more than 40% of our sample consists of funds of hedge funds and multi-strategy funds, most with global mandate, among which we would expect near-zero betas against Nordic equity markets. Looking at the equity funds and multi-strategy/fund of funds separately, we find little difference in beta between the two groups, and a standard t-test cannot reject the hypothesis of the groups having the same average beta at any reasonable significance level, as seen in table 7.1.1 below.

Table 7.1.1 – Mean Beta Difference, Equity Funds vs. Other Funds

Group	Obs	Mean	Std.Err	Std.Dev	95% Conf.Interval	
Equity	28	0.2426345	0.0482489	0.2553094	0.1436358	0.3416332
FoF & MS	20	0.2127576	0.0295053	0.1319516	0.1510023	0.2745128
Combined	48	0.2301858	0.0305183	0.0305183	0.1687908	0.2915807
Diff		0.0298769	0.0565555		-0.0842153	0.1439692

Diff = Mean(Equity) – Mean (FoF & MS). Null Hypothesis: Diff = 0.

t = 0.5283, Satterthwaite's degrees of freedom = 42.5197

Ha: diff < 0	Ha: diff != 0	Ha: diff > 0
Pr(T < t) = 0.7000	Pr(|T| > |t|) = 0.6001	Pr(T > t) = 0.3000

It is important to note that the factor exposures appear sensitive to the choice of benchmark used, even when the benchmarks are highly correlated. This is most apparent for alpha, where average alpha is positive against SIXPRX & NOREX30, but negative against the Carnegie Small Cap Index. This confirms that great care must be taken in order to ensure the appropriateness of the benchmark, or results may be misleading.

There are six funds that have no beta against either benchmark, four equity funds and two multi-strategy funds, of which two have significant alpha in at least one model. These funds may be better described by a richer model with different risk-factor loadings. For instance, the Bid & Ask Stella Nova fund trades exclusively in derivatives and may thus derive a great part of its returns from changes in equity market volatility rather than equity market returns, and thus requires a benchmark that takes this into account.

The benchmark index with the most explanatory power as measured by r^2 is the Nordic small cap index, which at the same time has the lowest alphas, indicating that the hedge funds may have some size and/or growth bias in their investment portfolios, although this would have to be confirmed through Fama & French (1993) three-factor analysis as there is also a possibility that e.g. the Euro-denomination of the index skews the result.

An important note is that the return distribution has not been stable over the sample period, and an interesting picture emerges when we plot the number of active hedge funds in our sample together with the excess return over SIXPRX of the equal-weighted sample. As can be seen in figure 7.1.1, excess returns have fallen drastically over the investigated period whereas the number of funds has grown drastically, indicating that the kind of returns seen in the mid-to-late nineties may be a thing of the past, as ever more funds compete for the same investment opportunities. In addition, the drastic reduction does not appear to be due to any drop in market returns, as seen in 7.1.2, and it also appears that the fit between market return and hedge fund return has increased from 2004

onwards. Furthermore, since our sample is constructed only from currently active funds, it is likely to suffer from some degree of survivorship bias, meaning that the true returns to investors are potentially overstated in this analysis.

Figure 7.1.1: Hedge Fund Sample Returns vs. Number of Funds

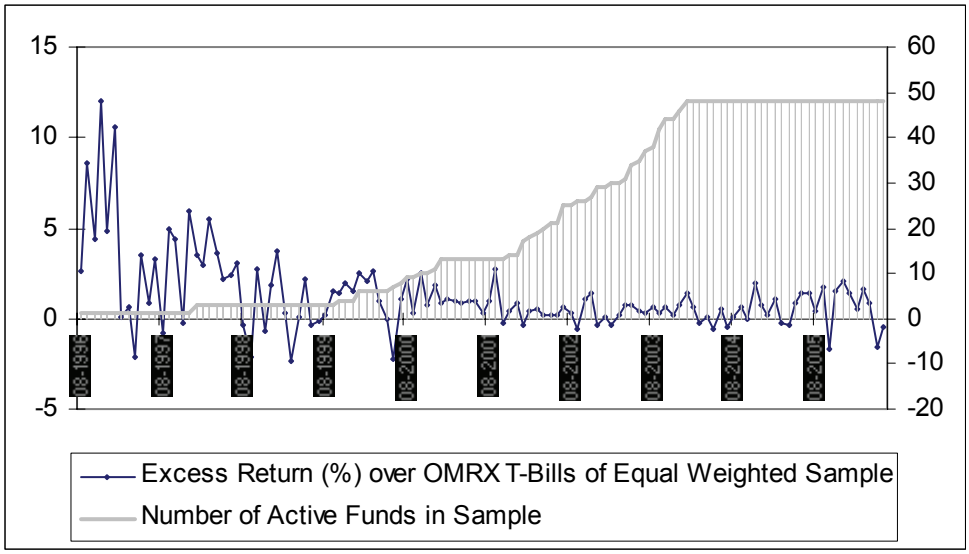
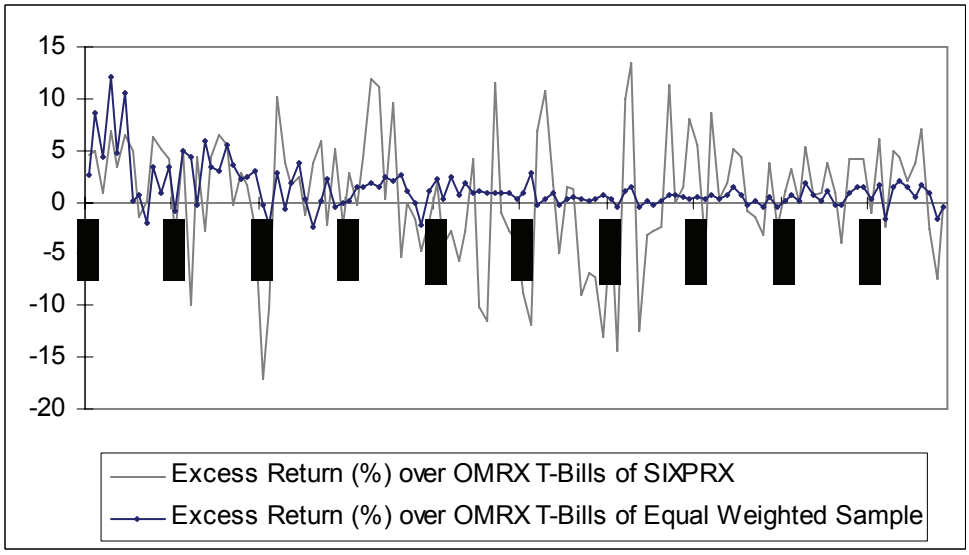


Figure 7.1.2: Hedge Fund Sample Returns vs. Market Returns



Working with hedge fund data, there are a number of problems one must be aware of. Firstly, since hedge funds are relatively new investment vehicles in the Nordic region there are natural limitations on the available dataset, producing less reliable regressions due to lack of observations. The limited dataset is also a

problem because of the dominant uptrend in the regional equity markets during the later part of the sample. It becomes more difficult to separate alpha and beta, as we do not see how resilient the hedge fund returns are to falling markets. Survivorship bias and reporting bias are other potential problems, as there is no reliable central database over historical hedge fund returns. One must also consider the fact that hedge fund returns tend to be non-normal with negative skewness and a greater-than-normal chance of outsized negative returns (Kat and Lu 2002), whereas classical mean-variance analysis disregards these higher moments and thus may underestimate the true risk of hedge funds and overstate risk-adjusted performance. Acker and Duck (2006) suggest that the choice of reference day can have a strong influence on the estimated properties of the returns, such as mean and standard deviation. Acker and Duck propose that the degree of reference risk should be tested for in models using monthly data by testing for robustness against different reference dates. This could potentially be done for the benchmark indices which can be decomposed into daily data, but not for the hedge fund data as daily returns are not reported.

The results from the comparison between the Sharpe ratio and the Sortino ratio show that the funds on average have higher Sortino ratio than Sharpe ratio. Our sample has a mean skewness of -0.12 and a kurtosis of 1.45, i.e. we have negative skewness but no excessive kurtosis (the kurtosis for a normal distribution is 3). However, one should keep in mind that survivorship bias hides some kurtosis, as funds with outsized negative returns tend to close down and thus be excluded from our analysis. Note that, since not all funds have negative skewness and/or excess kurtosis, a ranking of the funds using the Sortino ratio instead of Sharpe would yield some differences in fund ranking. This highlights the importance of using an appropriate performance measure and critical thinking when evaluating the reported metrics in order to make the right investment decisions. It may seem surprising that the funds tend to use the Sharpe ratio rather than the Sortino ratio in their reporting. However, we believe that this is due to the Sharpe ratio being more frequently used and well-known among investors in

general and hence easier to use when comparing hedge fund performance to e.g. stock indices or other benchmarks.

7.2 Explanatory Factors

We find little predictive value of incentive factors for hedge fund alpha, except for the size of the management fee, the implementation of a hurdle rate, and the implementation of both a hurdle rate and a high water mark. We find that funds with high management fees have higher alpha, as do funds using a hurdle rate. This does not support Liang's (1999) previous findings, described in section 3.2, that showed no relationship between these two variables and performance. However, the use of both a hurdle rate and a high-watermark is negatively related to alpha, as in the previous study.

One reason why high management fees may predict higher alpha is that if these funds have consistently higher alpha, they may want to extract more of that alpha as return to their managers rather than their investors, without having to rely on the beta of the fund making it beat the hurdle rate (as would be the case with higher performance fees). It may also be that there is a willingness among investors to pay higher fees for higher alpha, or that funds with higher fixed fees have greater ability to conduct market research and find better investment opportunities.

The use of a hurdle rate seems to have a positive effect on alpha. This may simply be due to the fact that if a hurdle rate is not implemented, funds would more commonly take out performance fees (i.e. also when performance is below the hurdle rate) leading to lower return for investors and thus more negative alpha. This is the only incentive factor that is not robust to all three indices, although it is non-significant by a very small margin, and only in one index.

The usage of both a hurdle and high water mark is negatively related with alpha, which may seem surprising as these would supposedly provide the best aligned

incentives between managers and investors. However, a possible reason has been described previously in the literature (e.g. Liang 1999).

Our data shows no significant relationship between leverage and alpha. This is in accordance with the existing studies that cannot find any significant relationship between leverage and returns, supporting the findings of Schneeweis, Karavas, Kazemi and Martin (2005) and those of Liang (1999). Funds using leverage do nevertheless have significantly higher beta on average and the results of a simple linear regression of beta against a leverage dummy are shown in table 7.2.1.

Table 7.2.1: Regression Results of Betas vs. Leverage Dummy

Model beta	Coef.	Strd.Err	T	P>|t|	95% Conf.Interval
Leverage	0.2512	0.0773	3.25	0.002	0.0945636- 0.4077792
Intercept	0.1695	0.0350	4.84	0.000	0.0985305- 0.2403892

R2 = 0.2220

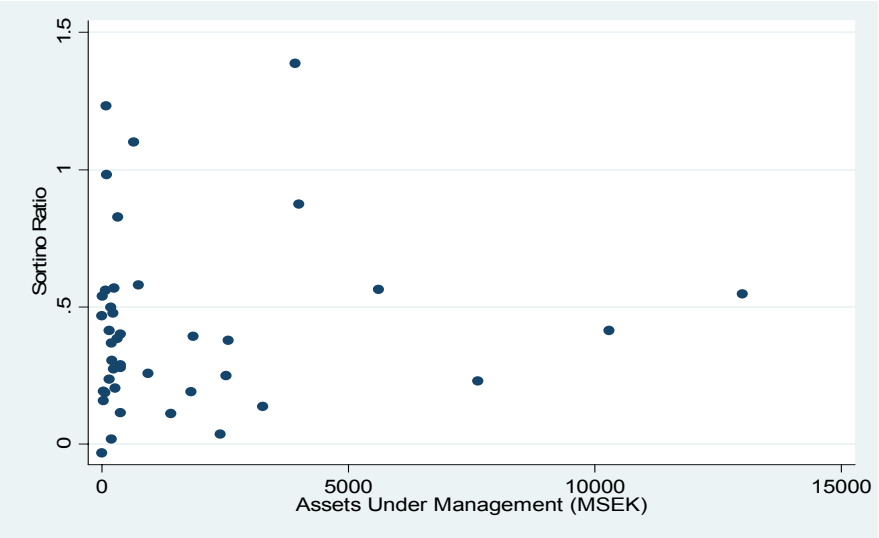
SIX beta	Coef.	Strd.Err	t	P>|t|	95% Conf.Interval
Leverage	0.2630	0.0802	3.28	0.002	0.1005123- 0.4254796
Intercept	0.1873	0.0363	5.16	0.000	0.1136638- 0.260845

R2 = 0.2252

The results above indicate that funds using explicit leverage are indeed leveraging their market exposure, but if there is no alpha pre-leverage, it is not going to somehow appear post-leverage.

Front/back-load fees do not seem to matter for alpha generation, which goes against most previous empirical findings of a negative relationship, e.g. Morey (2001). Neither does size appear to matter, but previous literature lacks consensus on whether such a relationship exists at all, and whether it is positive or negative. As figure 7.2.1 shows, there is little in our data to suggest a relationship. In this graph, Sortino ratio was used to avoid clustering at 0 due to few significant alphas.

Figure 7.2.1: Scatter plot of Sortino Ratio against AUM



The redemption period has no significant positive (or negative) relation with alpha, which opposes the findings of Agarwal, Naveen and Narayan (2006), and neither does the level of minimum investments.

An important note is that since end-of-period values are used in the micro-factor regressions we cannot claim to have established their power as alpha predictors, only that they appear correlated over the period if the values have not suffered significant fluctuation. In general, the available sample data period is too short too allow us to test, with reasonable robustness, alpha persistence and prediction, as splitting our sample leaves us with too little data to analyze.

8. Conclusions

In this study we have found significant market exposure for a majority of the funds and no significant difference for beta values across strategies, using a simple single-factor model. Only a minority of the funds appear to have produced positive excess returns. These findings provide the answer "no" to our first question if funds produce positive alphas with near zero betas. Our model appears somewhat sensitive to benchmark choice, which should be kept in mind when interpreting the results, but robustness is limited by the lack of available data. We also find indications that the return distribution of hedge funds is non-stable and decreasing from the mid-1990s to the present, possibly due to an increase in the number of funds, although this would need to be confirmed.

Among the micro factors investigated, only three showed significant relationships to alpha. The answer to our second question, whether there exists any connections between alpha and fund attributes, appears to be that management fee level and the use of a hurdle rate are positively related to alpha and the use of both a hurdle rate and high water marks has a negative relation to alpha. Since few funds produced any significant alpha, we recommend that these findings be reinvestigated when more data is available.

When interpreting the results one should keep in mind that there are potential data problems such as relatively few observations, reporting and survivorship bias.

9. Suggested Further Research

While our study is necessarily limited by the low availability of data, future research will benefit from longer sample periods as well as more funds, which should make future studies similar to ours more reliable. A larger number of observations would make the regressions more reliable and would mitigate problems such as market cycle biases, as well as allowing for stability testing and prediction over various periods. It could also enable the use multi-factor or alternative beta models, which would presumably give more robust results.

A future hedge fund sample could also serve as a basis for comparison of performance and characteristics between the Nordic countries as well as between the Nordic and other countries, to see to what extent alpha is local. There would also be more funds within each strategy, which would enable a deeper analysis and comparison of different strategies. In such a study one could use strategy-specific benchmarks or even fund-specific benchmarks using alternative beta models that attempt to passively replicate the risk factors of specific hedge fund strategies.

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11. Appendix

Table 11.1: Per Fund Single-Factor Regression Results

Fund Type	Fund	SIXPRX			NOREX30			CNG SMCAP (€)		
		α	β	R^2	α	β	R^2	α	β	R^2
Equity	3C Alpha Long-Short Hedge Fund		0.222*	0,32		0,153	0,19		0.232*	0,45
	3C Edge		0.243*	0,29		0,155	0,15		0.287*	0,53
	Altos		1.365*	0,42		1.113*	0,35		1.469*	0,62
	Avenir		0.389*	0,42		0.282*	0,28		0.427*	0,65
	Banco Hedge		0.201*	0,26			0,12		0.177*	0,26
	Carnegie WorldWide Long/Short Fund		0.435*	0,41		0.340*	0,32		0.417*	0,49
	Cicero Hedge		0.095*	0,22		0.084*	0,22		0,080	0,20
	DnB NOR Equity hedge fund Primus		0.235*	0,30		0.186*	0,24		0.207*	0,30
	Edge	0,009	0,280	0,18	0,010	0,218	0,14			0,12
	Eikos	0.005*	0.134*	0,35	0.006*	0.098*	0,24	0.004*	0.137*	0,47
	Erik Penser Hedgefond		0.276*	0,38		0.210*	0,28		0.258*	0,42
	Explora		0.199*	0,34		0.161*	0,28		0,138	0,21
	FIM Maltti		0,095	0,14			0,07			0,12
	Futuris		0,291	0,18		0,246	0,16		0,241	0,16
	Graal	0,002	0.092*	0,43	0,002	0.061*	0,23		0.089*	0,51
	Handelsbankens Hedgefond Aktie Europa		0.154*	0,34		0.117*	0,25	-0.004*	0.173*	0,55
	Libra			0,00			0,04			0,02
	Manticore		0.196*	0,26		0.158*	0,22		0.192*	0,32
	Merlin		0.364*	0,46		0.281*	0,35		0.328*	0,48
	Nordic Alfa plc		0.285*	0,31		0.238*	0,28		0.303*	0,45
	Nordea European Equity Hedge Fund		0.101*	0,22		0.092*	0,24		0.111*	0,35
	Nordic Absolute Return		0.448*	0,33		0.326*	0,22		0.409*	0,36
	Pecunia			0,01			0,01			0,01
	P&N Yield	0.002*	0.089*	0,53	0.002*	0.074*	0,46		0.068*	0,40
	RAM ONE		0.293*	0,50		0.207*	0,31		0.273*	0,55
	Sector Maritime Investments	0.016*		0,01	0,015		0,03			0,11
	Stella Nova Hedgefond	0.005*		0,01	0.005*		0,00	0.006*		0,03
	Zenit		0.312*	0,26		0,221	0,16		0.325*	0,36
FoF	Abacus		0.174*	0,27		0,127	0,18	-0,005	0.206*	0,48
	Discovery Fund plc		0.162*	0,36		0.155*	0,41		0.150*	0,39
	DnB NOR Prisma		0.272*	0,60		0.222*	0,51		0.258*	0,69
	DnB NOR Global Hedge		0.276*	0,58		0.220*	0,47	-0,003	0.269*	0,71
	Eliksir		0.105*	0,37		0.080*	0,27		0.117*	0,59
	FMG Bio-Med Hedge Fund Ltd		0.336*	0,36		0.283*	0,33		0.266*	0,29
	FMG Global Hedge Fund Ltd		0.347*	0,44		0.271*	0,34	-0.007*	0.390*	0,71
	Helios		0.203*	0,30		0.181*	0,30		0.211*	0,42
	Horisont	0,002	0.092*	0,34	0,002	0.067*	0,23		0.081*	0,33
	H&Q Global Hedge		0.251*	0,41		0.197*	0,32	-0.005*	0.288*	0,69
	H&Q Nordic Hedge		0.175*	0,38		0.148*	0,35		0.146*	0,34
	H&Q Solid		0.240*	0,46		0.181*	0,33		0.260*	0,70
	Scandium Fund Limited	0,004	0.192*	0,32	0,005	0.159*	0,28		0.199*	0,43
	Warren Wicklund Multi-Strategy Fund		0.152*	0,42		0.119*	0,33	-0,003	0.151*	0,53
M-S	Celeres Pensïon		0.284*	0,56		0.217*	0,42		0.267*	0,64
	GMM		0.186*	0,27		0,146	0,21		0,120	0,14
	Nektar			0,00			0,02			0,01
	Tanglin Fund			0,00			0,03			0,00
	Warren Wicklund Nordic Hedge I		0.200*	0,32		0.210*	0,45		0.177*	0,32
	Warren Wicklund Diversified Value	0.012*	0.607*	0,52	0.013*	0.536*	0,51		0.550*	0,54

p > |t| = 0.05
* p > |t| = 0.01

Table 11.2: Per Fund Performance Metrics and Return Properties

Fund Type	Fund	Sortino	Sharpe	Mean Return	Skewness	Kurtosis	StDev
Equity	3C Alpha Long-Short Hedge Fund	0,22	0,18	0,25%	-0,29	5,27	1,37%
	3C Edge	0,53	0,41	0,63%	-0,27	0,97	1,56%
	Altos	0,24	0,29	2,15%	-0,71	0,93	7,41%
	Avenir	0,26	0,30	0,64%	-1,38	5,55	2,10%
	Banco Hedge	0,21	0,17	0,23%	0,26	0,30	1,36%
	Carnegie WorldWide Long/Short Fund	0,59	0,51	1,21%	-0,39	0,44	2,36%
	Cicero Hedge	0,40	0,24	0,17%	-0,30	5,49	0,71%
	DnB NOR Equity hedge fund Primus	0,17	0,17	0,26%	-0,60	0,74	1,50%
	Edge	1,05	0,56	1,29%	2,33	8,33	2,29%
	Eikos	1,80	0,94	0,74%	-0,08	1,31	0,79%
	Erik Penser Hedgefond	0,50	0,48	0,75%	-0,01	3,35	1,57%
	Explora	0,60	0,45	0,53%	0,51	1,79	1,19%
	FIM Maltti	0,73	0,37	0,33%	1,18	1,90	0,89%
	Futuris	0,15	0,13	0,30%	-0,23	-0,20	2,40%
	Graal	1,44	0,65	0,32%	1,14	1,99	0,49%
	Handelsbankens Hedgefond Aktie Europa	0,02	0,02	0,02%	-1,07	3,88	0,93%
	Libra	-0,04	-0,03	-0,03%	-0,06	0,22	0,84%
	Manticore	0,21	0,20	0,27%	-0,53	0,91	1,34%
	Merlin	0,12	0,10	0,19%	-0,06	1,66	1,88%
	Nordea European Equity Hedge Fund	0,32	0,38	0,28%	-0,34	0,24	0,74%
	Nordic Absolute Return	0,60	0,34	0,91%	0,67	0,11	2,71%
	Nordic Alpha plc	0,44	0,41	0,73%	-0,08	1,11	1,77%
	P&N Yield	0,58	0,70	0,30%	-0,83	3,69	0,42%
	Pecunia	0,42	0,37	0,94%	-0,80	4,25	2,53%
	RAM ONE	0,57	0,47	0,68%	-0,59	0,62	1,45%
	Sector Maritime Investments	0,93	0,61	1,71%	0,15	0,92	2,80%
	Stella Nova Hedgefond	1,05	0,69	0,47%	0,72	1,67	0,69%
	Zenit	0,28	0,23	0,49%	0,29	0,77	2,16%
FoF	Abacus	0,04	0,04	0,05%	-0,48	0,29	1,18%
	Discovery Fund plc	0,09	0,06	0,06%	0,24	1,43	0,95%
	DnB NOR Global Hedge	0,30	0,26	0,33%	-0,46	-0,41	1,26%
	DnB NOR Prisma	0,41	0,35	0,43%	-0,73	-0,04	1,22%
	Eliksir	0,51	0,35	0,21%	0,02	0,00	0,60%
	FMG Bio-Med Hedge Fund Ltd	0,15	0,14	0,27%	-0,09	1,01	1,94%
	FMG Global Hedge Fund Ltd	0,15	0,14	0,26%	-0,73	0,09	1,83%
	H&Q Global Hedge	0,12	0,14	0,19%	-1,18	1,98	1,37%
	H&Q Nordic Hedge	0,48	0,38	0,37%	-0,18	-0,16	0,98%
	H&Q Solid	0,34	0,28	0,35%	-0,50	0,07	1,23%
	Helios	0,47	0,34	0,44%	0,02	0,13	1,29%
	Horisont	0,71	0,63	0,35%	-0,09	1,04	0,55%
	Scandium Fund Limited	1,67	0,61	0,72%	0,71	0,19	1,19%
	Warren Wicklund Multi-Strategy Fund	0,16	0,12	0,10%	-0,32	-0,53	0,82%
M-S	Celeres Pension	0,42	0,40	0,53%	-0,70	0,84	1,32%
	GMM	0,21	0,23	0,28%	-0,23	1,02	1,25%
	Nektar	0,25	0,20	0,31%	-0,32	0,41	1,58%
	Tanglin Fund	0,33	0,32	0,41%	0,62	1,00	1,28%
	Warren Wicklund Diversified Value	0,96	0,70	2,06%	-0,05	-0,23	2,95%
	Warren Wicklund Nordic Hedge I	0,68	0,48	0,59%	0,08	3,33	1,23%
	Mean	0,41	0,34	0,52%	-0,12	1,45	1,55%

Figures 11.1.1-11.1.3: Sample Data Overview

Figure 11.1.1: Full Sample Period – 1996-2006 (119 Obs)

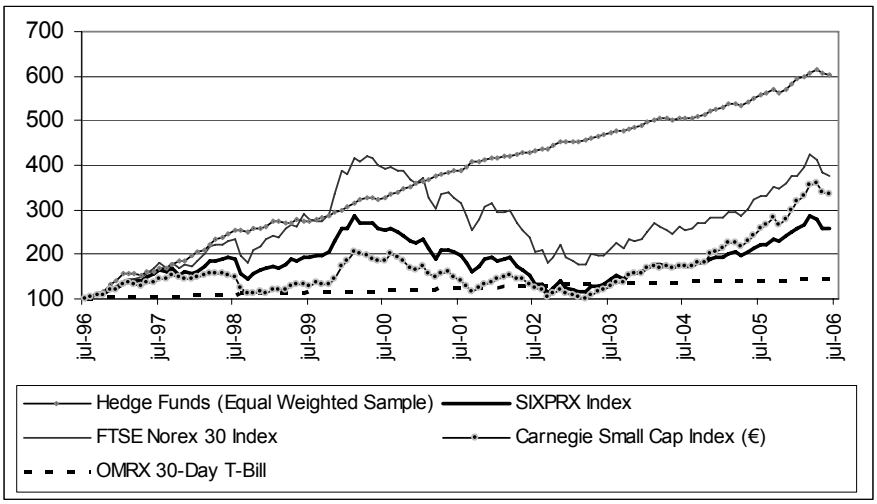

Figure 11.1.2: Half Sample Period – 2001-2006 (59 Obs)

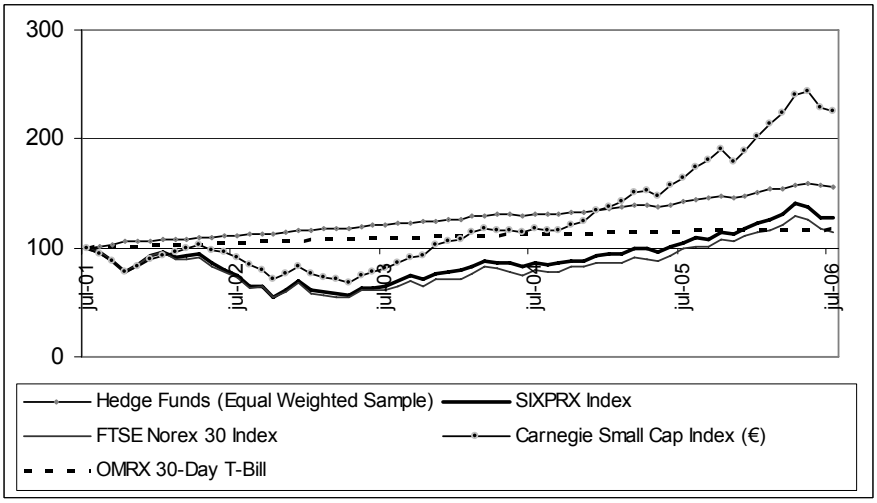

Figure 11.1.3: Minimum Sample Period – 2003-2006 (30 Obs)

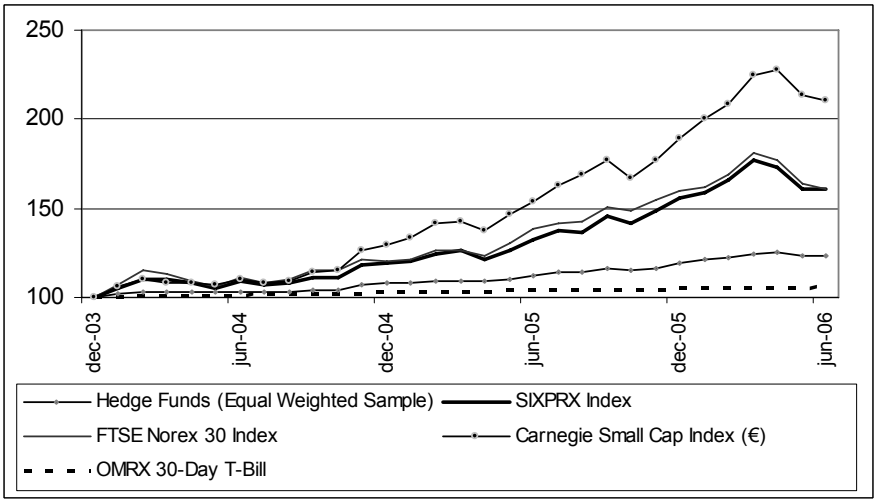

Table 11.3: Hedge Fund Characteristics[6]

Fund	Strategy	Country	AUM (MSEK)	Started	Perf. Fee (%)	Mgmt Fee (%)	Hurdle Rate	HWM	Leverage	Subscr.	Sub. Fee	Redemptions	Red. Fee	Ann. Strd Dev (%)	Min. Inv. (SEK)
Nordic Absolute Return	Equities	S	13000	Apr-03	20	1	30d SSVX	Yes	Yes	Quarterly	0	Quarterly	0	8,31	1,16m
Merlin	Equities	S	373	Oct-00	20	1	3m SSVX	Yes	N/A	Quarterly	0	Quarterly	0	7,88	1m
Stella Nova Hedgefond	Equities	S	324	Sep-03	20	1	30d SSVX	Yes	No	Monthly	1%	Monthly	0	2,59	100000
P&N Yield	Equities	S	221	Dec-02	20	1	30d SSVX	Yes	No	Monthly	0	Monthly	0	1,49	500000
Cicero Hedge	Equities	S	N/A	Jan-01	20	1	3m Stibor	Yes	No	Monthly	0	Monthly	0	4,49	25000
Erik Penser Hedgefond	Equities	S	1	May-02	20	1	None	Yes	No	Daily	0	Daily	0	6,84	5000
Libra	Equities	S	2	Oct-03	20	1	3m SSVX	No	N/A	Monthly	0	Monthly	0	2,94	100000
Edge	Equities	S	93	Jul-02	0	2	Outperform SAX with 3% & pos perform.	No	N/A	Quarterly	0	Quarterly	0	15,49	50000
Explora	Equities	S	14	Jul-02	0	1	Outperform SAX with 1% & pos perform.	No	N/A	Quarterly	0	Quarterly	0	7,11	50000
RAM ONE	Equities	S	N/A	Nov-02	20	1	None	Yes	N/A	Quarterly	0,3	Quarterly	0,3	6,62	5m
Zenit	Equities	S	932	Jul-96	20	1	30d SSVX	Yes	No	Monthly	1% if less than SEK 2,5m	Quarterly	0	14,25	500000
Graal	Equities	S	645	Jul-02	20	0,75	OMRX T-bill	No	No	Monthly	0	Monthly	0	3,03	100000
Handelsbankens Hedgefond Aktie Europa	Equities	S	195	Nov-01	20	0,7	1m Stibor	Yes	Yes	Monthly	0	Monthly	0	3,1	50000
DnB NOR Equity hedge fund Primus	Equities	S	36	Feb-03	20	1	1m Stibor	Yes	Yes	Monthly	0	Monthly	0	4,51	500000
Eikos	Equities	S	3923	Jan-00	20	1	3m SSVX	Yes	No	Quarterly	0	Quarterly	0	6,09	500000
Futuris	Equities	S	3270	Oct-99	20	1	3m EuroLibor	Yes	Yes	Monthly	0	Quarterly	0	7,43	929000

[6] Subscription fees and redemption fees are what we call front and back-load fees in section 3.2.

Manticore	Equities	S	1805	Jan-01	20	1	3m SSVX	Yes	No	Monthly	1%, max SEK 25000	Monthly	0	6,04	500000
Pecunia	Equities	S	1851	Feb-02	15	0,8	None	Yes	No	Quarterly	3%	Quarterly	2%	13,23	2m
Nordea European Equity Hedge Fund	Equities	S	375	Mar-02	20	1	1m Stibor	Yes	No	Monthly	0	Monthly	0	2,86	100
Nordic Alpha plc	Equities	N	147	Sep-03	20	1,5	2%	Yes	Yes	Yearly	0	Monthly	0	5,94	1,16m
Discovery Fund plc	Equities	N	N/A	Jan-02	20	1,5	3m Nibor less 1%	No	N/A	Monthly	0,20%	Monthly	0,20%	4,98	N/A
Sector Maritime Investments	Equities	N	3995	Jan-00	20	2	None	Yes	N/A	Monthly	0	Quarterly	0	11,37	2,32m
Carnegie WorldWide Long/Short Fund	Equities	D	5620	Jul-03	20	1	3m Euribor	Yes	Yes	Monthly	0	Monthly	0	7,86	92900
FIM Maltti	Equities	F	242	Jul-03	20	1,1	1m Euribor	Yes	No	Monthly	1%	Monthly	1%	2,99	929
Altos	Equities	F	149	Oct-03	20	1	1m Euribor	Yes	Yes	Monthly	1%	Monthly	1%, max EUR 1000	24,73	185800
Avenir	Equities	F	2527	Dec-00	20	1	1m Euribor	Yes	Yes	Monthly	0-1%	Monthly	0	5,3	929000
3C Edge	Equities	F	179	Dec-03	20	1,6	3m Euribor	Yes	No	Monthly	1%	Monthly	1%	5,23	464500
3C Alpha Long-Short Hedge Fund	Equities	F	273	Jun-00	20	1,6	3m Euribor	Yes	No	Monthly	1%	Monthly	1%	6,6	464500
DnB NOR Prisma	FoF	S	191	Sep-03	10	1	1m Stibor	Yes	No	Monthly	0	Monthly	0	4,1	50000
Horisont	FoF	S	740	Jan-04	20	1,5	OMRX T-bill	Yes	No	Monthly	2%	Quarterly	1% first 6 mths, then 0	1,97	100000
DnB NOR Global Hedge	FoF	S	239	Sep-02	10	1,5	None	Yes	No	Monthly	0	Monthly	0	4,07	50000
H&Q Nordic Hedge	FoF	S	380	May-03	10	1,5	3m SSVX	Yes	No	Monthly	1%	Monthly	0	3,21	10000
H&Q Global Hedge	FoF	S	1399	May-03	10	1,5	3m SSVX	Yes	No	Monthly	1%	Monthly	0	4,41	10000
H&Q Solid	FoF	S	205	May-03	10	1,5	3m SSVX	Yes	No	Monthly	1%	Monthly	0	3,81	100000
Helios	FoF	S	10298	Apr-02	0	0	None	No	No	Monthly	0	Quarterly	0	4,17	100000
FMG Global Hedge Fund Ltd Class A	FoF	N	N/A	Jan-02	10	1,5	Libor	Yes	No	Monthly	1-5%	Monthly	0	5,3	72500

FMG Bio-Med Hedge Fund Ltd	FoF	N	N/A	Jul-00	10	1,5	Libor	Yes	No	Monthly	1-5%	Monthly	0	10,42	N/A
Scandium Fund Limited	FoF	D	84	Jan-02	15	1,5	5%	Yes	N/A	Monthly	0	Quarterly	0	4,33	N/A
Abacus	FoF	F	2406	Jan-04	12	1,2	3m Euribor	Yes	No	Monthly	3%	Monthly	1,50%	3,93	464500
Eliksir	FoF	F	2561	Dec-02	0	0,85	None	Yes	No	Monthly	1%	Monthly	1%	1,94	4645
Warren Wicklund Multi-Strategy Fund	FoF	N	N/A	Jul-02	20	1,5	None	No	N/A	Quarterly	2%	Quarterly	1%	2,53	N/A
Warren Wicklund Diversified Value	Multi	N	N/A	Aug-03	0	1,5	None	No	No	Daily	Max 2%	Daily	Max 1%	10,83	N/A
Celeres Pension	Multi	F	316	Dec-03	25	0,8	Finnish TEL rate ca. 6%	Yes	No	Daily	1%	Daily	1%	4,39	92900
Banco Hedge	Multi	S	67	Feb-98	20	1,1	OMRX T-bill	No	No	Daily	0	Daily	1%	5,97	4000
Warren Wicklund Nordic Hedge I	Multi	N	70	Jun-03	0	2,25	None	No	No	Quarterly	Max 5%	Quarterly	Max 1%	5,36	N/A
GMM	Multi	S	33	Sep-03	20	1,5	3m Stibor	Yes	No	Quarterly	0	Quarterly	0	4,45	SEK 1m
Nektar	Multi	S	7627	Jan-98	30	1	3m SSVX	Yes	No	Monthly	1% if less than SEK 2,5m	Monthly	0	6,07	500000
Tanglin Fund	Multi	S	381	Aug-00	20	1	1m Stibor	Yes	No	Monthly	Currently 5%	Monthly	0	5,74	500000