

Indexes versus Active Funds

- A Performance Evaluation of Swedish Registered Mutual Funds

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ABSTRACT

Mutual funds are today one of the most popular forms of saving or investment. The increased interest in mutual funds calls for an increased focus on evaluations of their performance. From an investors point of view it is important to know whether actively managed funds, not only add value but, add enough value to offset the costs associated with active management. In order to answer this question the well known performance measure Jensen's alpha is estimated using the traditional CAPM approach. In addition, an alternative approach to estimate performance by incorporating the funds' communicated benchmarks is introduced. Moreover, a database free from survivorship bias, encompassing the Swedish registered mutual fund space, is employed. Our method and database enables us to also investigate different types of funds besides the equity funds that most articles and papers focus on. The results do not support the confidence in active management evidenced by the lionshare of fund wealth being allocated to active funds. Instead the results indicate that the majority of active funds underperform relative to a passive benchmark.

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1 Introduction

Mutual funds are today one of the most popular forms of saving or investment¹. An ever increasing number of new funds is a result of this development. In Sweden much of the increased interest coincided with the reform of the pension system (PPM) which introduced that a part of an individuals pension savings were to be placed in mutual funds. The performance of different funds may vary substantially causing the decision of which funds to invest in to become a crucial determinant of future levels of savings and pension. The increased interest in the mutual funds is therefore followed by an increased need for proper evaluations of their performance.

Another aspect that highlights the importance of mutual fund evaluation can be found in the principal-agent relationship between the mutual fund manager and the investor. In this relationship there is a risk that moral hazard and asymmetric information might induce the fund manager to divert from the optimal risk/return trade-off of the investor. Therefore, fund evaluation also play a crucial role in preventing these agency costs and aligning the interests of the mutual fund manager and the investor.

The popularity of mutual funds together with the availability of large amounts of data have inspired the academia to write an endless number of reports and articles on the subject. Still there is no consensus formed on how to properly evaluate mutual funds.

Despite a constant flow of research papers suggesting that active management has little to offer in terms of added value, the lionshare of Swedish registred mutual funds are actively managed according to our database. The merit of active portfolio management is based on the idea that markets are not completely efficient. Therefore, a well performed security analysis may reveal mispriced assets that can be exploited. The active manager may also be able to generate better performance than a passive investment by timing the market or by superior asset allocation. The thesis at hand is however more focused on, determining if there has existed abnormal performance in the past, than on how it was generated.

This study will take more of a practitioner’s view to mutual fund evaluation. This can be interpreted as the study not being a test of the efficient market hypothesis. Instead it places the investor in focus and his/her investment decisions. The majority of Swedish registred funds communicate a benchmark in relation to which the performance of the fund is measured. By the act of investing in a specific mutual fund the investor is in this study taken to accept the explicitly stated benchmark as a reasonable predictor/proxy for what he/she can expect to earn on his investment. However, the investor, that

¹ Approximately 94% of the population between 18-74 years invest their money in the asset class according to a report published by “Fondbolagens Förening”.
http://www.fondbolagen.se/upload/fondsparandet_i_sverige_2006.pdf

chooses to place money in an actively managed fund, is giving the manager of that fund a mandate to deviate from the portfolio composition suggested by the stated passive benchmark. The mandate is given in belief that the fundmanager may be able to generate value above what could be received from investing directly in the passive index². For the service of active management the investor is charged a fee. Therefore, the fund manager not only need to outperform the benchmark, in addition he/she needs to do it net of fees for the investment in the active portfolio to be worthwhile.

This study aims to investigate whether the confidence in active management, for which the fund wealth allocation in Swedish registered funds is taken as evidence, is warranted. Furthermore, the methodology chosen for the investigation is based on the dominant performance measure in the mutual fund literature; Jensen's alpha. Two different methods for estimating alpha will be used. The first model utilize a broad passive market index (MSCI World Index) in the manner first described by Jensen (1968). The second approach may have less theoretical merit, but perhaps more practical importance. The broad passive market index is substituted by the specific benchmark stated by each mutual fund investigated.

Moreover, further analysis into this popular topic may also be motivated on the grounds that we are in this thesis able to use and enhance a very extensive dataset free from survivorship bias. It is a proprietary dataset that covers all Swedish registered mutual funds that exists or have existed at the end of 2004. The data on mutual funds is hand collected from the mutual funds information sheets "fakta blad". There are several reasons why we do not investigate more recent fund introductions. First, there is a time lag until data on new funds become available. Second, adding more data is also extremely time consuming since it has to be hand collected like the data we already have. Most importantly ,however, is that on the basis of validity, we require the dataseries to include at least 30 observations³. In sum, the expectation is that employing such a complete dataset will lend relevancy and validity to the results obtained.

As will become apparent in the subsequent literary review most fund evaluation studies are focused on equity funds. Therefore, it is an additional contribution of the thesis that it also evaluates bond funds, money market and balanced funds.

² A discussion of the possibilities of investing in the passive assets (indexes)will follow in a later section.

³ The frequency of the data is monthly.

1.1 Purpose

The purpose of this thesis is to evaluate to what extent the Swedish registered mutual funds have been able to generate abnormal performance in the past. By the results we can determine whether past management fee levels have been justified and whether the investor would have been better off investing in a passive portfolio. Our performance measures are computed using historic data but justified on the basis of predicted relationships, implicitly it is assumed that historic results have at least some predictive ability. In other words the study aims to investigate whether the confidence in active management, for which the fund wealth allocation in Swedish registered funds is taken as evidence, is warranted.

A second objective of the thesis is to identify possible patterns in the results that may offer additional indications or guidelines to the investor. We will look at factors such as geographical investment mandate, fundtype, fundsize and management fees. Specific attention will be devoted to fund fees. Are fund fees a reliable signal of knowledgeable managers who will outperform the index to a larger extent? To put it bluntly, are higher fees a signal of higher performance?

1.2 Outline

The thesis will begin by a background section (2) with the ambition of placing the research carried out in this paper in its broader context. The context is further developed in the preceding section (3) on prior research in the field. Section (4) describes the data used in the econometric investigation into mutual fund performance. The specific research methodology is developed in section (5). Results and analysis thereof is presented in the following chapter (6). Finally, section (7) presents the conclusions.

2 Background

2.1 Mutual Funds

A mutual fund is composed of a collection of investors that contribute capital to be invested at the discretion of the mutual fund manager. The mutual fund manager usually invests the capital contributions in stocks and/or bonds⁴. In return for the invested capital the investor receives shares in the fund. Each share is an equally weighted claim against the total net asset value (TNA) of the fund. The value will increase as a result of paid out dividends from shares, interest received from bonds, capital gains on sold assets and value increases on unsold assets. Similarly, it will decrease as a result of capital losses and value decreases on unsold assets. The price of a share is often referred to as the NAV-rate (net asset value). Like the name implies the NAV-rate is the net value of the claim (i.e. the price after management fees have been deducted).

2.2 Investment Process

Against the backdrop of modern portfolio theory the task of the mutual fund is that of security analysis and portfolio analysis. The selection of a preferred combination of risk and return must, in the final analysis, depend on the preferences of the investor and cannot be made solely by the mutual fund manager. However, it would be practically impossible for the manager to determine the preference patterns of its investors. Therefore, the process must begin with the mutual fund management selecting an attitude towards risk and expected return and then inviting investors with similar preferences to purchase shares in the fund. A central part in the communication of the fund's preferences, or investment philosophy as it is often called, is the indication of a benchmark.

2.3 The Swedish Mutual Fund Industry

Swedish mutual fund industry has experienced a remarkable growth since the middle of the nineties. In 1994 the number of mutual funds available on the Swedish market was about 350 and today⁵ there are over 1250 funds available. The increased popularity of the mutual fund as a savings form and investment has meant that the aggregated market value of the mutual funds have increased immensely, from about 207 billion SEK in 1994 to over 1500 billion SEK today⁶. Much of the increase coincided

⁴ As the mutual fund business have evolved, especially with a growing number of hedgefunds, the use of options, futures and other derivatives becomes more common.

⁵ 2006-10-26 rapport "Fondsparandet i Sverige" www.fondbolagensforening.se

⁶ http://www.fondbolagen.se/upload/fondformogenhet_2006_003.xls, Statistics from Fondbolagens Förening.

with the launch of the new pensionsystem in 1999. The reason for this was that the pension system reform introduced that a part of the pension was to be placed in mutual funds at the individuals discretion. According to a report published by Fondbolagens Förening the interest for investing in mutual funds in Sweden is widespread. Approximately 94% of the population between 18-74 years invest their money in the asset class. Even when the holdings due to the pension system (PPM) is excluded 77% of the population above invest in mutual funds. Furthermore, the report also reveal that the most common motif for investing in mutual funds is saving for retirement and to build up a capital cushion. The Swedish investors' most important considerations when selecting which fund to invest in are the risklevel and past performance⁷.

⁷ http://www.fondbolagen.se/upload/fondsparandet_i_sverige_2006.pdf Report published by Fondbolagens Förening.

3 Prior Research

Before 1965 a mutual fund's performance was often rated by comparison to other funds' returns or by averaging returns over a number of periods. Treynor addresses the shortcomings of such methods in "How to Rate Management of Investment Funds" (1965). The article presents a new way of viewing performance results. Based on modern portfolio theory, Treynor discusses both market influence on portfolio returns and investors' aversion to risk. The article begins by developing the characteristic line, which relates the expected return of a fund to the return of a suitable market average. Treynor then continues with the development of the portfolio-possibility line, relating the expected value of a portfolio containing a fund to the owner's risk preferences. From the above described graphical technique Treynor develops the first risk adjusted measure for rating management performance.

A year later, Sharpe (1966), in "Mutual Fund Performance," explains in a modern portfolio theory context that the performance of an efficient portfolio is dependent on two measures; expected return $E(R_p)$ and the predicted variability of risk (σ_p), measured by the standard deviation of return. Since all investors share the same predictions about the future performance of securities all efficient portfolios will fall along a straight line of the form,

$$E(R_p) = p + b\sigma_p$$

where p is a pure (risk-less) interest rate and b is the risk premium. The optimal portfolio constructed by the risky portfolio and a risk-free asset is the one with the greatest reward-to-variability ratio (later called the sharpe ratio),

$$\frac{E(R_p) - p}{\sigma_p}$$

The article evaluates 34 open-end mutual funds during 1954-1963 and finds important variations in the Sharpe ratio, ranging from 0,78 to 0,43. Sharpe notes that either the variation is random or due to high fund expenses, or the difference is due to management skills.

In 1968 Jensen published "The Performance of Mutual Funds in the Period 1945-1964," The article investigates the performance of mutual funds with a model that statistically measures a fund's performance relative to a benchmark.

The estimating equation is,

$$R_{jt} - R_{ft} = \alpha_j + \beta_j (R_{mt} - R_{ft}) + u_{jt}$$

where the α is later termed Jensen's alpha and the error term u_{jt} is expected to be serially independent.

A positive α indicates superior security price forecasting. A negative α indicates either poor security selection or the existence of high expenses. Jensen investigates 115 mutual fund returns (1945-64) relative to the S&P 500 index, and finds that the funds on average earned 1,1 percent less than expected given their level of systematic risk. On average, mutual funds do not produce returns to offset their internal expenses and fees.

In 1995 Malkiel published “Returns from Investing in Equity Mutual Funds: 1971 to 1991”. In this paper he investigates returns from all equity mutual funds that existed each year during the period 1971-1991. In addition to performance he also addresses survivorship bias, expenses, and performance persistence. When returns from all funds are analyzed, Malkiel finds that mutual funds have tended to underperform the market, not only after management expenses have been deducted, but also gross of all reported expenses except load fees. The database employed permits him to study the effect of survivorship bias which he finds to be significant. Moreover, Malkiel finds no relationship between betas and total returns. He concludes that his findings do not provide any reason to abandon the efficient market hypothesis.

A year later, Gruber (1996), in “Another Puzzle: The Growth in Actively Managed Mutual Funds” asks what accounts for the appeal of mutual funds, and in particular actively managed mutual funds, as an investment vehicle. Using a sample of 270 funds (1985-1994) Gruber finds that mutual funds underperform the market by 1,56 percent per year using a single index model and with a four-index model the underperformance is 0,65 percent per year. Expense ratios for his sample averaged 1,13 percent per year. Stating that the four-factor index estimate as more reliable he concludes that active management adds value, but that mutual funds charge the investors more than the value added. Gruber also tests index funds and finds that they have an average annualized alpha of -20.2 basis points, with average expenses of 22 basis points.

In Wermers and Moskowitz (2000), “Mutual Fund Performance: An Empirical Decomposition into Stock-Picking Talent, Style, Transactions Costs, and Expenses,” the authors decompose mutual fund returns by attributable factors such as stock holdings, expense ratios, and transaction costs. Their results over the 1975 to 1994 period indicate that mutual funds held stock portfolios that outperform a broad market index (the CRSP valuetypeweighted index) by 1,3 percent per year. They found that about 60 basis points was due to the higher average returns associated with the characteristics of stocks held by the funds, whereas the remaining 70 basis points is due to talents in picking stocks that beat their

characteristic benchmark portfolios. However, on a net-return level, the funds underperformed broad market indexes by one percent per year. Of the 2,3 percent difference between the returns on stock holdings and the net returns of funds, 0,7 percent per year is due to the lower average returns of the nonstock holdings of the funds during the period (relative to stocks). The remaining 1,6 percent per year is split almost evenly between the expense ratios and the transactions costs of the funds. Wermers notes that mutual fund holdings of cash and bonds, which presumably is kept to maintain liquidity in the face of uncertain investor inflows and redemptions, put a substantial drag on the net returns of funds relative to the market.

Baks, Metrick, and Wachter (2001) take a novel approach to mutual fund performance in “Should Investors Avoid all Actively Managed Mutual Funds? A Study in Bayesian Performance Evaluation.” They focus on the investor’s perspective using Bayesian performance evaluation where an investor chooses to invest in an active fund when the prior point estimate of alpha is positive. For 1,437 domestic equity funds in 1996, the authors calculate the posterior expectation of alpha over a range of prior beliefs. They conclude that a mean-variance investor would require extremely skeptical beliefs about the possibility of managerial skill to be induced not to invest in an actively managed fund.

Pastor and Stambaugh (2002), in “Investing in Equity Mutual Funds” and in “Mutual Fund Performance and Seemingly Unrelated Assets” modify existing performance methodology by incorporating non-benchmark assets in the estimation of alpha. In the first paper, the authors develop a framework in which prior views about pricing models and managerial skill are incorporated into the investment decision through the use of benchmarks prescribed by the Jensen, Fama-French, and Carhart models and by several non-benchmark assets. Findings indicate that actively managed funds can be better substitutes for the benchmarks than existing passive funds, indicating that active funds can be selected even by investors who admit no possibility of selection skill.

In their second paper, the authors attempt to show that an estimate of either alpha or the Sharpe ratio can be improved with the use of non-benchmark assets. When estimating CAPM alphas, the Fama-French factors SMB and HML become two of the non-benchmark factors. The second series of non-benchmark assets is the momentum factor constructed by Carhart(1997). The remaining non-benchmark assets are portfolios constructed from a universe of 20 value-weighted industry portfolios formed using the same classification scheme as Moskowitz and Grinblatt (1999). Their results indicate that, when including the non-benchmark assets, new Sharpe ratio estimates are typically four to five times more precise than usual estimates. Also, the difference between Fama-French and CAPM alphas is substantially reduced when the non-benchmark assets are included. Empirically, however, estimated alphas for the majority of equity funds are negative when the non-benchmark assets are either included or excluded, confirming previous findings in the literature.

The issue of economies of scale is also addressed by Chen, Hong, Huang, and Kubik (2004) in “Does Fund Size Erode Mutual Fund Performance? The Role of Liquidity and Organization.” Answering the title of the paper, they find that fund size do erode mutual fund performance using a sample of fund returns between 1962 and 1999. The authors find that the effect of fund size on fund returns is most pronounced for funds that play small cap stocks. This suggests that liquidity is an important reason why size erodes performance. Moreover, they argue that organizational diseconomies related to hierarchy costs may also play a role in addition to liquidity in the documented diseconomies of scale.

4 Data

In this thesis we are able to use and enhance a very extensive dataset free from survivorship bias. It is a proprietary dataset that covers all Swedish registered mutual funds that exists or have existed at the end of 2004. The data on mutual funds is hand collected from the mutual funds information sheets “fakta blad”. The dataset includes information on mutual fund returns and fees. We have extended the dataset further by identifying and gathering data on each index stated by the mutual funds as part of their benchmarks. Using hand collected data from the mutual fund reports we have information on the fund benchmark and on the broad geographical target in each funds investment objective. We can also distinguish between equity and various classes of non equity funds. Moreover, we know the size of the different funds.⁸

Unique benchmarks for each of the funds included in the entire sample has been created. In total the final sample consists of 436 mutual funds and their respective benchmarks. Data on the return on benchmarks and mutual funds cover the period Jan 1984 – Dec 2004. Obviously only a small subset of indexes and mutual funds have existed throughout the whole period, but the aim is to make use of as much information that is possible.

Furthermore, what stands out from many other studies of mutual fund performance is that the sample includes different fund types. The dataset covers equity funds, bond funds, balanced funds, moneymarket funds and hedgefunds. However, the funds included in the sample are funds that existed in the end of 2004. This means that only a few hedge funds and funds-of-funds are included. Hence, we will not be able to say much about these rather new phenomena in the mutual fund industry.

It is perhaps important to note that the sample of funds is not all encompassing of the mutual fund space available for a Swedish investor but covers mutual funds that are registered in Sweden. However, as regards the funds that are indeed Swedish registered our database covers approximately 95%⁹ of the total fund wealth in this group.

There are several reasons why we do not investigate more recent fund introductions. First, there is a time lag until data on new funds become available. Second, adding more data is also extremely time consuming since it has to be hand collected like the data we already have. Most importantly, however, is that on the basis of validity, we require the dataserie to include at least 30 observations.

⁸ The size of a specific fund, or the wealth of a fund, is often referred to as its TNA (total net assets)

⁹ The aggregated TNA of all funds in our sample is 727700 Mkr. The total amount of fund wealth reported to Fondbolagens förening amongst Swedish registered funds is 762165 Mkr.

4.1 Classification

The funds are divided into different classes in accordance with their investment philosophy. The division is based on the different fund types and on their geographical areas of investment. The types of funds are the aforementioned equity, bond, money market and mixed funds.

Hedgafunds and fund-of-funds are classified as equity since there are too few to make up separate classes that are usefull for inference. The geographical division is based on funds investing solely in Sweden, funds investing both in Sweden and abroad (denoted International) and funds investing exclusively abroad.

4.2 Data transformation

4.2.1 Mutual fund return

All mutual funds where extracted from the dataset in levels including dividends. The series were converted to Swedish Krona and transformed to changes in the following manner,

$$(P_{(t+1)} - P_{(t)}) / P_{(t)}$$

Where $P_{(t+1)}$ = Price at time $t+1$ and $P_{(t)}$ = Price at time t . The price series are adjusted for dividends, splits and mergers. It is also important to emphasize that the return is net of all fees charged to the investor¹⁰. In subsequent regression analysis excess returns will be used and therefore the risk-free rate was deducted from the monthly returns of the funds. Following common practice the 30 day Swedish T-Bill was employed as the risk-free rate.

$$r_{it} = R_{it} - R_{ft}$$

4.2.2 Benchmark return

First, all indexes stated by the mutal funds as part of their benchmarks where gathered from the databases; Datastream, Ibbotsson and SIX Trust. Second, unique benchmarks for each fund were created. For some of the funds the benchmark is just a simple index. Still for other funds their benchmark comprised of up to seven different indexes that where weighted in a specific way stated by the mutual fund. For example,

$$r_{\text{Benchmark},t} = 0,3 * r_{\text{MSCIworld},t} + 0,5 * r_{\text{SIXPRX},t} + 0,2 * r_{\text{OMRXbond},t}$$

The majority of the funds have benchmarks that include dividends (71%). In conformity with the mutual fund returns the benchmarks where converted to Swedish crona and transformed to net return and subsequently to excess return as described in the mutual fund return section.

¹⁰ In practice they do not include possible charges related to sale or initial investment in the fund.

4.3 Survivorship bias

Mutual funds attrition can create problems for a researcher because the funds that disappear tend to do so either because their performance is very poor over a period of time or because their market value is so small that management judges that it no longer pays to maintain the fund. Thus to only study funds that survive overstates the measured performance.¹¹

An empirical investigation into the possible magnitude of the survivorship bias can be found in “Mutual Fund Survivorship” by Carhart, Carpenter, Lynch, and Musto (2002). The authors investigate the issue of survivorship bias by examining the effect of survivor conditioning on estimates of average performance using data from 1962 to 1995 for 1,346 surviving funds and 725 nonsurviving funds. For a one-year sample period, the average survivor bias is only about 0.07% annually. However, for sample periods of greater than 15 years, the average bias is about 1% annually. Survivorship bias increases with sample length, but at a decreasing rate.

The data used in the thesis at hand is free from survivorship bias because we include all funds in our analysis even the funds that were reported dead at the end of 2004.

4.4 Mutual fund fees and costs

In the introduction we mentioned that the service of active management is not available free of charge. The mutual fund usually charges the investors a management fee. The size of the fee varies amongst funds and fund types. The matrix below gives an indication of different levels of fees.

Table 1. Average management fees.

	Equity funds	Bond funds	Money Market funds	Mixed funds
All	1,35%	0,68%	0,52%	1,17%
Abroad	1,43%	-	-	-
International	1,38%	0,93%	-	1,18%
Sweden	1,21%	0,60%	-	1,15%

The management fee is not the only cost the investor faces. There are also a number of other charges that has to be paid by, the mutual fund and in the extension, the investor. These charges include commissions, taxes and other transaction costs. All charges are, in Sweden, denoted by the abbreviation TKA (“Total kostnads andel” in Swedish). It describes the part of all the funds costs that can be derived to each investor and is expressed in percentage form. It is important to note a higher TKA will lower

¹¹ Elton, Gruber, Blake (1996).

the return directly. However, if the actions taken by the manager (that increases TKA) are profitable, a high TKA can indirectly lead to a higher return.

4.5 Total Net Asset Value (TNA)

Besides the fees we also have data on the size of all the funds examined in this thesis. However, we will only use this variable in analysis relating to equity funds. Therefore, we report descriptive statistics on total net asset values for this subsample. We record the data on TNA in billion Swedish crowns for the 315 equity funds in our dataset.

Table 2. Descriptive Statistics TNA in sample of 315 equity funds.

	Average TNA	Median TNA	Min TNA	Max TNA
Equity Funds	1,437	0,459	0,001	29,216

5 Research methodology

In broad terms the methodology of the paper will be structured as follows: We will estimate measures of performance for the funds using two different models. In an attempt to fulfill the primary objective of the thesis we devote specific attention to analyzing aggregated performance among the mutual funds. We then proceed by grouping the funds with similar characteristics, such as geographical investment targets and fund type to approach the second objective. Finally, the relationship between performance and the factors fundsize and fees is analyzed.

5.1 Model 1 – Jensen (1968) framework

The first model in the thesis is based on the widely used method of “Jensen’s Alpha” developed in Jensen[1968] described above in the literary review. The method is essentially an application of the Capital Asset Pricing Model (CAPM). According to the CAPM the return on any given portfolio will depend on the amount of systematic risk that it takes on. Total risk is not relevant since the nonsystematic component of total risk can be diversified away.¹² Hence a regression model predicting the excess return is of the form,

$$R_{it} = \beta_i * R_{mt} + e_{it}$$

R_{it} is the excess return of portfolio i , R_{mt} is the excess return of the market portfolio, β_i is the correlation between portfolio i and the market. e_i is the error term, a random variable, with expected mean equal to zero. Jensen, however, notes that if a portfolio manager is a superior forecaster, he will tend to select securities which realize $e_i > 0$. Hence his portfolio will earn more than the “normal” riskpremium for its given level of risk. And we must therefore allow for this when estimating the systematic risk of a managed portfolio. Allowance for such forecasting ability can be made simply by not restricting the model to pass through the origin.

¹² The nonsystematic component of the portfolio variance [variance=risk] is $\sigma^2(e_p)$ and it is attributable to firm-specific components, e_i . Because e_i are independent, and all have zero expected value, the law of averages can be applied to conclude that as more and more stocks are added to the portfolio, the firm-specific components tend to cancel out. Thus resulting in ever-smaller nonsystematic risk.

We allow for the possible existence of a non-zero constant in the above equation which transforms into,

$$R_{it} = \alpha_i + \beta_i * R_{mt} + u_{it} \quad ^{13}$$

The constant denoted by α is the measure of performance introduced by Jensen. a positive number indicates a superior performance by the portfolio manager while the opposite is true for a negative number. The regression is estimated using ordinary-least-squares (OLS) estimation.

The first model will provide a first evaluation of the equity funds in the dataset. Moreover, it will serve as an estimate to compare with the second model when used on only equity funds.

¹³ Note that alpha and beta does not have a t-subscript and hence are assumed to be stationary through time.

5.2 Model 2 – Performance Relative to the Stated Benchmark

The second model will replace the market index used in the first model by the benchmark that each fund are communicating to the public. This change may seem subtle, however, in effect it represents a rather radical deviation from the original model. In the first model setup a common interpretation of alpha is that it represents the skill of the fund's manager in selecting mispriced securities. This interpretation is subject to a number of potential complications, including the concern that the benchmark might not price all passive investments. The second model develops a new framework for defining a measure of managerial skill when a pricing model is viewed as possibly flawed but not useless. By instead defining skill with respect to a specific benchmark universe we weaken the link to a pricing model.

The interpretation of alpha becomes more problematic. However, here it is of less concern to us because we are not occupied with analyzing what actions of the portfolio manager that generates the alpha. It may here be satisfying to interpret alpha as a sign of deviation from the portfolio composition suggested by the passive benchmark. These actions are defined as active management and we wish to analyze whether they add value in relation to the passive benchmark (i.e. in a segmented market). Active management is associated with higher fees than passive investments and it is therefore important to include the price the investor pays for the active management. Hence, the return series for the mutual funds are measured net of fees.¹⁴

A negative alpha is regarded as active management resulting in underperformance and by the same logic a positive alpha is taken to mean the opposite. In this setup we can analyse whether the fund delivers on its promise¹⁵ to its investors. Does active management add value in relation to the passive benchmark and are the fees associated with it justified. The regression equation transforms into,

$$R_{it} = \alpha_i + \beta_i * R_{bit} + u_{it}$$

Where the dependent variable is still the return on fund i net of fees. Alpha is the intercept and our measure of over- or underperformance. Beta is now the correlation between the return of fund i and the return of the funds corresponding benchmark (R_{bit}).

¹⁴ Obviously investment in the passive benchmark may also be associated with a cost, and also, they may not always be open for investment. However, for the reason of simplicity, we assume that they are open for investment and that the cost for investing in them is negligible. Further research may prove this to be an unfair assumption.

¹⁵ "The promise" may be a strong expression; It is rather a communication of what performance can approximately be expected from the fund in relation to other investments.

5.2.1 Hypothesis testing

The purpose of the thesis is not to investigate how to achieve statistical significance for every estimate. Instead we will focus on the study of averages and base our conclusions on results which are economically meaningful. An average, economically meaningful, negative alpha is regarded as active management resulting in underperformance and hence it fails to add value. By the same logic an average economically meaningful, positive alpha is taken to mean the opposite. When we have obtained the alpha estimates they will also be analysed in part by ranking and grouping so as to find possible patterns which could enhance the investors decision base.

5.2.2 The cost of passive investment

It is important to bear in mind that investing in the passive asset might not always be possible. However, there are often close substitutes readily available in the form of index funds. Investment in index funds does not come without cost. The cost of passive management are usually in the range 10-50 basis points.¹⁶ This cost must therefore be kept in mind when analyzing the merits of active management.

5.2.3 The impact of factors fundsize and management fees

After estimating the alphas using the second model we will use them for further regression analysis.

For instance, we are interested in investigating if there is a “size-effect”. If the size of the fund may influence the fund’s performance. On the one hand large funds may perform worse because they have to keep larger liquidity buffers. However, on the other hand large funds may benefit from economies of scale (for example in security analysis) with lower costs as a result. Still, they may not be able to fully profit on good stockpicking of small stocks (e.g. because of ownership restrictions). In order to test whether the size of funds affect their performance we regress the estimated alphas of all equity funds on the factor total net assets (TNA)¹⁷. Because the two aspects discussed above will affect performance in opposite directions and because of the difficulties in approximating their relative force, we conduct a two-sided test. We reject the hypothesis of a “size-effect” if we find that the coefficient on the factor TNA is not statistically different from zero on a reasonable significance level.

The alpha estimates will also be used to investigate if there is a clear relationship between performance and the size of the fees the investor is charged. As discussed in the data section the investor is charged a number of different types of fees that collectively are referred to as TKA. However, we only know the size of the management fee on before hand since the other costs are

¹⁶ On top of charges between 10-50 basis points there may be possible effects from tracking error associated with index fund management.

¹⁷ $\alpha = \gamma + \beta TNA + \varepsilon$

determined by the future actions of the manager. Still, the management fee usually makes up the lionshare of the TKA. A priori, the investor must assume that if the fund will charge a higher fee this will be an indication that the manager expects to deliver superior performance. We are therefore, interested in evaluating if the management fee is a reliable signal of superior performance. The working hypothesis is that management fees should be positively correlated to alpha. We regress the estimated alphas on the factor management fees¹⁸. Both variables will enter the regression in percentage form. We reject the hypothesis if the betacoefficient is not larger than zero at a reasonable significance level.¹⁹ Finally, we will test if the two factors affect performance jointly by incorporating their cross product in the regression.

5.2.4 Robustness test.

A caveat to the results we will obtain using the second model is that mutual fund companies have full discretion as regards the choice of benchmark to communicate. There is no third party determining their appropriateness or fairness. That said there may exist a temptation and an incentive to chose easy comparables. An example of such easy comparables may be to indicate an index that does not include dividends as the funds benchmark. The results for these funds will therefore be positively biased. Initially we have assumed that the effect of excluded dividends in benchmarks is not significant. As a test of robustness we introduce a dummy variable to determine if our assumption was to strict.

¹⁸ $\alpha = \gamma + \beta \text{fee} + \varepsilon$

¹⁹ A description of the variables TNA and management fees can be found in section 4.4-4.5.

6 Results and Analysis

We begin by examining the funds in relation to the world market index. The reason for that is that we wish to commence with a holistic approach to measuring performance where we acknowledge that the investor in reality has the possibility to diversify his/her investments on the global market. The second model departs from this view in that it acknowledges that many mutual funds have restrictions in their mandates that limit their diversifying possibilities. Since these restrictions are usually communicated by the mutual funds, it is fair to assume that an investor has accepted these restrictions once he/she has made the investment, which in turn renders the comparison to the world market index fallacious.

The second model deals with this issue by measuring performance relative to the specific investment universe targeted by the mutual fund manager. In other words, it provides the opportunity for a skilled manager to show how well he/she performs in a segmented market. It is important to note that limiting the investment universe possibly entails a greater level of risk. The second model partly takes this aspect into account by comparing the fund to a benchmark with a closer corresponding level of diversification and risk.

In section 6.2.1.4 we compare the results from the two models.

6.1 Model 1

6.1.1. Aggregate results

As described in the methodology section the first model measures Jensen's alpha using the CAPM (single index) approach with MSCI World Index as the market portfolio. Model 1 is used to test all the equity funds in the sample (315). Out of these 315 approximately one half have an international investment mandate and one quarter have a restricted Swedish mandate. The remaining quarter of funds invests solely outside of Sweden.

Table 3. Equity fund performance

MODEL 1: EQUITY FUNDS				
	ALL	ABROAD	INTERNATIONAL	SWEDEN
N	315	74	168	73
Positive alphas	156	26	66	64
<i>significant alphas(%)</i>	19%	0%	12%	33%
Negative alphas	159	48	102	9
<i>significant alphas(%)</i>	13%	4%	18%	0%
Mean annual α	-1,26%	-3,04%	-2,25%	2,83%
Median annual α	-0,04%	-2,27%	-1,02%	2,80%
Percentile (α)				
0%	-27,59%	-14,23%	-27,59%	-8,67%
10%	-8,69%	-10,08%	-9,03%	-0,20%
20%	-6,12%	-8,56%	-6,49%	0,97%
30%	-3,18%	-7,34%	-4,00%	1,80%
40%	-1,63%	-5,22%	-2,48%	2,18%
50%	-0,04%	-2,27%	-1,02%	2,80%
60%	1,27%	-0,78%	-0,07%	3,61%
70%	2,15%	0,69%	1,35%	4,24%
80%	3,25%	1,99%	2,35%	4,63%
90%	4,63%	4,38%	3,64%	5,45%
100%	17,51%	7,55%	17,51%	12,57%

**N is the number of corresponding funds. Second row describes the number of funds with positive alphas in each class. Third row describes the number of funds with significant positive alphas. The percentiles describes the distribution of alphas.*

Out of 315 equity funds only 49 funds are found to have significant alphas. The overall mean alpha is -1,26 percent. The average alpha amongst those that are significant is even more negative (-1,8%). As depicted in the table above the distribution is skewed into the negative numbers meaning that the probability of random fund underperforming is higher than the probability that it will generate abnormal performance. Amongst the worst performing funds we find several funds that have a global investment objective. In the group of funds that have significant positive alphas one finds a high concentration of funds investing only in Sweden. 29 funds have significant positive alphas and out of these funds, 21 funds are Sweden funds. The high concentration of Sweden funds among the high performing funds may indicate superior forecasting or active management by the managers of Sweden funds. However, in this setup it may very well be the result of the equity premium being higher in Sweden than on the world market in general. A competing explanation of why global fund managers performed badly and Sweden fund managers excelled could be found in the quality of the information they possess. It may be the case that investors have an informational advantage on their home market.

6.1.2 Comparison of different geographical investment mandates.

A more explicit division of the funds into subclasses according to geographical investment mandates reveals some interesting patterns. On the one hand, Swedish fund managers investing only in Sweden generate a positive average annual alpha of approximately 2,83%. On the other hand, Swedish registered funds investing only abroad generate instead a negative alpha of almost the same magnitude (-3,04%). The portfolio managers investing both in Sweden and abroad (termed international) exhibits an average annual alpha in between the two extremes (-2,2%). Furthermore, the distribution of alphas for funds investing abroad is skewed into the negative numbers but the opposite is true for funds investing only on the Swedish market. This finding indicates that the results are not merely due to a couple of extremely high performing funds in Sweden. Rather it is the case that the probability is higher for a randomly chosen fund to outperform an investment in a passive world market portfolio. In the class of funds that invest internationally we find the sample's worst performer and also the best performer.

6.1.3 A closer look at the funds with significant alphas

The average alpha in the sample of funds with significant alphas is negative (-1.8 %) as indicated above. However, the median is 3% indicating that there are more positive alphas than negative alphas in this subsample but of less extreme magnitude.

As mentioned earlier, the mutual fund returns are net of all costs such as management fees and transaction costs. The average TKA (total costs charged) among the 315 equity funds is 1,84%. This implies that a negative alpha of -1,8% can be interpreted as the fund generating the same performance as the passive index but still charging the investor for it.

6.2 Model 2

6.2.1 Result overview

The second model is employed to investigate the full sample of funds that meet the requirements²⁰ to be included in our database. In total 436 funds are analysed. Out of these 436 funds, the 315 equity funds in the sample have been analysed earlier using the first model. In addition we now analyse 35 balanced funds, 55 bond funds and 31 funds classified as money market funds. The fact that we analyse the same equity funds using the two different methods enables us to compare the two estimates from the two approaches. The conclusions from this comparison will be presented below in connection to the discussion of equity funds.

Table 4. Results table Model 2 All funds.

MODEL 2: ALL FUNDS				
	ALL	ABROAD	INTERNATIONAL	SWEDEN
N	436	77	212	147
Funds with Benchm incl div	311	64	138	109
Positive alphas	135	13	71	51
significant alphas(%)	9%	0%	6%	16%
Negative alphas	301	64	141	96
significant alphas(%)	31%	8%	33%	45%
Mean annual α	-1,39%	-3,15%	-1,55%	-0,24%
Median annual α	-0,75%	-2,25%	-1,55%	-0,24%
Percentile (α)				
0%	-24,69%	-15,75%	-24,69%	-11,79%
10%	-5,49%	-12,82%	-6,03%	-3,30%
20%	-3,58%	-4,57%	-4,02%	-1,00%
30%	-2,58%	-3,47%	-3,06%	-0,71%
40%	-1,52%	-2,68%	-2,37%	-0,48%
50%	-0,75%	-2,25%	-1,55%	-0,24%
60%	-0,37%	-1,33%	-0,70%	-0,11%
70%	0,12%	-0,70%	0,44%	0,17%
80%	1,22%	-0,29%	1,26%	1,30%
90%	2,74%	1,98%	3,28%	2,44%
100%	13,83%	9,45%	13,83%	8,27%

**N is the number of corresponding funds. Second row describes the number of funds that benchmark against indexes that include dividends. Third row presents the number of funds with positive alphas in each class. The fourth row describes the proportion of funds with positive alphas that are significant. The percentiles describes the distribution of alphas.*

²⁰ Requirements discussed in section 4 "Data".

Out of 436 funds approximately three quarters of the funds benchmark against indexes that include dividends. Moreover, we find 135 funds with positive alphas and 106 funds have significant alphas. However, only 12 funds have significant positive alphas. The lionshare of significant alphas are negative (94).

The image of the aggregated fund space provided by the results from the second model is fairly similar to the one projected by the first model. The average alpha including all funds is found to be negative - 1,39% and the distribution of alphas is skewed into the negative numbers.

6.2.1.1 Money Market Funds.

Grouping the funds according to type can reveal some interesting features. In our database 31 money market funds are included. Out of these funds almost all benchmark against indexes that include dividends. The most common benchmark is the OMRX T-BILL index. All money market funds investigated invest exclusively in the Swedish market. The most striking feature of the results from this group is that 18 out of the 31 funds have significant alphas and only one fund has a positive alpha. The average alpha is -0,36%. It is interesting to note that the average management fee is 0,5% and TKA is 0,6% in this group. The expected return is self-evidently much lower in this category as compared to equity funds. As the results may suggest, it might be harder for managers of funds in this group to generate enough return to offset the costs and fees. It could therefore be important for an investor to bear in mind that the performance of funds in this class may be more sensitive to the size of the fees than in the other classes.

6.2.1.2 Bond Funds.

The bond fund group consists of 55 funds with international and Swedish investment mandates (1 fund invests exclusively abroad). In conformity of the money market class almost all funds benchmark against indexes including dividends (53). The mean annual alpha is -0,49% and the median is -0,64%. Further similarities to the above described group is a high concentration of significant alphas and very few positive alphas. Approximately half of the generated alphas are significant and only 8 fund managers were able to generate positive alphas. A comparison between funds with an international investment mandate and funds that invest only in Sweden does not reveal any striking differences. The distribution of international funds have somewhat longer tails whilst Sweden funds are more concentrated around their mean -0,45%. The average management fee 0,69% is also close to that of the money market fund group and average TKA is 0,7%. The risk and therefore expected return is

slightly higher than in the money market group. Nevertheless, fees still have a significant impact on the return to bond fund investors.

6.2.1.3 Balanced Funds.

Looking at the balanced funds in isolation reveals no intriguing results. As one could expect based on the composition of assets in their portfolios they end up somewhere in between the bond funds and the more risky equity funds. The average alpha in the class is -0,98% and the median is -0,84%. Furthermore, the number of funds in the category is rather small. All in all the subsample of balanced funds cover 35 funds. Despite the on average mediocre performance generated by these funds investors are charged a rather high TKA (1,44% on average) and the management fees are in the class 1,17%. 10 of the balanced funds generated a significant alpha with an average of -0,17%. The results indicate that an investor has to pay a high price for the asset allocation service provided by this type of funds.

6.2.1.4 Equity Funds.

Focusing on equity funds we find that the skewness is even more pronounced using the second model. The average alpha in this group is -1,7% and median 1,36%. Moreover, an interesting observation is that the perceived abnormal performance over the world index generated by Sweden funds disappear using their stated benchmarks as the market portfolio (mean annual alpha -0,14%). This may be an indication that the abnormal performance was not attributable to more skilled managers or informational advantage. Perhaps it is more likely due to higher returns (and risk) on the Swedish market vis-à-vis the World market. The number of funds that generate significant alphas increase substantially using the second approach (106 up from 49). In line with the previous finding the number of funds with significant alphas among Sweden fund decreases. However, the overall geographical pattern still remain. The average annual alpha is most negative among funds that solely invest abroad. International funds perform a little better and funds investing only in Sweden outperform the others on average. Still, as noted above we do not find evidence of abnormal performance among Sweden funds. At least not over and above the costs charged by the mutual funds. As have been discussed above an alpha close to zero indicate that the active management is able to generate a high enough return to cover the costs and fees that they charge the investor²¹.

Beside the Sweden funds, important differences between the two models are found for small cap funds. This finding may be due to the widely documented “small firm effect”. A theory that holds that

²¹ Since the returnseries are net of such costs and fees.

smaller firms outperform larger firms. Fama & French (1992) proposed that returns should be reported adjusted for size. The second model may eliminate the possible bias that the proposed market anomaly may introduce in the results from the first model by indirectly taking this size factor into account²².

Among the funds that perform relatively well against their own benchmarks, but poorly against the MSCI World Index benchmark of the first model, we find several of the funds that are using benchmarks that does not include dividends. Finally, several TIME and Internet funds underperformed the MSCI World Index. The same is also true for a number of growth funds²³.

6.3 The relationship between alphas, fees and fund size.

In the methodology section we described how we would investigate the impact of factors TNA and mutual fund fees on performance. As regards the impact of the factor management fees, the hypothesis was that management fees are positively correlated to performance. However, the results, listed in the table below, leads us to reject the hypothesis. In practice this means we cannot take a high management fee as an indication of an abnormally performing fund. This finding is also consistent with the findings of Gruber (1996). The coefficient on the variable management fee suggests that a one percent increase in the management fee transmits into a 1.49 percent decrease of the alpha. Hence, there is no evidence to suggest that an increase in the management fee will not have a direct negative impact on performance of at least the same magnitude.

Furthermore, the impact of the size of the fund on performance was evaluated. The hypothesis was that the factor TNA is correlated to performance. The results in the table below indicate that the factor size is positively correlated to performance. In practice this may imply that the economies of scale (larger investor base to split costs over. e.g. costs for management and analysis.) are larger than any potential diseconomies of scale. However, the economical significance is low because it requires a 1Bn increase in TNA to generate a 0,003 percentage point increase in the alpha.²⁴

Moreover, we note from the table of results the r-squares of the different regressions may be on the low side. In addition to regressing the estimated alphas on each factor separately we also regressed the alphas on the two factors together with no material changes to the coefficients. Finally, we test for an interaction effect by also including the crossproduct of the two factors. The p-value on the coefficient is 0.101 which makes it hard to reject the possibility of an interaction effect. The economical significance is rather important. A one unit increase in the interaction term translates into a decrease of alpha by approximately 0.17 percentage points. The evidence suggests that the size of the fund may

²² Small cap funds are benchmarking against small cap indexes.

²³ These funds were benchmarking against MSCI World Growth Index.

²⁴ A 1 Bn SEK increase is very substantial keeping in mind that the average fund size was approximately 1,5Bn SEK and the median was approximately 0,5 Bn SEK

affect the impact on performance caused by a change in the management fee. One may for instance speculate that an increase in the management fee in a small fund may be warranted to ensure sufficient analysis can be carried out. Whereas on the same note, in a large fund it may not be warranted since the cost of analysis could be assumed to reach a level where increasing costs further only negatively affects performance without improving the analysis.

Table 5. Output from regressions.

Variable	Regression 1	Regression 2	Regression 3	Regression 4
Management fee	-1.4925 (-2.24)**		-1.4482 (-2.2)**	-1.2730 (-1.66)*
TNA		0.0027 (3.07)**	0.0027 (3.07)**	0.0050 (0.95)
Cross product				-0.1731 (1.66)
R ²	0.016	0.029	0.045	0.046
N	315	315	315	315

(*)coefficient significant at the 10% level (**)significant at the 5% level. The TNA variable is scaled in billions SEK, fees and alpha are in percentage form.

6.4 Robustness test

The robustness test indicate that the positive bias may have been more important than we thought at the outset. The dummy variable is significant and shows a higher intercept than for funds in the reference group (i.e. funds that benchmark against indexes that include dividends) We cannot conclude with absolute certainty that it is only due to the difference regarding dividends but most likely that is the case. Therefore, we have reason to believe that the average underperformance found in our results would be even worse if all funds did benchmark against indexes that included dividends.

Table 6. Output from regression.

Regression	Coefficient	Standard error	t	P> t	[95% Conf. Interval]	R -square
Dummy variable	0.0263	0.0043	6.17	0.000	0.018 0.035	0.081

7 Conclusions

Throughout the thesis we have chosen to keep the focus on the investor and the ambition has been to improve the foundation upon which investment decisions are made. Specific attention has been directed to evaluating active management and the possible value added thereof.

The estimates obtained from the first model indicated that there are actively managed funds in the Swedish registered mutual fund space that have been able to generate abnormal performance in the past. However, the average fund underperformed the passive benchmark. We identified a geographical pattern in performance. In the group of funds that had significant positive alphas there was also a high concentration of funds investing only in Sweden. On the contrary, mutual funds that only invested abroad exhibited poor performance in general. It was speculated that this could be due to an informational advantage for managers acting on home turf. A drawback of using the first model is that it assumes that the mutual fund manager is able to diversify the portfolio on a global level. Since we have discussed earlier how the investment mandates differ among funds this may be an unfair assumption.

The second model dealt with this issue by measuring performance relative to the specific investment universe targeted by the mutual fund manager. In other words, it provided the opportunity for a skilled manager to show how well he/she performs in a segmented market. Moreover, the abnormal performance of Sweden funds in the first model setup was generated by underdiversification. This underdiversification, in turn, results in a higher risk level. To be fully comparable the performance measure should therefore be risk-adjusted. The second model partly takes this aspect into account by comparing the fund to a benchmark with a closer corresponding level of diversification and risk.

Among the funds that generate a significant alpha the lionshare are negative alphas. The same picture emerges when analyzing the total distribution of alphas. The average alpha was negative in the second framework. The conclusion to be drawn from this may be that the probability of a randomly chosen fund to be underperforming is higher than the probability that it will add value above cost. The majority of actively managed funds in the fundspace of Swedish registered funds have not been able to generate abnormal performance (at least not over and above the costs and fees charged to the investor). Thus, the average investor would have been better off investing in a passive portfolio.

It is, however, important to bear in mind that investing in the passive asset might not always be possible at least not without cost. This cost must therefore be carefully compared to the cost of active management and the contingent alpha.

The results do not imply that the investor should abandon actively managed funds altogether, since we find several funds that consistently outperformed the market. The problem is that we do not know to what extent there is persistence in performance. We have assumed that past returns have at least some predictive power but it cannot be taken as a guarantee for future performance. We investigated other possible signals as well, however, neither fundfees nor fundsize was a reliable signal of high performing managers. On the contrary, the evidence may suggest that the investor should instead search for funds with low fees.

8 Further research

Suggestions for further research;

- Are alphas time-varying? Investigating different time periods. As an investor it is of great interest to know if historical alphas will persist in the future.
- Extending the dataset employed to cover more recent fund introductions would increase the relevancy of the results obtained.
- Extend sample with funds registered outside Sweden, but still available to Swedish investors.
- Furthermore, it may be interesting to analyze fund performance by sector or country.

9 References

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10 APPENDIX

Table 7. Results table Model 2 Equity funds.

MODEL 2: EQUITY FUNDS				
	ALL	ABROAD	INTERNATIONAL	SWEDEN
N	315	74	168	73
Funds with Benchm incl div	211	62	113	36
Funds with positive alphas	112	13	58	41
significant alphas(%)	8,93%	0,00%	3,45%	19,51%
Funds with negative alphas	203	61	110	32
significant alphas(%)	13,58%	8,20%	27,52%	28,13%
Mean annual α	-1,70%	-3,24%	-1,70%	-0,14%
Median annual α	-1,36%	-2,36%	-1,61%	0,18%
Percentile (α)				
0%	-24,69%	-15,75%	-24,69%	-11,79%
10%	-6,56%	-13,22%	-6,35%	-4,48%
20%	-4,39%	-4,89%	-4,68%	-3,12%
30%	-3,23%	-3,50%	-3,37%	-1,55%
40%	-2,37%	-2,84%	-2,75%	-0,28%
50%	-1,36%	-2,36%	-1,61%	0,18%
60%	-0,51%	-1,52%	-0,69%	1,10%
70%	0,57%	-0,71%	0,64%	1,77%
80%	1,64%	-0,28%	1,41%	2,37%
90%	3,58%	2,03%	3,60%	3,74%
100%	13,83%	9,45%	13,83%	8,27%

*N is the number of corresponding funds. Second row describes the number of funds that benchmark against indexes that include dividends. Third row presents the number of funds with positive alphas in each class. The fourth row describes the proportion of funds with positive alphas that are significant. The percentiles describes the distribution of alphas.

Table 8. Results table Model 2 Balanced funds.

MODEL 2: BALANCED FUNDS			
	ALL	INTERNATIONAL	SWEDEN
N	35	30	5
Funds with Benchm incl div	17	13	4
Funds with positive alphas	14	10	4
significant alphas(%)	42,86%	50,00%	25,00%
Funds with negative alphas	21	20	1
significant alphas(%)	23%	25%	0%
Mean annual α	-0,94%	-1,18%	0,52%
Median annual α	-0,84%	-1,18%	0,31%
Percentile (α)			
0%	-4,75%	-4,75%	-3,58%
10%	-3,60%	-3,64%	-2,09%
20%	-3,25%	-3,25%	-0,60%
30%	-2,57%	-2,72%	0,18%
40%	-1,71%	-1,89%	0,25%
50%	-0,84%	-1,18%	0,31%
60%	-0,16%	-0,65%	0,86%
70%	0,55%	0,45%	1,41%
80%	0,91%	0,70%	2,16%
90%	1,65%	1,54%	3,09%
100%	4,02%	3,19%	4,02%

*N is the number of corresponding funds. Second row describes the number of funds that benchmark against indexes that include dividends. Third row presents the number of funds with positive alphas in each class. The fourth row describes the proportion of funds with positive alphas that are significant. The percentiles describes the distribution of alphas.

Table 9. Results table Model 2 Bond Funds.

MODEL 2: BOND FUNDS				
	ALL	INTERNATIONAL	SWEDEN	
N	55	13	41	
Funds with Benchm incl div	53	11	41	
Positive alphas	8	3	5	
significant alphas(%)	25%	0%	20%	
Negative alphas	47	10	36	
significant alphas(%)	47%	50%	50%	
Mean annual α	-0,49%	-0,56%	-0,45%	
Median annual α	-0,63%	-1,84%	-0,52%	
Percentile (α)				
0%	-2,56%	-2,56%	-1,22%	
10%	-1,94%	-2,44%	-1,09%	
20%	-1,11%	-2,19%	-0,91%	
30%	-0,91%	-2,13%	-0,77%	
40%	-0,77%	-2,02%	-0,70%	
50%	-0,63%	-1,84%	-0,52%	
60%	-0,49%	-1,29%	-0,40%	
70%	-0,29%	-0,75%	-0,24%	
80%	-0,08%	-0,10%	-0,08%	
90%	0,20%	3,07%	0,03%	
100%	6,90%	6,90%	1,33%	

**N is the number of corresponding funds. Second row describes the number of funds that benchmark against indexes that include dividends. Third row presents the number of funds with positive alphas in each class. The fourth row describes the proportion of funds with positive alphas that are significant. The percentiles describes the distribution of alphas.*

Table 10. Results table Model 2 Money Market Funds.

MODEL 2: MONEY MARKET FUNDS	
	ALL
N	31
Funds with Benchm incl div	30
Positive alphas	1
significant alphas(%)	0%
Negative alphas	30
significant alphas(%)	60%
Mean annual α	-0,36%
Median annual α	-0,30%
Percentile (α)	
0%	-1,27%
10%	-0,74%
20%	-0,59%
30%	-0,49%
40%	-0,35%
50%	-0,30%
60%	-0,22%
70%	-0,19%
80%	-0,16%
90%	-0,10%
100%	0,96%

*N is the number of corresponding funds. Second row describes the number of funds that benchmark against indexes that include dividends. Third row presents the number of funds with positive alphas in each class. The fourth row describes the proportion of funds with positive alphas that are significant. The percentiles describes the distribution of alphas.

Table 11. Descriptive statistics (difference between funds benchmarking against indexes including dividends and the funds that do not.)

ROBUSTNESS TEST			
	GROUP I	GROUP II	
N	311	124	
Percentage of all funds	71%	28%	
Positive alphas	60	75	
significant alphas(%)	5%	12%	
Negative alphas	251	49	
significant alphas(%)	35%	12%	
Mean annual α	-2,14%	0,48%	
Median annual α	-1,19%	0,64%	
Percentile (α)			
0%	-24,69%	-13,62%	
10%	-6,21%	-3,00%	
20%	-4,13%	-1,92%	
30%	-3,16%	-0,68%	
40%	-2,25%	0,08%	
50%	-1,19%	0,64%	
60%	-0,73%	1,16%	
70%	-0,37%	1,59%	
80%	-0,04%	2,67%	
90%	1,69%	4,37%	
100%	10,79%	13,83%	

Group 1=Funds that benchmark against indexes that includes dividends, Group 2=Funds that benchmark against indexes that excludes dividends