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Evaluation of Fund Manager Performance

An empirical study of Sweden funds between 2001 and 2005

ABSTRACT

In this paper we aim to investigate 40 Sweden funds between the years 2001–2005, which constitute 12.6% of the total Swedish stock fund value on 31/12/2001 (Sweden funds and other stock funds). The model for evaluating the sampled Sweden funds is developed in Engström (2005), where he describes a framework of strategic and tactical performance in fund management. Moreover, we expand the study of Engström by evaluating Sweden funds both in bull & bear market conditions. We find that the average Sweden fund does not provide consistent excess risk-adjusted return for its investors subtracted of management fees. If one excludes management fees of the performance we find some support for excess risk-adjusted return of Sweden funds. Moreover, we find that managers of Sweden funds are able to create excess strategic alpha, yet are unable to create tactical alphas. Furthermore, we find that the alpha of the Sweden funds differ in bull & bear market and that the difference is mostly explained by difference in strategic alpha. Finally, we find no support that higher management fees are indicative or correlated with higher alpha (excluding management fees) – neither with strategic nor tactical performance.

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1 Introduction

1.1 Background

The question whether active portfolio management creates value or not has been debated for decades. According to the efficient market hypothesis any given fund should not be able to generate consistently abnormal returns above an appropriate benchmark index. Hence, taken into account the management fees of investing in mutual funds one would expect a lower return compared to investing in the index itself. Still, an enormous amount of money is invested in actively managed mutual funds every year and some academic studies also support value added through active fund management.

In Sweden, this subject is more actualised than ever after a pension reform in year 1999, which has forced all pension eligible workers to actively decide in which funds to put their money. The increased interest in mutual funds is not only due to the aforementioned pension reform, but also to an increased demand for private savings due to e.g. a doubtful status of future pension payments. The increased importance of mutual funds in people's every day life seems to have raised questions about what value the funds actually provide. How good are fund managers at managing funds and are the fees for active management really justified?

Plenty of research has been done in the field of evaluating fund managers performance. Ph D Stefan Engström (2005) developed the traditional fund performance evaluation framework with the aim to break down fund managers' performance into a strategic and a tactical part. This break-down makes it easier to see where the returns actually come from. Moreover, he showed in his article, which evaluated Sweden funds between 1996 and 2000, that the mangers generally were good at strategically choosing industries and stocks at the beginning of a given year but worse in actively enhancing the value by actively trading stocks throughout the year.

From the perspective of the Swedish fund investors we find Engström's framework relevant in that it separates the return into several parts which enables the private

investor to replicate those parts that he or she finds profitable. For example one could identify a fund which managers empirically seem to be very good making strategic decisions but worse doing tactical decisions. Then one could to a low cost[1] replicate the strategic portfolio holdings and create a personal passive fund. From the perspective of an institutional investor one would be able to delegate the strategic portfolio building to someone proven good at strategic decisions while letting another part proven good at actively trading making the tactical decisions.

In this paper we will follow Engström's methodology to evaluate Swedish fund managers' strategic and tactical performances for the five-year period between 2001 and 2005. However, the scope of this paper goes beyond the evaluation of fund managers' strategic and tactical decisions with the aim to examine how these decisions are affected by the current state of the economy. During the period of 2001-2005 the Swedish market experienced both bull and bear conditions and our hypothesis is that the relatively importance of strategic decisions versus tactical decisions varies with the market condition.

1.2 Purpose

Our aim with this paper is twofold. Firstly we would like to contribute to previous research on fund performance evaluation, particularly to Engström's study which sample period ends when our period starts. Secondly we would like to provide valuable information for people investing in Sweden funds which would help them sorting out if Sweden funds offer good value for money. We believe that answering the following four questions will take us there:

1. Do actively managed Sweden funds create excess return?
2. How do our results concerning strategic and tactical performance compare to Engström's (2005) results?
3. Is there any difference in manager performance between bull and bear market conditions?

[1] Engström (2005) writes that an investor of moderate size would be able to replicate the strategic portfolio at a cost of 0.05% per year.

4. Is there any correlation between manager fees and excess fund return?

1.3 Swedish mutual funds

We have focused on Sweden funds for several reasons. Firstly, Sweden funds have a similar investment opportunity window and similar investment objectives which enable a focus on actual return rather than risk-adjusted return. Secondly, since we cover almost all non small-cap Sweden funds existing during this period there will be no survivorship bias in our results.

In order to provide the reader with a background of the Swedish fund industry we will describe the Swedish stock market's development for the relevant time period, discuss the implications of the Swedish pension reform and finally have a closer look at the behaviour among Swedish fund investors. Firstly, however, we will take a closer look at this paper's sample of funds.

1.3a Sample of funds

The sample of funds consists of all Swedish registered Sweden funds during the period from 2001 to 2005 – totalling a number of 40 different funds. All the funds have both their fund management and administration in Sweden.[2] Moreover, all the funds are non-special and non-national funds, which have different investment legislation than the standard open-ended mutual fund we investigate. The total value of our investigated funds exceed SEK58bn[3] in 31/12/2001, which then constituted 12.6% of the total fund value of stock funds registered in Sweden (Sweden funds and other stock funds). Thus, since our sample constitutes more than 10% of the total market and thus significantly more of the total Sweden funds market, this study is rather encompassing of the Swedish market in general and the Sweden funds market in particular.[4] Finally all funds in our data set have the common features of being

[2] Search obtained from www.morningstar.se and data from Finansinspektionen
[3] Finansinspektionen
[4] Svensk Fondstatistik

actively managed and following the UCITS[5] terms. Finally, we have excluded the results of the SKF Sweden fund for the years 2001-2003 as that fund at the beginning of the period held too high stakes in SKF.

The time period has been chosen to coincide where our primary model of Engström (2005) ends, i.e. at the end of 2000, beginning on the 1st of January 2001. However, our sample of funds differ from Engström due to that we have chosen a narrower definition of Sweden fund e.g. we have no foreign registered funds. Thus, all our funds are part of the study of Engström, however, not all the funds evaluated in Engström's study are part of our sample.

Hence the final data sample compromises of approximately 50 000 data points (5 year period * 250 trading days * 40 funds) and 200 specifications of annual holding (40 funds * annual holdings * 5 year period) and 2500 data points from the Six Portfolio Return index & STIBOR five day return (5 year period * 250 * 2 index).

1.3b Stock market development

The Swedish stock market has experienced a dramatic development between 2001 and 2005. Starting at an index level[6] of 278 on the first of January 2001, which is the start date of our sample period, the Swedish market had decreased from the peak of 400 in March 2000 falling to the bottom level of 123 in October 2002. After a couple of months up-and-down movements the Swedish stock market started to climb at the beginning of 2003 reaching an index level of 293 by the end of 2005, which is the end date of our survey.[7] Roughly speaking, the Swedish stock market held bear features in 2001 and 2002 and bull features in 2003-2005.

[5] The Undertakings for Collective Investments in Transferable Securities was introduced in 1985 and states e.g. that a single stock must not constitute more than 10% of the fund's total value. During 2001 UCITS III was adopted which enabled funds to invest in a broader range of financial instruments.
[6] Affärsvärlden's General Index
[7] Data obtained from Datastream

1.3c The Swedish pension reform

In 1999 a new pension system consisting of inkomstpension (income pension), premiepension (PPM) (premium pension) and garantipension (guaranteed pension) replaced the former system with folkpension and ATP. Inkomstpension, or income pension, works in accordance with the *pay as you* go principle, which means that today's fees is paid out as pensions to the retired population. The second part of the new system, PPM, works differently and the money is put aside in an individual fund account where the individual himself can decide which funds to choose. The pension system absorbs 18.5% of the individual's gross taxable income of which 16% goes to the income pension and 2.5% to the PPM.[8]

The new system has significantly increased the amount of assets managed in funds. We have seen an inflow of around SEK20bn per year (SEK13bn if you exclude the 7th AP fund[9]) into funds stemming from the PPM. Today, the PPM system involves about 5.3 million Swedes and accounts for a 14% of the total fund assets. It has also been possible to choose funds for pension insurance which in combination with the PPM system has led to pension savings accounting for 50% of the households' fund wealth compared to 25% in 2000.[10]

1.3d Behaviour among Swedish fund investors

Since year 2000 total assets under management in Sweden has increased from SEK855bn to SEK1160bn. The development has not been characterised by a steady annual increase but rather been correlated to the initial bear market and subsequently with the bull market. In September 2002 one could observe the lowest amount of assets under management for this sample period totalling SEK672bn. During the same period net savings in funds have been steady around SEK60bn per annum. SEK13bn of these SEK60bn stems from the PPM (the 7th AP fund is excluded).[11] As an

[8] Data obtained from www.morningstar.se
[9] The 7th AP fund gets the inflows from those people who do not actively choose where to place their savings.
[10] Fondbolagens förening (2005)
[11] Fondbolagens förening (2005)

indication of the net savings' importance for the overall asset growth it is interesting to know that the wealth growth between 1999 and 2004 to 1/3 was due to value increase and to 2/3 due to an increase in net savings.[12]

The importance of equity funds have decreased from constituting 69% of all assets managed in 2000 to 53% in 2006. The negative development for equity funds can most likely be explained by the bear market conditions in 2000-2002 which have made people interested in fixed income securities. Since year 2000 the holdings of fixed income securities has doubled and now accounts for around SEK300bn. The increased risk aversion has also had a positive effect on the fund-in-fund and hedge fund evolvement.[13]

The total number of funds has increased dramatically from 1400 in year 2000 to 2400 at the end of 2005. During the same period the four major banks' share of the total fund market has decreased from 85% to 68%, indicating that the competition in this industry has increased significantly.

1.4 Prior studies

The academic literature tends to start with assuming efficient capital markets and then shows that the average fund manager will not outperform any benchmark index. This view is also supported by an extensive number of studies. However, little attention has been paid to what kind of decisions the fund managers actually take in their active management. In this paper we aim to look in more detail at what implications the active decisions, that distinguish an active portfolio from a passive portfolio, have on the funds' performance.

Previous studies of fund managers' performance have used the Treynor and Mazuy (1966) and Henriksson and Merton (1981) framework decomposing the performance into stock selectivity and market timing ability. The problem with this approach is that it might hide valuable information since results are merely based on time series

[12] Fondbolagens förening (2004)
[13] Fondbolagens förening (2005)

regressions of the funds' aggregated returns with little focus on tracking the actual active decisions.

As a consequence of this shortcoming, recent studies have analyzed fund performance based on observed portfolio holdings. However, not many studies have been made this way, probably because such extensive data is difficult to access. Some of the first articles in this field were written by Grinblatt and Titman (1989) and Grinblatt and Titman (1993) and, more recently, by Chen, Jagadeesh and Wermers (2000) and Wermers (2000). Chen, Jagadeesh and Wermers (2000) used US data on mutual funds' performance and showed that stocks that fund managers bought performed significantly better than stocks that they sold during a one-year period and Wermers (2000) showed that fund managers who trade more are better stock-pickers than those who trade less. Also Dahlquist, Engström and Söderlind (2000) showed, using Swedish data, that the performance of mutual funds is positively related to the funds' trading activity.

Engström (2005) has followed the development in the literature using data on the funds' portfolio holdings. Then he takes one step further and decomposes fund holding allocation into strategic and tactical allocation. The strategic allocation is defined as an investment decision that lasts for more than one year and the tactical allocations is defined as the changes in the strategic allocation during the year. The performance of the strategic decision is the return of the one-year buy-and-hold portfolio, which we just described as the strategic portfolio. The return from the tactical decision is the difference between the strategic and the actual return. The one year buy-and-hold portfolio, replicated from the initial strategic decisions, also works as the fund's benchmark for a given year. Hence, using a replicating portfolio does not only enable decomposition of the overall performance into a strategic part and a tactical part but also solves the problem of finding a suitable benchmark for all funds. In his paper from 2005, Engström finds support for the value of active portfolio management when examining 112 Sweden funds during a five-year period from 1996-2000. He finds a positive alpha for the average fund manger and, moreover, shows a positive relation between the value created and trading activity.

Previous studies have also examined the impact of various macro economic factors on fund managers' performance; however, few seem to have touched upon the bull and bear market effect. Cha, Li and Lu (1997) cover the Japanese fund market from 1981 to 1992 which is roughly an eight-year bull market until the end of 1989 and the subsequent bear market. After comparing their performance measures (Jensen's alpha and the Positive Period Weighting measure (PPW)) they conclude that the performance was not any better in either sub period.

Fabozzi and Francis (1979) examined whether or not the betas for 85 mutual funds differed in bull and bear market periods. The rational behind the study was that one might expect a good market timer to increase the fund's beta level in a bullish market and decrease the level in a bearish market. However, the results showed that the managers did not shift the beta levels in order to profit from the market conditions. Moreover, the authors did not find any differences in Jensen's alpha in bull and bear markets respectively.

2 Methodology

This section firstly explains the most important traditional measures used to evaluate fund managers' performance. Then we continue with a detailed description of the model that we have primarily used, henceforth called Engström's model, followed by a description of how we measure difference in performance in bull & bear market. Finally we will describe how we have obtained the data and comment on a few points where we have deviated from Engström's methodology.

2.1 Fund evaluation models

Treynor (1965), Sharpe (1966) and Jensen (1968) developed the first techniques to evaluate fund managers' performance. Jensen's alpha has become the most widely used measure in the literature and it is measured as the intercept from a regression with the excess return of the managed portfolio relatively the risk-free interest rate as independent variable and the excess return of a benchmark portfolio relatively the risk-free interest rate as the dependent variable. The regression can be written

$R_{it} - R_{ft} = \alpha_i + \beta_{i0}(R_{bt} - R_{ft}) + \varepsilon_{it}$ where R is the return, i the managed fund, f the risk-free rate, b the benchmark portfolio, t a time variable and ε a random error term. The intercept, α_i, is the Jensen's alpha and a positive number indicates a superior performance by the fund manager while the opposite is true for a negative number. The beta coefficient measures the risk exposure to the benchmark and is less important evaluating the fund managers' performance. In our study we have used the above framework in order to estimate the funds' beta coefficient to the benchmark index and in order to get estimates of the alpha of the funds for each given year. The above framework is dependent upon that the data the error term is normally distributed, which we have attempt to assure through taking first differences of the series and visual inspecting the residuals to a normally distributed plot curve. The regressions have been made both including the management fees in the return of the fund and excluding management fees. The alpha estimates have been tested using an F-test whether the alphas are collectively different from zero for each given year. Moreover, since tests of averages of relatively small populations may be skewed by outliers, we have also done Wilcoxon signed rank tests of the median of the investigated years.

An occurring problem with the alpha measure in order to evaluate the fund managers' performance is that it fails to capture the managers' market timing ability. E.g. a successful market timer can get a negative performance measure due to a statistical bias. In order to test for market timing ability one may include an additional variable, which is the square of the excess return of the market. If the variable is statistically significant and of economically significant magnitude, one may conclude that the fund manager is able to time the market. Treynor & Mazuy (1966) use the following regression to test for market timing ability $R_{it} - R_{ft} = \alpha_{it} + \beta_{Mit}(R_{bt} - R_{ft}) + \beta_{Tit}(R_{bt} - R_{ft})^2 + \varepsilon_{it}$, where the subscript T is market timing ability. We have used a simplified methodology and tested, similarly to Fabozzi & Francis (1977), whether the funds increase or decrease their beta loadings in changing market conditions taking the differences in mean and median of beta for the investigated years. The actual test of the beta estimations are described in the bull & bear market section.

Another possible shortcoming with the Jensen's alpha regression is that it traditionally has been used unconditional and hence not taken into account the time-varying effect when estimating expected return and risk. Ferson and Schadt (1996) aimed to improve that feature by adding a predetermined information variable to the regression. $R_{it} - R_{ft} = \alpha_i + \beta_{i0}(R_{bt} - R_{ft}) + \beta'_{i1 q_{t-1}}(R_{bt} - R_{ft}) + \varepsilon_{Sit}$ The predetermined information variable is q_{t-1} and has a zero mean. Since our aim is to evaluate passed performance rather than estimating expected performance we will keep the original estimation of Jensen's alpha.

2.2 Engström's model

The aforementioned traditional measures have focused on aggregated fund returns derived from stock selection and market timing ability. In this paper we are using Engström's (2005) framework decomposing overall fund performance and linking it to fund managers' tactical and strategic decisions. This requires the construction of a passive replicating portfolio which is referred to as the strategic portfolio. In our survey, this benchmark portfolio, which runs for one year, constitutes of those stocks that the actual fund portfolio holds at the beginning of the year. E.g. a given fund's benchmark/strategic/replicated portfolio for year 2002 holds the same stocks throughout the year as the actual fund does on the 1st of January 2002. During 2002 the strategic portfolio is then only changed if a single stock disappears from the market or if any regulatory restrictions force a rebalancing. The strategic portfolio will not mirror the actual return but rather work as a proxy for the managers' ability to strategically choose the best securities.

Changes made by the fund manager during the one-year period are referred to as tactical decisions. Put it in other words, the strategic portfolio reflects the long-term management decisions while the tactical portfolio reflects the short-term decisions. The difference between the actual portfolio and the benchmark portfolio could be interpreted as the value created by active management and a positive measure is the result of buying better assets and selling worse. After a year the replicating portfolio is rebalanced with the current actual holdings of the evaluated fund.

The managers' performance can also be calculated on a risk-adjusted basis using the Jensen's alpha regression. The strategic performance is measured by the intercept. $R_{Rit} - R_{ft} = \alpha_{Si} + \beta_{Si}(R_{bt} - R_{ft}) + \varepsilon_{Sit}$ R_{Rit} is the return of the replicated portfolio at time *t* and the subscript *S* refers to strategic decisions. Hence the alpha and the beta coefficients respectively measure the performance of, and the risk in, the strategic portfolio. The independent variable is constructed as the excess return of a benchmark over the risk-free rate. We will discuss suitable benchmarks later on. However, at this point it is worth to clarify that the calculations of the risk-adjusted measures are dependent on an external benchmark as explanatory variable.

Performance and risk of the tactical decisions are measured in the same way but with the excess return of the actual fund over the replicated fund as the independent variable. The subscript *T* refers to tactical decisions
$R_{it} - R_{Rit} = \alpha_{Ti} + \beta_{Ti}(R_{St} - R_{ft}) + \varepsilon_{Tit}$.

There are alternative performance attribution models that one could have used to decompose the ability of fund managers. A commonly used framework uses an equally weighted benchmark index of both stocks and fixed income securities. Then one attributes the difference in return of the investigated portfolio versus the benchmark index to security selection and asset allocation decisions. $R_{Pt} - R_{Bt} = \sum_{i=1}^{n}(W_{Pit}R_{Pit} - W_{Bit}R_{Bit})$ where $(W_{Pit} - W_{Bit}) * R_{Bit}$ is attributed to asset allocation in asset class *i* and where $W_{Pit}(R_{Pit} - R_{Bit})$ is attributed security selection within asset class *i* and finally where P is the investigated portfolio of holdings and where B is the chosen benchmark index. The reason why we have not chosen the above attribution model is that the model does not take long-term and short-term considerations into account and because we have used a sample of pure stock portfolios.

2.3 Tests of Bull & Bear market performance

The bull & bear years of the study were chosen to 2004 & 2005 respectively 2001 & 2002. Although, 2003 was a bull year, we have purposely left 2003 out due to that our study begins in 2001, which was preceded by the bear year 2000 and in order to allow for the same condition in 2004 & 2005 we left the bull year of 2003 out. Fabozzi & Francis (1977) use substantial movements on a monthly basis as their proxy for bull & bear markets using 0.5 standard deviations of the market as a proxy for substantial movements. Since we have our data on a yearly basis we have defined a bear as negative return of a benchmark stock index of more than 10% and defined a bull year as a positive return in the excess of 15%. The difference in thresholds for bull & bear markets is due to that the long run expected return of stocks is positive and thus requires a higher threshold to be classified as bull market.

We have followed the methodology of Cai et al. (1997) and tested whether fund managers load beta in bull markets and unload beta in bear markets. However, we simplified their testing method by using matched pairs t-tests of the average beta and Wilcoxon signed rank tests of the median beta of the investigated years against each other.

Moreover, we have tested whether the average and median alpha excluding management fees differ between bull & bear market. The test is done through a matched pairs t-test of individual bull & bear years' average and median alpha of investigated funds, i.e. we test whether 2001 differ from 2004, 2001 from 2005, 2002 from 2004 and finally if 2002 differ from 2005. In addition, using the same methodology, we test whether the strategic and/or tactical performances differ in bull & bear market conditions by testing the average and median strategic and tactical alpha.

Finally, we regress the alpha estimates excluding management fees on the beta estimates, strategic alpha estimates and tactical estimates using all sample years. Since we expect this data to have problems with heteroskedasticity, we have regressed the estimates using a robust function using a 1/(1-h)^2 bias correction. We compute

the regression in order to differentiate which of market timing, strategic performance and tactical performance that is the most important factor in explaining the funds' alphas. $\alpha_{it} = \beta_{Ti}(\alpha_{Tit}) + \beta_{Si}(\alpha_{Sit}) + \beta_{Bit}(B_{it}) + \varepsilon_{it}$ where the first factor measures the loading of tactical performance, the second measures the loading on strategic performance and the last term measures the loading of market timing. *B* is the estimated betas of the regressions for obtaining alphas of the investigated Sweden funds.

2.4 Test of management fees and performance

In order to test whether higher management fees are indicative of better performance, we have regressed the alphas exclusive of the Sweden funds for each of the investigated years to the management fees charged by the sample funds. Although most funds charge a percentage fee on the asset value in the funds, one fund in our sample also have an extra fee of 25% of all excess performance over the SIX Portfolio return index to a total of maximum of 3%. The fund thus uses the same benchmark index as we use. Due to the different performance of that fund and since some funds have changed the percentage charged of asset value, the average charged management fees differ slightly across years. The regression we perform is $\alpha_{it} = C_t + \beta_t(F_{it}) + \varepsilon_{it}$ where the alphas of the Sweden funds in our sample for each year is regressed on the management fees charged for the individual fund for each year.

Moreover, we develop the above framework by also regressing the strategic and tactical alphas on the charged management fees in order to attempt to distinguish between whether higher management fees are indicative of either strategic or tactical performance or both. Strategic performance regression $\alpha_{Sit} = C_{St} + \beta_{St}(F_{it}) + \varepsilon_{Sit}$ and tactical regression $\alpha_{Tit} = C_{Tt} + \beta_{Tt}(F_{it}) + \varepsilon_{Tit}$

2.6 Data handling & Replication of Engström's model

The annual portfolio holdings of the sample funds were requested from Finansinspektionen.[14] Yearly data of the stocks in the holdings of the investigated Sweden funds were collected from Thomson Financial through their application DataStream. Daily data of the funds' net asset values (NAV) and the SIX Portfolio return index as well as the five day STIBOR[15] interest rate were obtained from the Trust database of Findata. The NAV includes the reinvested dividends.

In order to construct replicating strategic portfolios we have entered the annual portfolio holdings of all the Sweden funds in our data set as they have been registered by Finansinspektionen. The holdings of stocks in the funds within our dataset have been value weighted at the beginning of each sample year for each fund and then multiplied by the yearly total return[16] of the corresponding stock. The resulting return of this method is the strategic return of the replicating portfolio.

Our method differs slightly from Engström's model concerning how to estimate strategic performance in a few aspects. We are unable to rebalance our strategic portfolio during the year, to replicate the legislation commanding a maximum of 10% to be allocated to a single security, due to that we only have yearly stock developments and not daily. Yet, we have investigated the year 2001, which we believe could be especially cumbersome due to the very adverse movements of the stock markets 2000–2001. However, we find that on average only 0.7 holdings in the sampled funds' stock holding are approaching regulatory sell-off (i.e. the 10%-level) and no fund has more than 2 holdings approaching regulatory sell-off when the average number of holdings in a portfolio is 48 stocks. Moreover, as one of our primary aims of the thesis is to provide an investment tool to private investors which

[14] The data is available on request from Finansinpektionen. Finansinspektionen is the Swedish Financial Supervisory Authority. Their role is to promote stability and efficiency in the financial system as well as ensuring an effective consumer protection. They authorize, supervise and monitor all companies operating in Swedish financial markets. The Finansinspektionen is accountable to the Ministry of Finance.
[15] STIBOR Stockholm Interbank Offering Rate
[16] RI: Total Return Index includes dividends and adjusts for stock splits.

are not restricted by the UCITS regulations, one may argue that the model do not need to be restricted by the 10% maximum holding constraint.

Moreover, Engström uses a Weighted Least Square regression to estimate the beta coefficients due to problems with heteroskedasticity when estimating the general alpha, the strategic alpha and the tactical alpha. We inspect, through plotting the residuals of the regression in comparison to a normality plot, and conclude that the sample is unlikely to be plagued by heteroskedasticity and thus uses the OLS to estimate alphas and betas.

Yet, as our model of strategic return uses yearly results we are unable to make any estimates for the beta coefficients of the replicating strategic portfolio. Instead we proxy the beta loading of the actual portfolio and use those estimates in order to find strategic and tactical alphas. This simplification should not significantly affect our comparison with Engström (2005) since his results show that the differences between actual and strategic betas are very small. In order for a beta to be permissible as a proxy we have only used beta estimates, which are at least statistically significant on the 10%-level using a t-test and where the regression at least have an R-square of 50%. Ten of our funds turned out not to fulfill this criteria for 43 of our 200 regressions (40 funds over 5 years) having an R-square lower than 10%. This noise may be a result of the funds closing their trading earlier than the stock market which, of course, makes it harder to explain their results with daily index returns. We have taken a closer look at these returns and been able to obtain significant explanatory power by using monthly data instead of daily data. As the average beta turns out to be pretty close to one (0.98) we have then proxied the beta loading with one which is arguably first best as the funds normally use our given benchmark to evaluate its performance.[17]

[17] See appendix A: Complementary beta regressions using monthly data.

2.7 Benchmarks

Using Engström's model we create our own benchmark as described in the methodology section. However, when evaluating the funds on a risk-adjusted basis we need an external benchmark. For this purpose we are using the SIX portfolio return index which covers all of the stocks listed on the Stockholm Stock Exchange (SSE). This is the same index as the one used in Engström (2005). The index is value weighted, includes dividend payments and reflects the average performance of stocks listed on the Stockholm Stock Exchange. Moreover our index follows the UCITS rules and does not allow any single firm to constitute more than 10% of the total value. The risk free rate has been proxied as the STIBOR five day rate. The chosen risk free rate is the same as in the Engström's study and is a highly liquid fixed income instrument, which closely follow the Swedish Government overnight rate.

3 Results and analysis of results

Our results will be presented in four sub sections reflecting our initial structure from the Introduction where we asked four questions.

3.1 Does active management create alpha?

In this section we will present our results from the traditional Jensen's alpha method, first when the management fees are included in the return and secondly when they are not.

3.1a Evaluation of performance including management fees

The results of our statistical analysis of the dataset do not support the hypothesis that active fund management subtracted for its fees is able to achieve positive alphas as defined by the Jensen alpha.

Average Alpha (incl. management fees)

	2001	2002	2003	2004	2005
Alpha	**-0.8%**	**-3.4%**	**0.9%**	**0%**	**0.9%***
St dev.	**3.4%**	**8.4%**	**2.5%**	**1.6%**	**1.2%**

*The reported alphas are the means of the investigated Sweden funds for the sampled years and the standard deviation is accordingly the standard deviation among funds in a given year. * indicates that the result is statistically significant on the 10%-level and ** on the 5%-level.*

The average alpha for the investigated funds is negative in both 2001 and 2002, positive for 2003 and 2005 and approximately zero in 2004. In essence the results are not consistent over the years. Moreover, the result of the F-test on whether the funds' alphas for a given year were collectively statistically significantly different from zero indicates that only the alpha for 2005 was statistically significant at the 10%-level.[18] Thus, with only one year of statistically significant positive alpha, one is unable to support the hypothesis that active fund management is able to achieve positive alphas. The rejection of the hypothesis is further supported by the fact that two years have negative alphas and four out of five years have statistically insignificant results. Furthermore, the only economically relevant result is for 2002 when the average fund achieved a negative alpha of 3.4%. However, if one uses the monthly estimates of beta regression the year 2002 is statistically significantly negative, yet the result is no longer economically significant. All in all, the results from our estimates using monthly data show the same pattern as with daily data, yet of lesser magnitude.[19]

From an ocular inspection one may notice that the distribution of alphas is very tightly clustered around zero with additional kurtosis centred slightly negatively. The few negative outliers in the distribution are unlikely to have skewed the results significantly to the negative.[20] Thus, the results do not seem to be consistent across fund managers, rather do the results seem to be reasonably randomly distributed. In addition, we also tested the median of the each investigated years, which largely confirm the results of the mean alphas.[21]

[18] See appendix A: Simultaneous F-test of constants.
[19] See Appendix A: Alpha using monthly data.
[20] See appendix A: Distribution plots of the estimated alphas from the $R_{it} - R_{ft} = \alpha_i + \beta_{i0}(R_{bt} - R_{ft}) + \varepsilon_{it}$ regression.
[21] See appendix A: Wilcoxon signed rank test of median alpha

In summery the results of he investigated funds' performance inclusive of management fees are inconclusive on whether actively managed funds create alphas for its investors. Our finding that the overall performance of Sweden funds is indicative of not being able to create positive alphas is contrary to Engström's (2005) findings, however consistent with the research of Dahlquist et al (2000).

3.1b Evaluation of performance excluding management fees

However, when one tests for whether managers of Sweden funds are able to create alphas exclusive of management fees it seems as if managers are able to achieve positive alphas. The positive alphas are rather persistent over time since four out of five years have a positive alpha and all statistically significant results also are of economic significance.

Average Alpha (excl. management fees)

	2001	2002	2003	2004	2005
Alpha	**0.2%**	**-2.4%***	**1.9%****	**1.0%****	**1.9%****
St dev.	**3.7%**	**8.3%**	**2.7%**	**1.5%**	**1.2%**

Moreover, three of the positive alpha years have significant alphas below the 5%-level. As one may notice the average management fee is approximately 1% in our dataset, which is the difference between the alpha of the funds and the alpha excluding management fees. In addition, the Wilcoxon signed rank test of the median confirms largely the results of the mean testing with the alphas of approximately the same magnitude and sign as well as regarding statistical significance.[22] Thus, when one includes management fees we are able to support Engström's findings.

3.2 Evaluation of return according to Engström's model

3.2a Does active fund management create excess strategic returns?

[22] See appendix A: Wilcoxon signed rank test of median alpha excl. management fees

The first dimension that Engström (2005) uses to evaluate the performance of Sweden funds is the strategic performance. The average strategic alpha, defined as the excess return of the replicating portfolio, which is defined as the weighted return of a portfolio keeping the securities from the beginning of the year fixed, over the Six Portfolio Return benchmark for the investigated Sweden funds, is positive in our study. Our findings, that the strategic alphas are positive which indicate that managers of Sweden funds are able to create positive alphas in their strategic choice of securities, are in line with Engström's previous research.

Average Strategic Alpha

	2001	2002	2003	2004	2005
Alpha	**0.2%**	**-1.3%**	**5.6%****	**4.5%****	**5.6%****
St dev.	**4.3%**	**5.0%**	**4.9%**	**2.6%**	**3.4%**

The alphas are positive in four out of five periods, which is rather persistent, and in the only year of negative strategic alpha the result is neither statistically significant at the 10%-level nor at the 5%-level. Moreover, one may notice that 2002 has the largest standard deviation across funds and a closer examination of the results reveal that the average is skewed positively of an outlier. If one examines the distribution of the alphas across funds for every year, the results are rather robust as the results do not seem to be obscured by outliers, except for the year 2002.[23] The median tests confirm largely the tests of the mean with the exception that the negative alpha in 2002 is statistically significant in the Wilcoxon signed rank test.[24] The results for the period 2003-2005 has both economically and statistically significant results, which indicate that managers of Sweden funds do indeed with some consistency create strategic alphas. However, one may question the results on the grounds that the very high strategic return of 2003-2005 seems disorientate in a well functioning market place. Yet, the results seem to be consistent with Engström (2005), who also finds alphas of similar magnitude.

Average Strategic Return

	2001	2002	2003	2004	2005
Return	**-12.5%**	**-36.4%**	**33.7%**	**20.9%**	**33.4%**
St dev.	**4.4%**	**5.1%**	**4.7%**	**1.6%**	**2.6%**

[23] See appendix B: Distribution plots of the estimated strategic alphas
[24] See appendix B: Wilcoxon signed rank test of median tactical alpha

The return is the total return of the strategic return of the investigated funds including stock splits and dividends. The standard deviation is the standard deviation of the mean return among the investigated funds.

The estimation of strategic alphas may be biased by the approximation of the actual funds' betas in the estimation of strategic alphas. If one assumes that the betas from the investigated funds on the Six Portfolio Return index is plagued by measurement biases or errors and that the average beta of a Sweden fund is rather equal to one, then one may compare the return of the strategic performance to the return of the Six Portfolio return index. The average strategic return of the investigated funds has then outperformed the Six Portfolio return in four out of five years. A distribution examination of the strategic results of the Sweden funds shows that they are rather clustered around the mean with the exception of 2002 and 2005 where there is one positive outlier for each year.[25]

SIX Portfolio Return

	2001	2002	2003	2004	2005
Return	**-13.5%**	**-36.1%**	**29.8%**	**18.0%**	**33.4%**

Thus, one may summarize the results as that we are able to confirm the findings in Engström's (2005) paper regarding that managers of Sweden funds are able to create excess return to the Six Portfolio index through the strategic choices of securities. The reason put forward for why fund managers of Sweden funds consistently would be able to create positive alpha is due to the larger research capabilities of large institutional buyers and possibly that the skill of the average professional fund manager is superior when it comes to evaluating the long-term potential of a security compared to individual investors.

3.2b Does active fund management create excess tactical returns?

The second dimension that Engström (2005) uses to evaluate Sweden funds is the tactical performance. The tactical performance is defined as the return the fund managers create through short-term trading decisions. We find that the average Sweden fund creates a negative tactical alpha.

[25] See appendix B: Distribution plots of the estimated strategic return

Average Tactical Alpha

	2001	2002	2003	2004	2005
Alpha	**-1.8%**	**-1.7%****	**-1.7%****	**-3.4%****	**2.0%****
St dev.	**4.8%**	**4.5%**	**4.6%**	**2.7%**	**2.8%**

The negative tactical alphas are rather persistent over the sample period as four out five years have negative alphas. The results are, however, a bit skewed by outliers as 2001, 2002 and 2005 has one negative outlier each while 2003 and 2004 both has one positive outlier.[26] Furthermore, the negative alphas are in most periods both economically and statistically significant, which explain why we find that the average alpha for the investigated Sweden funds subtracted for its fees is zero or negative. The median of the tactical alphas are very similar in both size and sign and the Wilcoxon signed rank test of the median indicate that also median results are statistically significant.[27]

In summary, our study is able to support Engström's findings that Sweden funds are unable to create positive alphas through short term trading considerations. We also find that the average Sweden fund is in fact loosing money on short term trading as indicated by the overall negative alphas.

A few arguments for why managers of Sweden funds are unable to create tactical alphas are put forward in Engström (2005). The author argues that Sweden funds generally holds large capitalized stocks, which are liquid and transparent and well followed by analysts. Further explanations why fund managers of Sweden funds actually would be unlikely to create alphas in short term trading is that the large capitalization of the average Sweden fund prohibits short term exploitations of mis-pricings as the fund will correct for the mis-pricing when attempting to utilize it due to the large size of the funds positions. Moreover, since trading is costly even for a large institution, one may conclude that if the fund is unable to create alphas through short term trading, it is likely that they will loose money due to the transaction costs. Finally, an argument to further support why it may be likely for large Sweden funds to have short term alphas is that the funds hold quite a few number of stocks, which thus makes it unlikely that one is able to correctly evaluate if a particular stock is mis-

[26] See appendix C: Distribution plots of the estimated tactical alpha
[27] See appendix C: Wilcoxon signed rank test of median tactical alpha

priced and thus may be a likely target of buying at a premium, especially since the large positions may force the short term pricing higher (Lynch 2000).

3.3 Does active fund management performance differ between Bull & Bear market

3.3a Is there a difference in alpha between bull & bear market?

In an effort to further add to the study of Engström (2005) and to build on the current research of differences in fund management performance we have investigated whether the managers' of Sweden funds performance differ between bull & bear markets. As defined in our method we have chosen the years of 2001 and 2002 as the bear years and 2004 and 2005 as the bull years.

SIX Portfolio Return

	2001	2002	2003	2004	2005
Return	**-13.5%**	**-36.1%**	**29.8%**	**18.0%**	**33.4%**

The SIX index returns presented above clearly show the significant difference between bull & bear on the Stockholm Stock Exchange.

We will present the results both through differences in beta-loadings between bull & bear markets and as an alpha measure for bull & bear market. Moreover will we present the results of the differences in strategic and tactical alpha between bull & bear market.

The actual performance, as measured by the Jensen alpha, of the investigated Sweden funds differ considerably. The bear period of 2001 and 20002 have average alphas for the investigated Sweden funds of -0.8% and -3.4% in comparison to the performance of the bull market years when the average alpha of the investigates funds were 0.0% and 0.9%, the median results for the years were -1.2% and -2.6% respectively -0.1% and 0.7%.[28]

[28] See appendix A: Wilcoxon signed rank test of median alpha

Average Alpha (incl. management fees)

	2001	2002	2003	2004	2005
Alpha	**-0.8%**	**-3.4%**	**0.9%**	**0%**	**0.9%***
St dev.	**3.4%**	**8.4%**	**2.5%**	**1.6%**	**1.2%**

Excluding the management fees of the funds, the differences between the funds remain in magnitude, yet the statistical significance of the results of the bull years are at the 5%-level and the bear year's results are significant at the 10%-level, except for 2001. Moreover, the differences between bull & bear alphas are economically significant with more than 2% difference in the average alpha.

Average Alpha (excl. management fees)

	2001	2002	2003	2004	2005
Alpha	**0.2%**	**-2.4%***	**1.9%****	**1.0%****	**1.9%****
St dev.	**3.7%**	**8.3%**	**2.7%**	**1.5%**	**1.2%**

A matched paired t-test of the differences in alphas between bull & bear years indicate that there is a statistically significant difference in the alphas of the Sweden funds between bull & bear market years when on excludes management fees.[29] The matched pair t-test finds statistically difference between all pairs except for the difference in alphas for the years 2001 and 2004. However, generally the t-tests seem to indicate that there is a difference in the performance for the investigated Sweden funds for the given time period 2001–2005.

In addition the median alpha including management fees differ significantly between bull & bear market years. A Wilcoxon matched pairs signed rank test of the difference in median alpha indicates that there are statistically significant differences on the 5%-level between 2002 versus 2004/2005 and between 2001 versus 2005.[30]

[29] See appendix A: Wilcoxon signed rank test of median alpha excluding management fees
[30] See appendix A: Wilcoxon matched pairs signed rank test of median alpha ex. fees

3.3b Is the difference in alpha in bull & bear market due to market timing?

In order to test whether the differences in performance in the bull & bear market years are due to market timing, we have tested whether the Sweden funds shifts out of the market in bear years and loads on beta in bull years. Since the investigated funds are pure equity funds, shifting out of the market will mean buying defensive stocks with lower beta in the bear years. An overview of the average beta of the investigated Sweden funds does not support that the fund managers have shifted out of the market when the market has performed poorly as in 2001 and 2002. Rather the trend seems to support the previous study of Japanese funds by Cai et al (1997) who showed that the fund managers have the highest betas in their portfolio when the market is performing poorly and the lowest beta when the market is performing well.

Average Beta

	2001	2002	2003	2004	2005
Beta	**0.96**	**0.95**	**0.92**	**0.87**	**0.85**
St dev.	**0.12**	**0.10**	**0.09**	**0.09**	**0.05**

Our matched paired t-test of the beta indicates that the difference in beta is statically significant as all pair were statically significant on the 5%-level, i.e. if anything, fund managers have had higher beta in the bear market.[31] Furthermore we have done a matched paired Wilcoxon signed rank test on the difference in beta between bull & bear market, which confirm the test of the mean beta.[32] Thus, one may conclude that our finding support Cai et al (1997) in that fund managers seem to be unable to time the market through loading and unloading on beta. Moreover, we conclude that the significant difference in alpha performance between bull & bear years is not due to market timing.

The observed pattern of falling betas in bull markets and higher betas in bear markets may be due to the extraordinary events of 1999–2000, when the IT-bubble forced the funds to load up on high beta tech stocks in order to match or possibly beat index.

[31] See appendix A: Matched pairs t-test of beta
[32] See appendix A: Wilcoxon matched pairs signed rank test of median beta

However, when the market crashed in March 2000, there were no buyers of the higher beta stocks, which left the funds with high beta portfolios in a falling market.

3.3c Is the difference in alphas in bull & bear market due to difference in tactical performance?

The question is whether we are able to explain the difference in alphas using the model of tactical and strategic performance and thus the corresponding tactical and strategic alphas. An observation of the tactical alphas leaves a rather inconclusive picture since on the one hand both the alphas are negative in the bear market, yet, on the other hand so is the alpha for 2004 in the bull market. The 2005 year bull market's tactical alpha of 2.0% is both statistically and economically significant, yet the bull market's 2004 alpha of negative 3.4% is also statistically and economically significant.

Average Tactical Alpha

	2001	2002	2003	2004	2005
Alpha	**-1.8%**	**-1.7%****	**-1.7%****	**-3.4%****	**2.0%****
St dev.	**4.8%**	**4.5%**	**4.6%**	**2.7%**	**2.8%**

Thus, from observing the data, one is unable to draw any conclusion whether tactical performance in different markets explains the difference in alphas of the funds. A result of the matched pairs sample t-test of tactical alphas reveal that all periods are statistically significant different from each other, yet the result is rather immaterial as the sign is the same for 2001, 2002 and 2004.[33] Finally test of the median tactical alpha using a matched pairs Wilcoxon signed rank test confirms the results of the matched pairs t-test.[34] Thus, we are unable to conclude whether tactical performance for the investigated Sweden funds is any better or worse in bull & bear markets. Hence, the most likely explanation is that tactical performance is not dependent upon the trend in the market. This is a bit counterintuitive as one would have expected tactical trading to be better in bull market as one is able to go long in short-term momentum stocks, yet these funds are unable to short stocks that have negative momentum in bear market.

[33] See appendix C: Bull & Bear Matched pairs t-test of tactical alpha
[34] See appendix C: Bull & Bear Matched pairs Wilcoxon signed rank test of median tactical alpha

The only notable result of the tactical performance in bull & bear market is that there seems to be a declining trend in the standard deviation of the funds' tactical performance in bull market compared to bear market. This may be due to that in bull market, fewer positions need to be closed due to internal stop-loss limit, which may trigger a stock to fall if the fund holds a significant share of the particular stock and thus increase the deviation in outcome of the performance due to short-term trading.

3.3d Is the difference in alpha in bull & bear market due to difference in strategic performance?

Finally, an observation of the strategic performance indicates that the performance of Sweden fund managers has differed between bull & bear market.

Average Strategic Alpha

	2001	2002	2003	2004	2005
Alpha	**0.2%**	**-1.3%**	**5.6%****	**4.5%****	**5.6%****
St dev.	**4.3%**	**5.0%**	**4.9%**	**2.6%**	**3.4%**

Although the average alpha for the most extreme bear year (2002) is not statistically significant at either the 5%-level or the 10%-level with a two-sided t-test, a one sided t-test would reject the null hypothesis of the average alpha being zero in 2002 on the 10%-level. Moreover, and possibly more important, the year of 2002 has an economically significant negative alpha and the positive alpha for the second bear year is just barely positive and far from statistically significant. In contrary, the two selected bull years and all years with high positive returns of the Six Portfolio index have statistically significant positive alphas on the 5%-level and alphas that are economically significant. The matched pairs t-test confirms that the difference in performance in strategic alpha is statistically significant at the 5%-level.[35] Moreover a matched pairs Wilcoxon signed rank test of the median for each bull versus each bear year confirm that there is a statistically significant difference between the periods at

[35] See appendix B: Bull & Bear Matched pairs t-test of strategic alpha

the 5%-level.[36] Thus, we are able to conclude that there is a difference in strategic performance in our data set.

Finally, the result of the heteroskedasticity adjusted regression of alpha excluding management fees on strategic alpha, tactical alpha and beta over the whole investigated period finds that strategic performance is the most important factor for the observed alphas excluding management fees. The strategic performance as measured by strategic alpha is highly statistically significant and has an unstandardized factor loading of 0.48 and a standardized factor loading of 0.52.[37]

In conclusion we have found that alphas, including and excluding management fees, differ between bull & bear market (negative in bear & positive in bull) in our sample period for our investigated funds. The only variable, which we analyze, which has the same pattern is the strategic performance measured as the strategic alpha. Moreover we have found that strategic alpha is by far the most important variable in explaining the observed actual alphas excluding management fees. Thus, we conclude that difference in strategic performance between bull & bear market may possibly explain why we find differences between bull & bear market alphas.

There are many possible explanations why strategic performance may differ between bull & bear markets. One argument that we bring up in the discussion part of the thesis involves the issue whether the model itself has a bias towards bull market years due to that the chosen method is a proxy for the true strategic and tactical consideration of a fund manager. A further explanation for why we find the high average strategic alphas in the bull market years is that fund managers are able to utilize a one year momentum strategy, but are unable to short the negative one year momentum stocks in a bear market.

[36] See appendix B: Bull & Bear Matched pairs Wilcoxon signed rank test of median strategic alpha
[37] See appendix A: Bull & Bear regression of variable importance

3.4 Do higher management fees implicate superior performance?

3.4a Regression results of management fees and Jensen's alpha excluding management fees

The final data investigation we have done concerns whether our investigated funds are able to support the findings of Engström (2005) that higher management fees is correlated with lower return of the Sweden funds exclusive of management fees.

Regression results Management Fees

	2001	2002	2003	2004	2005
Beta Fees	**3.2**	**-4.7**	**2.5**	**0.2**	**0.4**
P>|t|	**0.2%**	**6.5%**	**0.2%**	**65.0%**	**29.7%**
R-sqr	**21.9%**	**8.7%**	**22.0%**	**0.5%**	**2.9%**

Engström's findings is counterintuitive as one would at least expect better paid fund managers to perform equally well as the lesser paid fund mangers exclusive of fees. The performance of the Sweden funds we have investigated in the given time frame of 2001–2005 is unable to confirm Engström's findings in that higher management fees are negatively correlated with performance exclusive of management fees. Our results are inconsistent over the sample years and, if anything, reject the hypothesis in favour of a positive relationship between fund performance and management fees. However, the regressions have very low explanatory factors although the two statistically significant loadings are positive and of significant magnitude.

3.4b Regression results of management fees and strategic alpha as well as tactical alpha

To further evaluate whether fees are important we have investigated whether fees are associated with either strategic performance or tactical performance of the investigated Sweden funds. The regression results of strategic alpha and management fees and tactical performance and management fees do not give any conclusive

indication. Both the strategic and the tactical performance regressions have positive and negative factor loadings for management fees and performance.

Regression results Management Fees (strategic perf.)

	2001	2002	2003	2004	2005
Beta Fees	**2.3**	**-2.5**	**2.4**	**-1.3**	**0.1**
P>|t|	**8.5%**	**12.0%**	**14.3%**	**15.6%**	**94.9%**
R-sqr	**8.3%**	**6.8%**	**6.0%**	**5.7%**	**0.0%**

Moreover, none of the results are significant on the 5%-level and the r-squares of the estimated regressions are all below 10%, which lead us to conclude that we are unable to find any correlation between strategic or tactical performance and management fees.

Regression results Management Fees (tactical perf.)

	2001	2002	2003	2004	2005
Beta Fees	**2.3**	**2.1**	**0.7**	**-0.2**	**-0.9**
P>|t|	**11.0%**	**12.0%**	**59.7%**	**80.0%**	**32.1%**
R-sqr	**8.3%**	**6.8%**	**6.0%**	**5.7%**	**0.0%**

4 Discussion

The discussion of our findings is divided into three sections. The first section discusses reliability of our results in terms of sample size, length of estimation period, statistical testing, model building and possible sampling biases due to choice of benchmark etc. The second section discusses the validity of results in terms of whether the model actually tests the strategic and tactical choices that fund mangers make. The third and last part of the section discusses how our findings relate to classical finance theory and the possible implications for fund management and individual investors.

4.1 Reliability

In order to draw general conclusions one may argue that a sample of 40 Sweden funds is a bit narrow both in term of number of funds and in terms of their investment objective. However, our purpose of this study has been to help the private Swedish

investors, who normally have a significant share of their wealth in Swedish registered non-national and non-special Sweden funds, thus the study compromises all of these funds. The second objective was to test whether we could replicate the findings of Engström (2005). The sampled funds are part of the sample of Engström, who also included Sweden funds which are not registered by the Swedish Finansinspektion. We believe that the sample funds, although approximately half the size of Engström's study are numerous enough to fulfill also our second purpose of the thesis. Finally, the funds were tested over five years with changing market conditions, which replicated the length and variability of Engström's study and thus should fulfill the time period objective to be reliable. However, one may question whether the length of our bull & bear market study, which only comprises of two years of data for each market condition, is sufficient in order to draw any conclusions. A further investigation of bull & bear market data using Engström's model would enhance the quality of the findings for bull & bear markets.

In order to make accurate estimations of the variables investigated, we have attempted to correct for any signs of heteroskedasticity in the sample, investigated the median as well as the mean and also adjusted for heteroskedasticity in one of the performed regressions. Yet, in spite of our statistical precautions, there may still be statistical problems that our model has overlooked. One example of a possible bias is the chosen market index – the SIX return Portfolio index. Although, we believe that the index is suitable for the average Sweden fund in our sample, there may be some funds who evaluate their performance on other benchmarks than this study's chosen index. Thus, if the fund manager's have an active as well as a passive portfolio, the funds performance may be obscured by tracking of the specified index.

In addition, one may be sceptical of some of the results we find in our bull & bear market analysis as pervious researchers have found no difference in alpha between bull & bear markets. One possible explanation for our findings is the extreme events of the IT-bubble which forced funds to buy technology stocks in order to match any general index on the Stockholm Stock Exchange. Yet, when the market crashed, the technology stocks became so illiquid that the managers of Sweden funds could not sell them on the market while at the same time their importance on the value weighted index decreased, which thus could explain why we find negative alphas in the bear

market years. In conclusion, one may question whether our findings are due to extreme events or to a true difference in mangers ability in bull versus bear markets.

Finally, our research model has not taken into account the forced trading due to regulatory reasons. Engström (2005) finds that trading due to regulatory trading is less profitable than trading due to tactical or strategic reasons. Thus, one weakness in our results may be that some of our negative tactical alphas may be due to unprofitable forced trading due to regulatory issues. However, the argument does not seem to be very important since when one casually observe our data the portfolios are generally very well diversified and only very extreme returns of stocks may force regulatory sell off of stocks.

4.2 Validity

Our framework and research model replicates for all important parts Engström (2005). Although, it is outside the scope of this thesis, one may question whether the research model is a trustworthy proxy for tactical decisions and strategic decisions. Since, the research model does not involve qualitative data from the fund managers whether our observed annual holdings are strategic or tactical from the decision of the funds manager, there may be a risk that the model is unable to correctly proxy for the real strategic and tactical decisions fund managers make. However, in our view, we believe that the number of firms and length of the investigated time period alleviates the risk of observing strategic and tactical decisions rather than qualitative obtaining the mangers views on the holdings and trading decisions.

Finally, the study compromises approximately 13% (2001) of all stock funds' wealth in Sweden and naturally a lot higher proportion of all Nordic focused funds. Thus, one may conclude that the study has enough scope to deduce some general results regarding the Swedish mutual fund industry in general and Sweden funds in particular.

4.3 Implications

One may question whether the findings in this thesis question the efficient market hypothesis (EMH). However, the results of the average performance of the funds including management fees are too inconsistent to question the EMH. Moreover, although we find alphas with some consistency when one excludes the management fees, the average median alpha for the period is only 0.4%. We find that the excess return is likely to be due to better strategic choices among managers of Sweden funds compared to the general market. One may view the obtained alphas as premium for the research these firms provide to the market rather than superior performance of the fund managers. Since the tactical performance seems to be adding no value or negative value one may possibly conclude that the possible superior research skills of these large institutional investors is diluted by that their size makes is difficult to arbitrage on the market. In conclusion our findings do not contradict the EMH.

Engström (2005) has estimated the cost of trading a replicating portfolio only to 0.05% of the wealth. Thus, we are able to confirm Engström's findings that institutional investors in Sweden funds should possibly allocate the strategic choices to a diversified number of Sweden fund managers, yet either refrain from tactical trading or allocate the tactical decision makings to other asset classes where one is able to make profitable tactical trading. A private investor may use this model e.g. in order to evaluate the performance of his/her fund manager or replicate a diversified strategic portfolio, thus avoiding the cost of management fees. A private investor will on the other hand incur larger trading costs than an institutional, yet a buy-and-hold portfolio replicating the strategic decisions of fund managers need only to be traded once a year.

5 Conclusion

1. Do actively managed Sweden funds create excess risk-adjusted return?

The short answer to this question is no. Our regressions of returns including management fees resulted in two negative non-significant alphas, two slightly positive

alphas, of which one was statistically significant at the 5%-level, and one non-significant zero-alpha. Looking at the regression results excluding management fees the results is different with four out of five alphas being positive and with three of the four positive alphas being statistically significant at the 5%-level. However, from the perspective of a fund investor the results including management fees are more relevant and we conclude that no risk-adjusted return was created among Sweden funds during 2001-2005.

2. How do our results concerning strategic and tactical performance compare to Engström's (2005) results?

Our results regarding the strategic and tactical performance are in line with Engström's findings that fund managers generate positive strategic alphas but are unable to generate positive tactical alphas. We show that fund managers generate highly positive and statistically significant strategic alphas for 2003-2005, a non-significant yet positive alpha for 2001 and a non-significant negative alpha for 2002. Regarding the tactical performance four out of five years show negative alphas of which three of them are statistically significant. One positive and statistically significant tactical alpha is not enough to change this negative view.

3. Is there any difference in manager performance between bull and bear market conditions?

In the bear market both alphas were negative (-0.8% and -3.4%) and in the bull period they were either zero or positive (0% and 0.9%). Our matched pair t-tests between the bull & bear market alphas support the view that there is a difference in fund manager performance. Only the pair-combination 2001/2004 did not turn out to hold statistically different results. Moreover, when having a closer look at the beta loadings for the individual years we conclude that the difference in manager performance is not due to market timing ability. Rather it seems like the differences in performance between bull & bear markets stem from a difference in managers' strategic abilities.

4. Is there any correlation between manager fees and excess fund return?

Our data does not indicate any clear correlation between manager fees and excess fund return. The regression results are inconclusive over the years and with low explanatory power. We do not feel comfortable suggesting a positive correlation but at least we can conclude that we are far from Engström's (2005) findings which supported a negative correlation.

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7 APPENDIX

A. Benchmark Regression tests and plots

Simultaneous F-test of constants

F-test of collective constants from alpha regressions

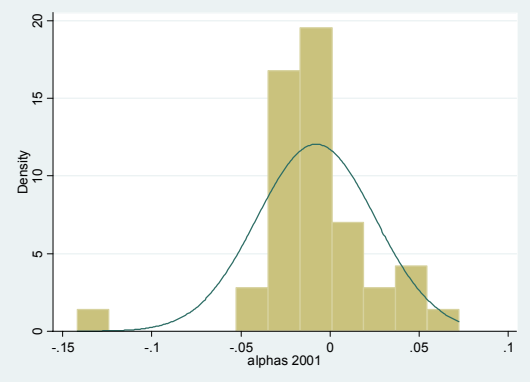
Year	2001	2002	2003	2004	2005
P>F	62.3%	46.6%	51.5%	69.9%	4.1%

The output is the significance levels of the F-test done on the constant of the following regression

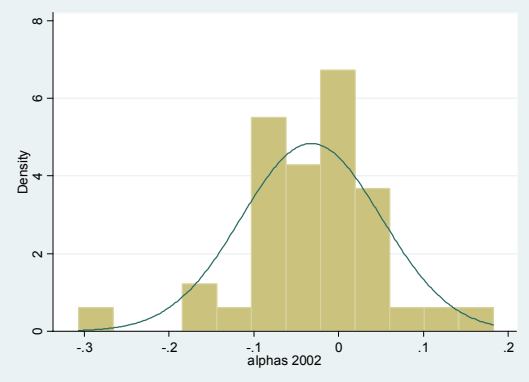
$$R_{it} - R_{ft} = \alpha_i + \beta_{i0}(R_{bt} - R_{ft}) + \varepsilon_{it}$$

Distribution plots of the estimated alphas from the regression

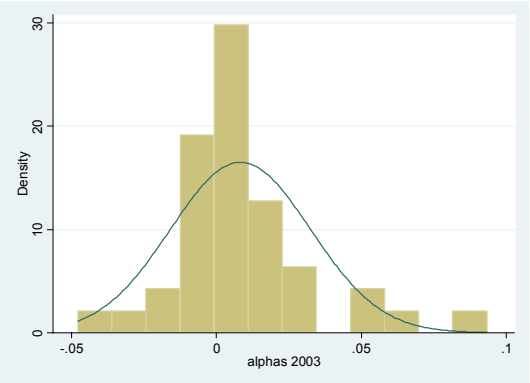
$$R_{it} - R_{ft} = \alpha_i + \beta_{i0}(R_{bt} - R_{ft}) + \varepsilon_{it}$$



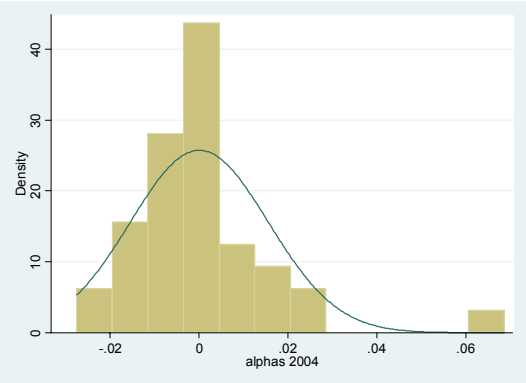
Year 2001



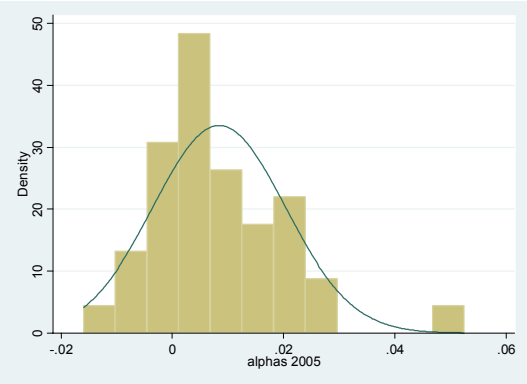
Year 2002



Year 2003



Year 2004



Year 2005

Wilcoxon signed rank test of median alpha

	2001	2002	2003	2004	2005
Median alpha	**-1.16%**	**-2.621%**	**0.546%**	**-0.138%**	**0.675%**
Sign.	**4.96%**	**1.17%**	**3.1%**	**32.98%**	**0.0%**

Wilcoxon signed rank test of median alpha (excluding management fees)

	2001	2002	2003	2004	2005
Median alpha excl. Mngt. fees	**0.272%**	**-2.046%**	**1.471%**	**0.873%**	**1.424%**
sign	**81.92%**	**5.37%**	**0.01%**	**0.0%**	**0.0%**

Alpha using monthly data

	2001	2002	2003	2004	2005
Average	0,22%	-0,25%	-0,30%	-0,06%	0,29%
Median	0,15%	-0,31%	-0,24%	-0,09%	0,32%

Year 2001, 2002 and 2005 are statstically singnificant on 10-level

Complementary beta regressions using monthly data

	Beta 2001	2002	2003	2004	20055
	1,2	0,9	1,6	1,2	0,7
	1,2	1,1	1,2	1,1	0,8
	0,9	0,8	0,9	0,7	0,8
	1,0	0,9	0,9	0,7	0,8
	1,2	1,1	1,2	1,0	0,7
	1,2	1,1	1,2	1,0	0,7
	1,2	1,2	1,2	1,1	0,7
	1,2	1,2	1,2	1,1	0,7
	1,0	1,0	1,1	0,8	0,7
	1,2	1,2	1,1	0,9	0,8
	1,0	1,0	1,2	0,8	0,7
	1,2	1,1	1,0	1,4	1,0
	1,1	1,1	1,1	0,9	0,8
	1,1	1,1	1,2	0,9	0,8
	0,9	1,0	1,0	1,0	1,0
	1,0	1,0	1,0	1,0	1,0
	1,2	1,1	1,2	0,8	0,7
	1,0	1,1	1,2	0,8	0,9
	1,0	1,0	1,1	0,7	0,9
	1,0	1,0	1,1	0,7	0,9
	1,0	1,0	1,1	0,8	0,9
	1,0	0,9	1,1	0,9	0,9
	1,0	1,0	1,1	0,7	0,9
	1,2	1,1	1,2	0,9	0,9
	1,1	1,1	1,2	0,9	0,8
	1,1	1,1	1,0	0,9	0,9
	1,3	1,2	1,0	0,9	1,0
	1,1	1,1	1,0	0,8	0,8
	1,0	1,0	1,1	0,8	0,9
	1,0	1,0	1,1	0,8	0,9
	1,1	1,1	1,0	0,9	0,8
	1,1	1,1	1,0	0,9	0,8
	1,0	0,9	1,0	0,7	0,9
	1,0	1,0	1,0	0,6	1,0
	1,0	1,1	1,2	0,8	0,8
	1,1	1,0	1,1	0,8	0,8
	1,0	1,0	0,6	1,0	0,7
	1,1	1,0	1,1	0,9	0,8
	1,2	1,1	1,3	0,9	0,8
	1,1	1,0	1,1	0,9	0,9
Average Beta	1,1	1,0	1,1	0,9	0,8
Median	1,1	1,1	1,1	0,9	0,8

Bull & Bear Matched pairs t-test of alpha excluding management fees

2001&2004

Paired t test

```
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [90% Conf. Interval]
---------+--------------------------------------------------------------------
axf_2001 |      40    .0018899    .0055535    .0351233    -.007467    .0112468
axf_2004 |      40    .0097076     .002431    .0153749    .0056117    .0138035
---------+--------------------------------------------------------------------
    diff |      40   -.0078177    .0068406    .0432637   -.0193433    .0037078
------------------------------------------------------------------------------
     mean(diff) = mean(axf_2001 - axf_2004)                      t =  -1.1428
 Ho: mean(diff) = 0                               degrees of freedom =       39

 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 0.1300         Pr(|T| > |t|) = 0.2601          Pr(T > t) = 0.8700
```

2001&2005

```
Paired t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [90% Conf. Interval]
---------+--------------------------------------------------------------------
axf_2001 |      40    .0018899    .0055535    .0351233    -.007467    .0112468
axf_2005 |      40    .0180568    .0019757    .0124957    .0147279    .0213857
---------+--------------------------------------------------------------------
    diff |      40   -.0161669    .0065874    .0416622   -.0272658    -.005068
------------------------------------------------------------------------------
     mean(diff) = mean(axf_2001 - axf_2005)                      t =  -2.4542
 Ho: mean(diff) = 0                               degrees of freedom =       39

 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 0.0093         Pr(|T| > |t|) = 0.0187          Pr(T > t) = 0.9907
```

2002&2004

```
Paired t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [90% Conf. Interval]
---------+--------------------------------------------------------------------
axf_2002 |      40     -.02241     .012751    .0806447   -.0438939   -.0009261
axf_2004 |      40    .0097076     .002431    .0153749    .0056117    .0138035
---------+--------------------------------------------------------------------
    diff |      40   -.0321177    .0126943    .0802857   -.0535059   -.0107294
------------------------------------------------------------------------------
     mean(diff) = mean(axf_2002 - axf_2004)                      t =  -2.5301
 Ho: mean(diff) = 0                               degrees of freedom =       39

 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 0.0078         Pr(|T| > |t|) = 0.0156          Pr(T > t) = 0.9922
```

2002&2005

```
Paired t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [90% Conf. Interval]
---------+--------------------------------------------------------------------
axf_2002 |      40     -.02241     .012751    .0806447   -.0438939   -.0009261
axf_2005 |      40    .0180568    .0019757    .0124957    .0147279    .0213857
---------+--------------------------------------------------------------------
    diff |      40   -.0404668       .0129    .0815867   -.0622017   -.0187319
------------------------------------------------------------------------------
     mean(diff) = mean(axf_2002 - axf_2005)                      t =  -3.1370
 Ho: mean(diff) = 0                               degrees of freedom =       39

 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 0.0016         Pr(|T| > |t|) = 0.0032          Pr(T > t) = 0.9984
```

Variable afx_01 is equal to alphas excluding management fees in 2001, afx_02 is equal to alphas in 2002… afx_05 is equal to alphas in 2005.

Bull & Bear Matched pairs Wilcoxon signed rank test of median alpha excluding management fees

2001&2004

```
. signrank afx_2001 = afx_2004
Wilcoxon signed-rank test

        sign |      obs   sum ranks    expected
-------------+--------------------------------
    positive |       14         295         410
    negative |       26         525         410
        zero |        0           0           0
-------------+--------------------------------
         all |       40         820         820
```

```
unadjusted variance     5535.00
adjustment for ties        0.00
adjustment for zeros       0.00
                        ----------
adjusted variance       5535.00

Ho: axf_2001 = axf_2004
             z =  -1.546
    Prob > |z| =   0.1222
```

2001&2005

```
. signrank axf_2001 = axf_2005

Wilcoxon signed-rank test

        sign |      obs   sum ranks    expected
-------------+--------------------------------
    positive |       11         207         410
    negative |       29         613         410
        zero |        0           0           0
-------------+--------------------------------
         all |       40         820         820

unadjusted variance     5535.00
adjustment for ties        0.00
adjustment for zeros       0.00
                        ----------
adjusted variance       5535.00

Ho: axf_2001 = axf_2005
             z =  -2.729
    Prob > |z| =   0.0064
```

2002&2004

```
. signrank axf_2002 = axf_2004

Wilcoxon signed-rank test

        sign |      obs   sum ranks    expected
-------------+--------------------------------
    positive |       14         228         410
    negative |       26         592         410
        zero |        0           0           0
-------------+--------------------------------
         all |       40         820         820

unadjusted variance     5535.00
adjustment for ties        0.00
adjustment for zeros       0.00
                        ----------
adjusted variance       5535.00

Ho: axf_2002 = axf_2004
             z =  -2.446
    Prob > |z| =   0.0144
```

2002&2005

```
. signrank axf_2002 = axf_2005

Wilcoxon signed-rank test

        sign |      obs   sum ranks    expected
-------------+--------------------------------
    positive |       12         173         410
    negative |       28         647         410
        zero |        0           0           0
-------------+--------------------------------
         all |       40         820         820

unadjusted variance     5535.00
adjustment for ties        0.00
adjustment for zeros       0.00
                        ----------
adjusted variance       5535.00

Ho: axf_2002 = axf_2005
             z =  -3.186
    Prob > |z| =   0.0014
```

Variable afx_01 is equal to alphas excluding management fees in 2001, afx_02 is equal to alphas in 2002… afx_05 is equal to alphas in 2005.

Bull & Bear Matched pairs t-test of beta

2001&2004

```
Paired t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [90% Conf. Interval]
---------+--------------------------------------------------------------------
    b_01 |      17    .9952141    .0267759    .1103998    .9484665    1.041962
    b_04 |      17    .9065442    .0230648    .0950987    .8662757    .9468127
---------+--------------------------------------------------------------------
    diff |      17    .0886699     .028381     .117018    .0391199    .1382199
------------------------------------------------------------------------------
     mean(diff) = mean(b_01 - b_04)                                t =   3.1243
 Ho: mean(diff) = 0                         degrees of freedom =       16

 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 0.9967         Pr(|T| > |t|) = 0.0065          Pr(T > t) = 0.0033
```

2001&2005

```
Paired t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [90% Conf. Interval]
---------+--------------------------------------------------------------------
    b_01 |      17    .9952141    .0267759    .1103998    .9484665    1.041962
    b_05 |      17    .8639979    .0133903    .0552097    .8406199    .8873758
---------+--------------------------------------------------------------------
    diff |      17    .1312163    .0233363    .0962179    .0904738    .1719587
------------------------------------------------------------------------------
     mean(diff) = mean(b_01 - b_05)                                t =   5.6228
 Ho: mean(diff) = 0                         degrees of freedom =       16

 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 1.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 0.0000
```

2002&2004

```
Paired t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [90% Conf. Interval]
---------+--------------------------------------------------------------------
    b_02 |      17     .990057    .0142557    .0587778    .9651682    1.014946
    b_04 |      17    .9065442    .0230648    .0950987    .8662757    .9468127
---------+--------------------------------------------------------------------
    diff |      17    .0835128    .0179855    .0741562    .0521122    .1149135
------------------------------------------------------------------------------
     mean(diff) = mean(b_02 - b_04)                                t =   4.6433
 Ho: mean(diff) = 0                         degrees of freedom =       16

 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 0.9999         Pr(|T| > |t|) = 0.0003          Pr(T > t) = 0.0001
```

2002&2005

```
Paired t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [90% Conf. Interval]
---------+--------------------------------------------------------------------
    b_02 |      17     .990057    .0142557    .0587778    .9651682    1.014946
    b_05 |      17    .8639979    .0133903    .0552097    .8406199    .8873758
---------+--------------------------------------------------------------------
    diff |      17    .1260592    .0103143    .0425269    .1080516    .1440667
------------------------------------------------------------------------------
     mean(diff) = mean(b_02 - b_05)                                t =  12.2218
 Ho: mean(diff) = 0                         degrees of freedom =       16

 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 1.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 0.0000
```

Variable b_01 is equal to betas in 2001, b_02 is equal to betas in 2002… b_05 is equal to betas in 2005.

Bull & Bear Matched pairs Wilcoxon signed rank test of median beta

2001&2004

```
. signrank b_01 = b_04

Wilcoxon signed-rank test
```

```
        sign |      obs   sum ranks    expected
-------------+--------------------------------
    positive |       13         131        76.5
    negative |        4          22        76.5
        zero |        0           0           0
-------------+--------------------------------
         all |       17         153         153

unadjusted variance      446.25
adjustment for ties       -0.25
adjustment for zeros       0.00
                     ----------
adjusted variance        446.00

Ho: b_01 = b_04
            z =   2.581
    Prob > |z| =   0.0099
```

2001&2005

```
. signrank b_01 = b_05

Wilcoxon signed-rank test

        sign |      obs   sum ranks    expected
-------------+--------------------------------
    positive |       15         148        76.5
    negative |        2           5        76.5
        zero |        0           0           0
-------------+--------------------------------
         all |       17         153         153

unadjusted variance      446.25
adjustment for ties       -0.25
adjustment for zeros       0.00
                     ----------
adjusted variance        446.00

Ho: b_01 = b_05
            z =   3.386
    Prob > |z| =   0.0007
```

2002&2004

```
. signrank b_02 = b_04

Wilcoxon signed-rank test

        sign |      obs   sum ranks    expected
-------------+--------------------------------
    positive |       15         144        76.5
    negative |        2           9        76.5
        zero |        0           0           0
-------------+--------------------------------
         all |       17         153         153

unadjusted variance      446.25
adjustment for ties       -0.25
adjustment for zeros       0.00
                     ----------
adjusted variance        446.00

Ho: b_02 = b_04
            z =   3.196
    Prob > |z| =   0.0014

. signrank b_02 = b_05
```

2002&2005

```
Wilcoxon signed-rank test

        sign |      obs   sum ranks    expected
-------------+--------------------------------
    positive |       17         153        76.5
    negative |        0           0        76.5
        zero |        0           0           0
-------------+--------------------------------
         all |       17         153         153

unadjusted variance      446.25
adjustment for ties       -0.25
adjustment for zeros       0.00
                     ----------
adjusted variance        446.00

Ho: b_02 = b_05
```

```
           z =   3.622
Prob > |z| =   0.0003
```

Variable b_01 is equal to betas in 2001, b_02 is equal to betas in 2002… b_05 is equal to betas in 2005.

Bull & Bear regression of variable importance

```
. regress afx_01_05 beta_01_05 t_01_05 s_01_05, robust hc3 beta

Linear regression                                      Number of obs =     200
                                                       F(  3,   196) =   32.50
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.2513
                                                       Root MSE      =  .03857

------------------------------------------------------------------------------
             |             Robust HC3
   afx_01_05 |      Coef.   Std. Err.      t    P>|t|                     Beta
-------------+----------------------------------------------------------------
  beta_01_05 |   .0466656   .0247194     1.89   0.061                 .1005158
     t_01_05 |   .1831293   .0919706     1.99   0.048                 .1721091
     s_01_05 |   .4770946   .0565301     8.44   0.000                  .518578
       _cons |  -.0490216   .0214454    -2.29   0.023                        .
------------------------------------------------------------------------------
```

Variable beta_01_05 is equal to betas of all funds 200 -20051, t_01_05 is tactical alphas for all funds in 2001 – 2005 and s_01_05 is equal to strategic alphas in 2001 – 2005..

B. Strategic performance tests and plots

T-tests of the strategic alphas

```
. ttest s_01 == 0, level(90)
One-sample t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [90% Conf. Interval]
---------+--------------------------------------------------------------------
    s_01 |      40    .0019846    .0062607    .0395959   -.0085638     .012533
------------------------------------------------------------------------------
    mean = mean(s_01)                                             t =   0.3170
Ho: mean = 0                                     degrees of freedom =       39

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.6235         Pr(|T| > |t|) = 0.7529          Pr(T > t) = 0.3765

. ttest s_02 == 0, level(90)

One-sample t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [90% Conf. Interval]
---------+--------------------------------------------------------------------
    s_02 |      40    -.011577    .0075146    .0475265   -.0242382    .0010841
------------------------------------------------------------------------------
    mean = mean(s_02)                                             t =  -1.5406
Ho: mean = 0                                     degrees of freedom =       39

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0657         Pr(|T| > |t|) = 0.1315          Pr(T > t) = 0.9343

. ttest s_03 == 0, level(90)

One-sample t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [90% Conf. Interval]
---------+--------------------------------------------------------------------
    s_03 |      37    .0510631    .0080891    .0492044    .0374062      .06472
------------------------------------------------------------------------------
    mean = mean(s_03)                                             t =   6.3125
Ho: mean = 0                                     degrees of freedom =       36

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 1.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 0.0000

. ttest s_04 == 0, level(90)

One-sample t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [90% Conf. Interval]
---------+--------------------------------------------------------------------
    s_04 |      40    .0442551    .0041647      .02634    .0372381    .0512721
------------------------------------------------------------------------------
    mean = mean(s_04)                                             t =  10.6262
Ho: mean = 0                                     degrees of freedom =       39

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 1.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 0.0000

. ttest s_05 == 0, level(90)

One-sample t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [90% Conf. Interval]
---------+--------------------------------------------------------------------
    s_05 |      40    .0545242    .0054445    .0344339    .0453509    .0636974
------------------------------------------------------------------------------
    mean = mean(s_05)                                             t =  10.0146
Ho: mean = 0                                     degrees of freedom =       39

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 1.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 0.0000
```

Variable s_01 is equal to strategic alphas in 2001, s_02 is equal to strategic alphas in 2002… s_05 is equal to strategic alphas in 2005.

Wilcoxon signed rank test of median strategic alpha

	2001	2002	2003	2004	2005
Strategic alpha median	-0.06%	-1.63%	5.02%	4.92%	5.11%
Sign. level	95.17%	6.15%	0,00%	0,00%	0,00%

Bull & Bear Matched pairs t-test of strategic alpha

2001&2004

```
. ttest s_01 == s_04, level(90)

Paired t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [90% Conf. Interval]
---------+--------------------------------------------------------------------
    s_01 |      40    .0019846    .0062607    .0395959   -.0085638     .012533
    s_04 |      40    .0442551    .0041647      .02634    .0372381    .0512721
---------+--------------------------------------------------------------------
    diff |      40   -.0422705    .0078659     .049748   -.0555235   -.0290175
------------------------------------------------------------------------------
     mean(diff) = mean(s_01 - s_04)                                t =  -5.3739
 Ho: mean(diff) = 0                         degrees of freedom =       39

 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 0.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000
```

2001&2005

```
. ttest s_01 == s_05, level(90)

Paired t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [90% Conf. Interval]
---------+--------------------------------------------------------------------
    s_01 |      40    .0019846    .0062607    .0395959   -.0085638     .012533
    s_05 |      40    .0545242    .0054445    .0344339    .0453509    .0636974
---------+--------------------------------------------------------------------
    diff |      40   -.0525396    .0080851    .0511344   -.0661619   -.0389172
------------------------------------------------------------------------------
     mean(diff) = mean(s_01 - s_05)                                t =  -6.4983
 Ho: mean(diff) = 0                         degrees of freedom =       39

 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 0.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000
```

2002&2004

```
. ttest s_02 == s_04, level(90)

Paired t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [90% Conf. Interval]
---------+--------------------------------------------------------------------
    s_02 |      40    -.011577    .0075146    .0475265   -.0242382    .0010841
    s_04 |      40    .0442551    .0041647      .02634    .0372381    .0512721
---------+--------------------------------------------------------------------
    diff |      40   -.0558321    .0091418     .057818    -.071235   -.0404293
------------------------------------------------------------------------------
     mean(diff) = mean(s_02 - s_04)                                t =  -6.1073
 Ho: mean(diff) = 0                         degrees of freedom =       39

 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 0.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000

. ttest s_02 == s_05, level(90)

Paired t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [90% Conf. Interval]
---------+--------------------------------------------------------------------
    s_02 |      40    -.011577    .0075146    .0475265   -.0242382    .0010841
    s_05 |      40    .0545242    .0054445    .0344339    .0453509    .0636974
---------+--------------------------------------------------------------------
    diff |      40   -.0661012    .0100483    .0635509   -.0830313   -.0491711
------------------------------------------------------------------------------
     mean(diff) = mean(s_02 - s_05)                                t =  -6.5784
 Ho: mean(diff) = 0                         degrees of freedom =       39
```

```
 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 0.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000
```

Variable s_01 is equal to strategic alphas in 2001, s_02 is equal to strategic alphas in 2002… s_05 is equal to strategic alphas in 2005.

Bull & Bear Matched pairs Wilcoxon signed rank test of median strategic alpha

2001&2004

```
. signrank s_01 = s_04

Wilcoxon signed-rank test

        sign |      obs   sum ranks    expected
-------------+--------------------------------
    positive |        5          95       409.5
    negative |       34         724       409.5
        zero |        1           1           1
-------------+--------------------------------
         all |       40         820         820

unadjusted variance     5535.00
adjustment for ties        0.00
adjustment for zeros      -0.25
                     ----------
adjusted variance       5534.75

Ho: s_01 = s_04
              z =  -4.227
    Prob > |z| =   0.0000
```

2001&2005

```
. signrank s_01 = s_05

Wilcoxon signed-rank test

        sign |      obs   sum ranks    expected
-------------+--------------------------------
    positive |        6          70       409.5
    negative |       33         749       409.5
        zero |        1           1           1
-------------+--------------------------------
         all |       40         820         820

unadjusted variance     5535.00
adjustment for ties        0.00
adjustment for zeros      -0.25
                     ----------
adjusted variance       5534.75

Ho: s_01 = s_05
              z =  -4.563
    Prob > |z| =   0.0000
```

2002&2004

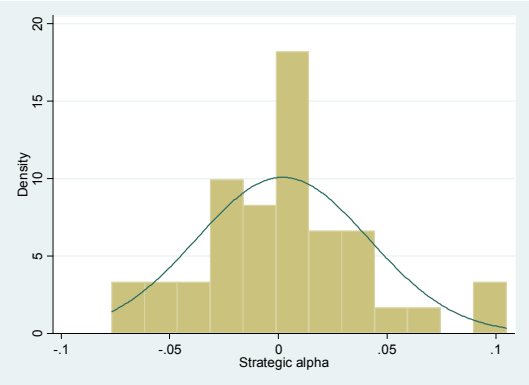
```
. signrank s_02 = s_04

Wilcoxon signed-rank test

        sign |      obs   sum ranks    expected
-------------+--------------------------------
    positive |        6          77       409.5
    negative |       33         742       409.5
        zero |        1           1           1
-------------+--------------------------------
         all |       40         820         820

unadjusted variance     5535.00
adjustment for ties        0.00
adjustment for zeros      -0.25
                     ----------
adjusted variance       5534.75

Ho: s_02 = s_04
              z =  -4.469
    Prob > |z| =   0.0000
```

2002&2005

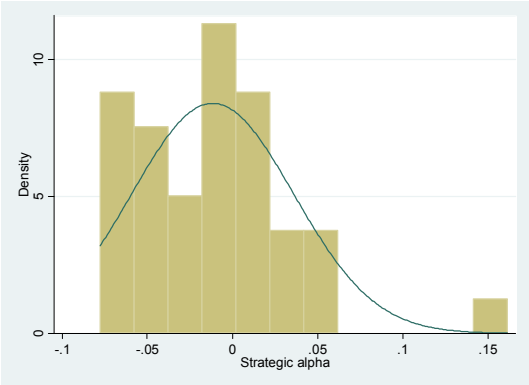
```
. signrank s_02 = s_05

Wilcoxon signed-rank test

        sign |      obs   sum ranks    expected
-------------+--------------------------------
    positive |        6          67       409.5
    negative |       33         752       409.5
        zero |        1           1           1
-------------+--------------------------------
         all |       40         820         820

unadjusted variance     5535.00
adjustment for ties        0.00
adjustment for zeros      -0.25
                     ----------
adjusted variance       5534.75

Ho: s_02 = s_05
             z =  -4.604
    Prob > |z| =   0.0000
```

Variable s_01 is equal to strategic alphas in 2001, s_02 is equal to strategic alphas in 2002… s_05 is equal to strategic alphas in 2005.

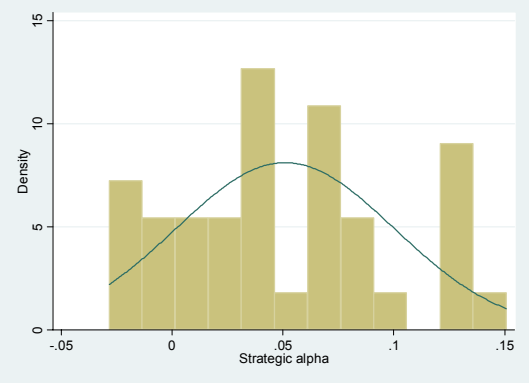
Distribution plots of the estimated strategic alphas



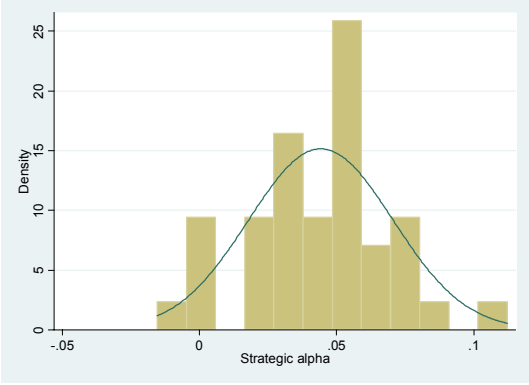
Year 2001



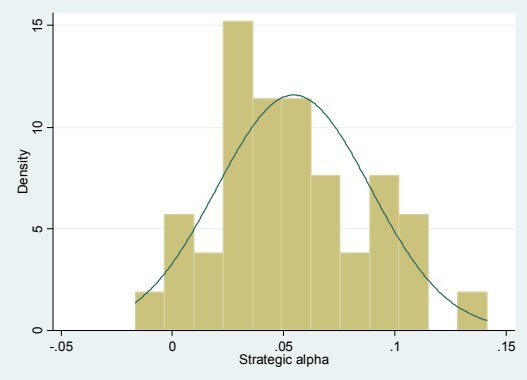
Year 2002



Year 2003

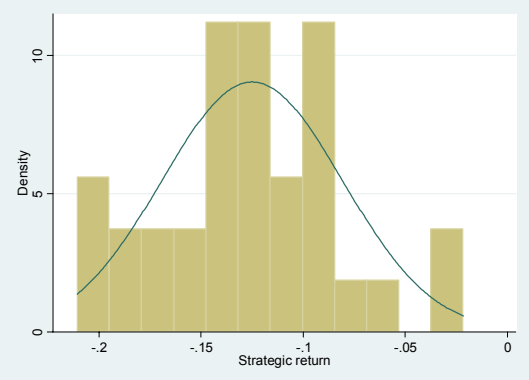


Year 2004

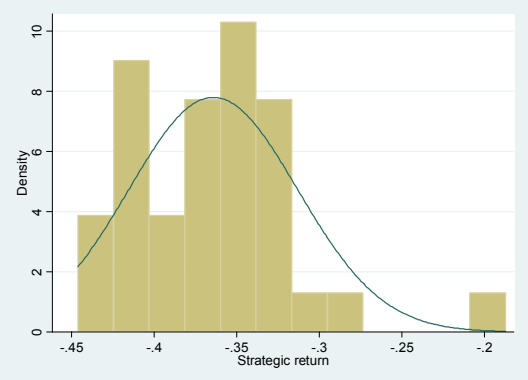


Year 2005

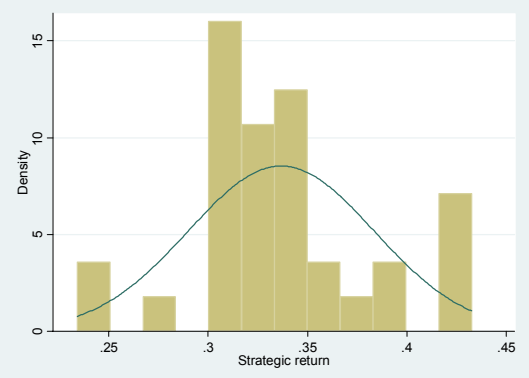
Distribution plots of the estimated strategic return



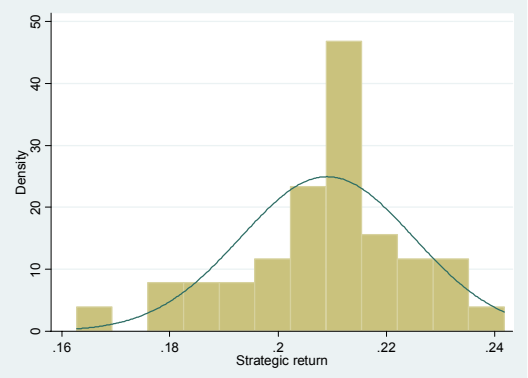
Year 2001



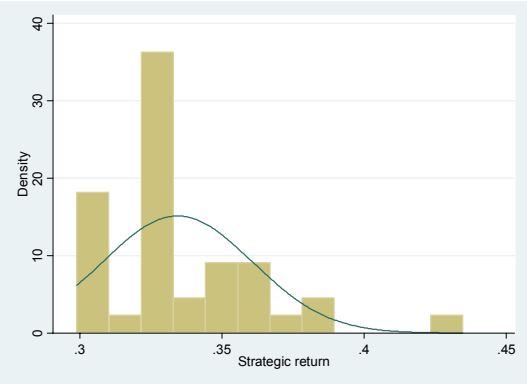
Year 2002



Year 2003



Year 2004



Year 2005

C. Tactical performance and tests

T-tests of the tactical alphas

```
. ttest t_01 == 0, level(90)

One-sample t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [90% Conf. Interval]
---------+--------------------------------------------------------------------
    t_01 |      40   -.0095496    .0070079    .0443218    -.021357    .0022578
------------------------------------------------------------------------------
    mean = mean(t_01)                                             t =  -1.3627
Ho: mean = 0                                     degrees of freedom =       39

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0904         Pr(|T| > |t|) = 0.1808          Pr(T > t) = 0.9096

. ttest t_02 == 0, level(90)

One-sample t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [90% Conf. Interval]
---------+--------------------------------------------------------------------
    t_02 |      40   -.0154985    .0068277    .0431822   -.0270024   -.0039947
------------------------------------------------------------------------------
    mean = mean(t_02)                                             t =  -2.2699
Ho: mean = 0                                     degrees of freedom =       39

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0144         Pr(|T| > |t|) = 0.0288          Pr(T > t) = 0.9856

. ttest t_03 == 0, level(90)

One-sample t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [90% Conf. Interval]
---------+--------------------------------------------------------------------
    t_03 |      39    -.022975    .0069742    .0435538   -.0347331   -.0112168
------------------------------------------------------------------------------
    mean = mean(t_03)                                             t =  -3.2943
Ho: mean = 0                                     degrees of freedom =       38

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0011         Pr(|T| > |t|) = 0.0021          Pr(T > t) = 0.9989

. ttest t_04 == 0, level(90)

One-sample t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [90% Conf. Interval]
---------+--------------------------------------------------------------------
    t_04 |      40   -.0330741    .0043095    .0272559   -.0403352   -.0258131
------------------------------------------------------------------------------
    mean = mean(t_04)                                             t =  -7.6746
Ho: mean = 0                                     degrees of freedom =       39

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 0.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 1.0000

. ttest t_05 == 0, level(90)

One-sample t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [90% Conf. Interval]
---------+--------------------------------------------------------------------
    t_05 |      40    .0199493    .0043404    .0274513    .0126363    .0272624
------------------------------------------------------------------------------
    mean = mean(t_05)                                             t =   4.5962
Ho: mean = 0                                     degrees of freedom =       39

    Ha: mean < 0                 Ha: mean != 0                 Ha: mean > 0
 Pr(T < t) = 1.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 0.0000
```

Variable t_01 is equal to tactical alphas in 2001, t_02 is equal to tactical alphas in 2002… t_05 is equal to tactical alphas in 2005.

Wilcoxon signed rank test of median tactical alpha

	2001	2002	2003	2004	2005
tactical alpha median	-1.94%	-0.97%	-3.4%	-3.61%	2.1%
Sign. level	6.8%	4.9%	0.1%	0.0%	0.0%

Bull & Bear Matched pairs t-test of tactical alpha

2001&2004

```
. ttest t_01 == t_04, level(90)

Paired t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [90% Conf. Interval]
---------+--------------------------------------------------------------------
    t_01 |      40   -.0095496    .0070079    .0443218    -.021357    .0022578
    t_04 |      40   -.0330741    .0043095    .0272559   -.0403352   -.0258131
---------+--------------------------------------------------------------------
    diff |      40    .0235245    .0078305    .0495247     .010331     .036718
------------------------------------------------------------------------------
     mean(diff) = mean(t_01 - t_04)                                t =   3.0042
 Ho: mean(diff) = 0                         degrees of freedom =       39

 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 0.9977         Pr(|T| > |t|) = 0.0046          Pr(T > t) = 0.0023
```

2001&2005

```
Paired t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [90% Conf. Interval]
---------+--------------------------------------------------------------------
    t_01 |      40   -.0095496    .0070079    .0443218    -.021357    .0022578
    t_05 |      40    .0199493    .0043404    .0274513    .0126363    .0272624
---------+--------------------------------------------------------------------
    diff |      40   -.0294989    .0087328     .055231   -.0442126   -.0147853
------------------------------------------------------------------------------
     mean(diff) = mean(t_01 - t_05)                                t =  -3.3780
 Ho: mean(diff) = 0                         degrees of freedom =       39

 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 0.0008         Pr(|T| > |t|) = 0.0017          Pr(T > t) = 0.9992
```

2002&2004

```
Paired t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [90% Conf. Interval]
---------+--------------------------------------------------------------------
    t_02 |      40   -.0154985    .0068277    .0431822   -.0270024   -.0039947
    t_04 |      40   -.0330741    .0043095    .0272559   -.0403352   -.0258131
---------+--------------------------------------------------------------------
    diff |      40    .0175756    .0080226    .0507397    .0040584    .0310928
------------------------------------------------------------------------------
     mean(diff) = mean(t_02 - t_04)                                t =   2.1907
 Ho: mean(diff) = 0                         degrees of freedom =       39

 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 0.9827         Pr(|T| > |t|) = 0.0345          Pr(T > t) = 0.0173
```

2002&2005

```
Paired t test
------------------------------------------------------------------------------
Variable |     Obs        Mean    Std. Err.   Std. Dev.   [90% Conf. Interval]
---------+--------------------------------------------------------------------
    t_02 |      40   -.0154985    .0068277    .0431822   -.0270024   -.0039947
    t_05 |      40    .0199493    .0043404    .0274513    .0126363    .0272624
---------+--------------------------------------------------------------------
    diff |      40   -.0354479    .0093498    .0591336   -.0512012   -.0196946
------------------------------------------------------------------------------
     mean(diff) = mean(t_02 - t_05)                                t =  -3.7913
 Ho: mean(diff) = 0                         degrees of freedom =       39

 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 0.0003         Pr(|T| > |t|) = 0.0005          Pr(T > t) = 0.9997
```

Variable t_01 is equal to tactical alphas in 2001, t_02 is equal to tactical alphas in 2002… t_05 is equal to tactical alphas in 2005.

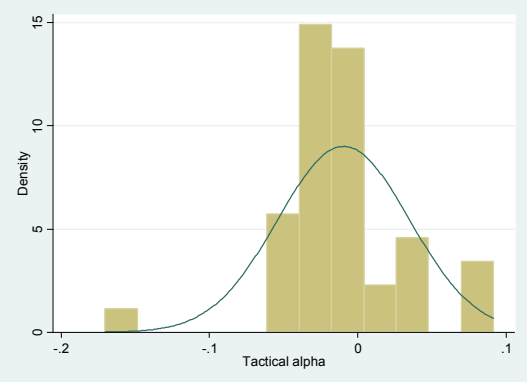
Bull & Bear Matched pairs Wilcoxon signed rank test of median tactical alpha

```
Wilcoxon signed-rank test

2001&2004

        sign |      obs   sum ranks    expected
-------------+--------------------------------
    positive |       27         616       409.5
    negative |       12         203       409.5
        zero |        1           1           1
-------------+--------------------------------
         all |       40         820         820

unadjusted variance     5535.00
adjustment for ties        0.00
adjustment for zeros      -0.25
                     ----------
adjusted variance       5534.75

Ho: t_01 = t_04
            z =   2.776
    Prob > |z| =   0.0055

2001&2005

. signrank t_01 = t_05

Wilcoxon signed-rank test

        sign |      obs   sum ranks    expected
-------------+--------------------------------
    positive |       10         178       409.5
    negative |       29         641       409.5
        zero |        1           1           1
-------------+--------------------------------
         all |       40         820         820

unadjusted variance     5535.00
adjustment for ties        0.00
adjustment for zeros      -0.25
                     ----------
adjusted variance       5534.75

Ho: t_01 = t_05
            z =  -3.112
    Prob > |z| =   0.0019

2002&2004

. signrank t_02 = t_04

Wilcoxon signed-rank test

        sign |      obs   sum ranks    expected
-------------+--------------------------------
    positive |       29         597       409.5
    negative |       10         222       409.5
        zero |        1           1           1
-------------+--------------------------------
         all |       40         820         820

unadjusted variance     5535.00
adjustment for ties        0.00
adjustment for zeros      -0.25
                     ----------
adjusted variance       5534.75

Ho: t_02 = t_04
            z =   2.520
    Prob > |z| =   0.0117

2002&2005

. signrank t_02 = t_05

Wilcoxon signed-rank test

        sign |      obs   sum ranks    expected
-------------+--------------------------------
    positive |        5         104       409.5
    negative |       34         715       409.5
        zero |        1           1           1
```

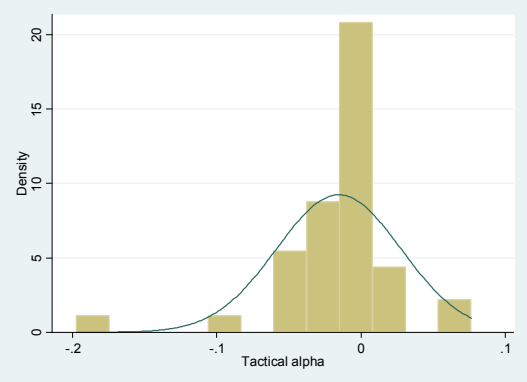
```
-------------+---------------------------------
         all |        40          820          820

unadjusted variance     5535.00
adjustment for ties        0.00
adjustment for zeros      -0.25
                     ----------
adjusted variance       5534.75

Ho: t_02 = t_05
                z =  -4.106
    Prob > |z| =   0.0000
```

Variable t_01 is equal to tactical alphas in 2001, t_02 is equal to tactical alphas in 2002… t_05 is equal to tactical alphas in 2005.

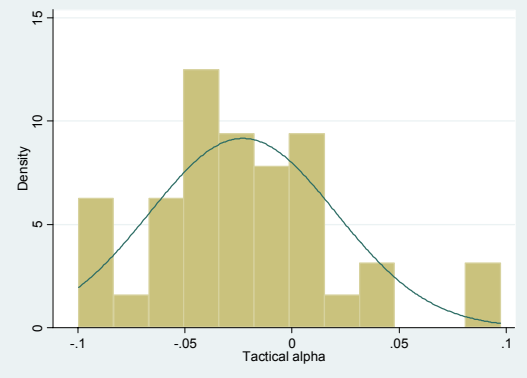
Distribution plots of the estimated tactical alphas



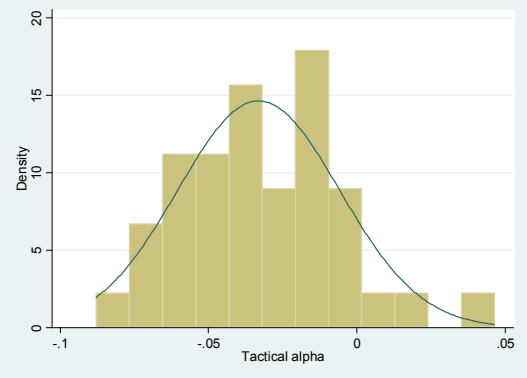
Year 2001



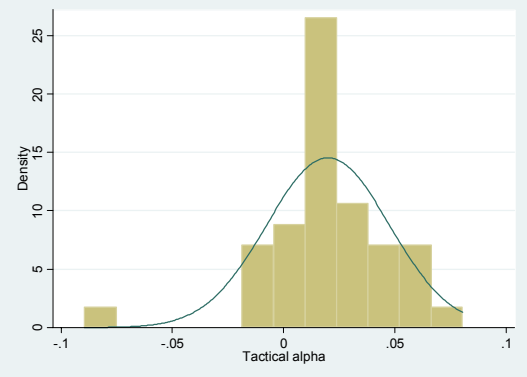
Year 2002



Year 2003



Year 2004



Year 2005