

Morten Graham Hjelman:
Mikkel Tagge Haugen:

Preliminary Master Thesis Report

Activeness and performance of Norwegian global mutual funds

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Thesis Supervisor:
Costas Xiouros

Abstract

The purpose of this research paper is to investigate the activeness of Norwegian global mutual funds by applying tracking error and R^2 . Then we will evaluate their performance in subject to their benchmark by looking at the alpha generated from CAPM, Fama & French 3- factor, Carhart 4- factor and Fama & French 5- factor models. We will also compare the results by applying other performance measures such as Sharpe ratio, Treynor ratio and Information ratio.

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Introduction

Motivation

Individual investors that do not have the time, skill or resources to generate excess return in financial markets, have the opportunity to generate economies of scale if they let professionals manage their money. When investors outsource their investing to fund managers, perhaps the biggest question they must consider is whether they ought to invest their money into passive index funds or actively managed funds.

Advocates of passive portfolio management believes that the market is efficient, meaning that a manager that continuously tries to beat the market will fail as the market already has incorporated all available information that is needed to obtain an edge. On the other side, we find advocates of active portfolio management. Being active means that they base their approach on that markets are not efficient, and believe that deviating from the passive management strategy would generate superior returns. While a passive strategy will only be able to generate the market return of the investment before costs, the active strategy must generate a higher return than the benchmark for the investor to obtain a better trade-off (Sharpe 1991). This is a result of the compensation the managers require, both for the time they use to locate winning strategies and other fees in regard to being an active fund. In many cases the trade-off between cost and return does not lean in favor of an active management style. A recent study conducted by S&P Dow Jones Indices in 2016, showed that 85 to 90 percent of all actively managed funds in the US failed to beat their benchmark index targets over one-year, five-year and ten-year periods. During the same time periods, excluding actively managed emerging market funds, this underperformance was also found to be the case for globally and internationally managed mutual funds. Their findings suggest that fees to the managers explain a significant part of their underperformance. This begs the question to why investors keep investing in actively managed mutual funds?

We see an increasing trend of investors that put more money than ever into mutual funds, with the amount invested growing continuously over the past decade. As of 2016, the total capital under management in Norway amounted to NOK 109 billion, an increase of approximately 62% since 2011 (VFF 2017). Investors that on the other hand look for alternative investment opportunities, have the option to invest in funds that primarily trade across the Norwegian borders. These funds are what is known as global funds, and provide investors with different risk profiles and investment strategies. As of 2016, the total capital under management in Norwegian global mutual funds amounted to NOK 210 billion - an amount nearly twice the size of mutual funds that solely consists of Norwegian securities (VFF 2017). This is the fund category we are going to investigate in this paper, as prior research of the performance of global funds in Norway are limited.

In recent years it has come to light that a numerous of funds that claim to be actively managed in fact only follows some benchmark indices holdings. This is what is known as “closet indexing”, and is a tool that funds use to lure money from customers as they charge high operating expenses for “actively managing” their money, when in fact they are not. This is a topic that are of current interest in Norway today as Norway's largest bank, DNB, were in late 2017 targeted by a class action on behalf of 180 000 customers, where they were accused of not actively managing their funds. DNB was not found guilty, as claims was unprecedented, and the Parliament of Norway had not introduced minimum limits to how active a fund must be in order to charge fees for active management (E24). We therefore find it interesting to investigate if closet indexing is present in Norwegian funds that invest globally.

The research question

First, we want to investigate whether Norwegian mutual funds with global investments are actively managed or not.

H0: Norwegian global mutual funds are being actively managed.

Ha: Norwegian global mutual funds are not being actively managed.

Then, we want to measure the same fund's performance and see whether they outperform their benchmark index or not.

H0: Norwegian global mutual funds are not able to outperform their benchmark index

Ha: Norwegian global mutual funds are able to outperform their benchmark index

Literature review

The question whether active portfolio managers consistently are able to outperform the benchmark has been a widely discussed topic for a long time that have generated a lot of controversy over the years. There has been conducted a lot of prior research, and the views of the results are mixed. In this section we will present prior research that are of relevance to our research question.

In his paper "*The performance of mutual funds in the period 1945 - 1964*", Michael C. Jensen (1968) introduced alpha as a measure of mutual funds' performance. 115 mutual funds were tested and he concluded that those funds on average were not able to outperform the market index. The results from his test shows that his conclusion holds both before and after management expenses.

Sharpe (1991) states that the index net of cost will always outperform an actively managed dollar. Sharpe therefore categorizes the markets as efficient, so that the passive investment strategy would include all possible investment opportunities and entails that all investors have the same objectives. On the other hand, he states that it is possible for actively managed funds to outperform the benchmark indices to some degree, but this is *only* possible if non-institutional investors are not included in the active management category and that they are foolish enough to pay the extra cost via the inferior performance for the active management.

Cumby and Glen (1990) conducted a study of mutual fund performance, with a goal to evaluate whether international mutual funds as opposed to domestic mutual funds are able to beat their benchmark indices. 15 U.S. based international funds were used in their analysis. The Morgan Stanley World Index and the Morgan Stanley U.S. Index were used as comparable benchmarks. They used alpha to measure portfolio performance over a period from 1982 to 1988. The results from their analysis showed that the international funds did not manage to outperform the World Index, but at some points during the time period the managers were able to beat the U.S. benchmark index.

Malkiel (1995) studies mutual fund returns over the period 1971 to 1991. After analyzing returns from all funds, Malkiel concluded that mutual funds tended to underperform the market, both before and after management expenses was deducted. In his study, he was able to obtain measures of survivorship bias, which he estimated to be substantial. Malkiel further suggests that studies who found active management to be superior, were likely to be influenced by survivorship bias.

Daniel, Grinblatt, Titman and Wermers (1997) conducted a study that measured whether mutual fund managers pick stocks that outperform simple mechanical rules. They included a new measure that matched the characteristics of the component shares in the funds under evaluation. Evidence from their results suggest that some mutual funds indeed are able to locate overperforming stocks, but that the outperformance is approximately equal to the management fees. They also found that more risky funds that invest in growth stocks, have the highest performance, but also the highest cost. This is consistent with Grossman and Stiglitz (1980) that said that investors with information benefits only outperforms the market enough to earn back their fees.

Gruber (1996) investigates why investors buy actively managed mutual funds, even though their performance on average have been inferior to that of index funds. He argues that future performance is in part predictable from past performance, because the price of the fund is equal to net asset value and does not reflect superior management. Gruber states that sophisticated investors seem to recognize and benefit from this, since the return from those funds are positive and above the returns from the

average passive and the average active fund. Gruber explained that these advantages arise as a result of a group of disadvantaged investors that continuously invest in funds that does not provide sufficient returns. These investors are according to Gruber either unsophisticated, institutionally disadvantaged or tax disadvantaged, that directs its money to funds based on advertising or mislead advice, predetermined destination from pension plans or tax on capital gain.

Elton, Gruber and Blake (1996) uses a survivorship bias free data sample of 188 funds to examine the predictability of mutual funds. They use a four-index model in respect to alpha to measure the performance of the funds. They find that when using risk-adjusted returns to rank their funds, that past performance is a good predictor for future risk-adjusted performance in both the short and the long run. Their findings suggest that actively managed funds are able to outperform the benchmark index in only those years that high growth stocks are high performers, i.e. that they have high predicted alpha values.

Carhart (1997) uses a dataset free of survivorship bias that includes all diversified equity funds in the period from January 1962 to December 1993 to examine the persistence in mutual fund performance. In his study he expanded the already established 3-factor model by Fama & French (1993) by adding the momentum effect of stocks as an explanatory variable by Jegadeesh and Titman (1993), an effect based on that high performers probably will be high performers in the near future. He concludes that the profit gained by following a momentum strategy will be covered by transaction costs for most mutual funds, excluding the top- decile that overperforms and the bottom- decile that underperforms. He also finds very slim evidence that funds with high 4-factor alphas have over-average high alphas and expected return in subsequent periods, so that there would exist short term persistence explained by skilled or informed mutual fund managers.

Bogle (2002) states that in most cases the benchmark index will perform better than actively managed portfolios. In his paper "*An Index Fund Fundamentalist*" from 2002, he looked at the fund performance in all the "Morningstar style boxes", a matrix that

consist of small, mid and large-capitalization on the y-axis and value, growth and blend-composition on the x-axis. Here he showed to a previous study he conducted over a 5-year period from 1992 to 1996, where he found that in terms of risk-adjusted return, index funds were superior in all except small-cap growth stocks. He then went on to conduct the same study but now for a ten-year period ending in 2001. The result was according to him not surprisingly nearly the same, whereas now not just the 8 boxes, but instead all of the nine style boxes provided superior returns in favor of index funds.

Looking at previous studies from Norway, Sørensen (2009) conducted a study on all mutual funds that have existed on the Oslo Stock Exchange between 1982 and 2008. His dataset therefore ended up being free of survivorship bias, where his result shows a statistically significant difference in active return on -3,1 % by funds that ceased to exist and those active in 2009. He finds the alpha to be indistinguishable from zero in actively managed funds. His analysis therefore comes to the conclusion that there is little to no evidence of any abnormal performance of actively managed funds in respect to benchmark returns from the Fama-French three-factor model.

In more recent years Amihud and Goyenko (2013) conducted an analysis that introduced R^2 as an alternative performance measure that does not rely on holding data. They use both the model of Fama & French (1993) and Carhart (1997) to figure out whether R^2 are able to predict alpha. They emphasize on how well R^2 are able to include several risk factors and find support for their hypothesis of that R^2 in fact is a sufficiently good predictor of performance.

Theory

Since we in this thesis are going to measure the performance of Norwegian global mutual funds and compare it to their benchmark index, we find it important to first define active and passive portfolio management. Bodie, Kane and Marcus (2014) defines passive portfolio management as buying a well-diversified portfolio to mirror a market index, without attempting to search for mispriced securities. Active management on the other hand, is defined as the attempt to improve performance either by identifying mispriced securities or by forecasting broad market trends.

Bodie, Kane and Marcus (2014) further defines an active portfolio in the context of the Treynor-Black model, as a portfolio that is formed by mixing analyzed stocks of perceived non-zero alpha values. This portfolio is ultimately mixed with the passive market-index portfolio.

When defining active and passive management styles, it *must* be according to Sharpe (1991) the case that:

- (1) before cost: “The return on the average actively managed dollar will equal the return on the average passively managed dollar and
- (2) after cost, the return on the average actively managed dollar will be less than the return on the average passively managed dollar.

For this statement by Sharpe to be true, it must be the case that markets are efficient. This leads us to the efficient market hypothesis.

The Efficient Market Hypothesis (EMH) was first introduced by Fama (1969). He defined an efficient market as a market in which prices fully reflects all available information. The EMH is normally divided into three different forms. The weak form hypothesis states that stock prices already reflect all information on market trading data such as the history of past prices and trading volume. The semi-strong form hypothesis states that stock prices reflect all publicly available information and the strong form hypothesis states that stock prices reflects all information that is relevant to the firm, even information that is available only to company insiders.

“Proponents of the efficient market hypothesis believe that active management is largely wasted effort and unlikely to justify the expenses incurred. Therefore, they advocate a passive investment strategy that makes no attempt to outsmart the market” (Bodie, Kane & Marcus, 2014).

If the efficient market hypothesis holds, investors would be unable to outperform the market through mispriced securities. It would therefore, according to EMH, be more rational to invest in low cost index fund rather than actively managed mutual funds.

Methodology

Factor Models

One-factor model (CAPM):

The Capital Asset Pricing Model (CAPM) was developed by William Sharpe (1964) and John Lindner (1956). CAPM aims to explain stock returns based on market return. The CAPM equation is defined as:

$$E(R_i) = R_f + b_i [E(R_m) - R_f]$$

Where:

$E(R_i)$ is the expected return on asset i .

R_f is the risk-free rate.

b_i is the beta of the security.

$E(R_m)$ is the expected market return.

Three-factor model (Fama and French):

The three-factor model by Fama and French (1992) aims to capture the relation between the average return, size of the company and price ratios like the book to market ratio. The reason for implementing this new three-factor model was that the CAPM model did not account for size and book to market ratio. They therefore provided an extension to CAPM to account for these anomalies. To account for the anomaly that small-cap stocks generate larger returns than CAPM predicts, Fama and French

included the small minus big (SMB) factor. The second factor they introduced was the high minus low (HML). This factor aims to account for the anomaly that firms with high book to market ratio tend to outperform firms with a low book to market ratio. Fama and French 3-factor model is derived as follows:

$$R_{it} - R_{Ft} = a_i + b_i (R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + e_{it}$$

Where:

R_{it} is the return on a portfolio or security i for period t .

R_{Ft} is the risk-free return.

R_{Mt} is the return on the value-weighted market portfolio.

SMB_t is the return on a diversified portfolio of small stocks minus the return on a diversified portfolio of big stocks.

HML_t is the difference between the returns on diversified portfolios of high and low B/M stocks.

e_{it} is a zero-mean residual.

Four-factor model (Carhart):

The four-factor model developed by Carhart is an extension of the Fama and French three factor model. The four-factor model also includes a momentum factor.

$$r_{it} = a_{iT} + b_{iT} RMRF_t + s_{iT} SMB_t + h_{iT} HML_t + p_{iT} PRIYR_t + e_{it}$$

Where:

r_{it} is the return on a portfolio in excess of the risk-free rate.

$RMRF_t$ is the excess return on a value-weighted aggregate market proxy.

$PRIYR_t$ is the return on a diversified portfolio for one-year momentum in stock returns.

Five-factor model (FF):

In 2014 Fama and French found it reasonable to expand the three factor model of Fama and French (1993), by adding two new quality factors to the equation; investment and profitability factors. These two factors aim to account for the fact that securities of firms with high operating profitability perform better, and that securities of firms with a high total asset growth tend to provide below average return.

$$R_{it} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + s_iSMB_t + h_iHML_t + r_iRMW_t + c_iCMA_t + e_{it}$$

Where:

RMW_t is the difference between the returns on diversified portfolios of stocks with robust and weak profitability.

CMA_t is the difference between the returns on diversified portfolios of low and high investments stocks.

Activeness of funds

When we are going to assess if a fund is being actively managed or not, we have to calculate to what degree the active portfolio deviates from its comparable benchmark index (Sørensen, 2009). Two of the most renowned measures for this purpose is the R^2 measure and the tracking error measure.

R² measure:

The R^2 measure that ranges from 0 to 1 calculates the percentage of variability in fund performance and explains it by benchmark performance. A mutual fund that does not deviate from the benchmark, typically an index fund, would have an R^2 close to 1. Following this analogy, an actively mutual fund would need an considerably lower R^2 to be considered to actively managed. The R^2 measure is described as follows:

$$R^2 = 1 - \frac{\text{Residual sum of Squares}}{\text{Total sum of Squares}}$$

Tracking error:

Tracing error is a measure of the volatility of the difference in return between a fund and its benchmark. It gives you an indication of how closely an fund follows the benchmark. High tracking error indicates that the portfolio deviates a lot from the benchmark, while low tracking error indicates that it follows the benchmark closely. Ideally a portfolio manager would want to have a combination of low tracking error and high excess return, since tracking error in some ways is a measure of excess risk,

but a high tracking error could also mean that the portfolio has outperformed its benchmark.

$$TE = \sqrt{\frac{\sum_{i=1}^n (R_P - R_B)^2}{N - 1}}$$

Where:

R_P is the return of manager or fund

R_B is the benchmark return

N is the number of return periods

Performance measures

Information ratio:

Information ratio is a risk-adjusted measure of performance that takes the average active return and divides it by the standard deviation of active return.

$$\text{Information Ratio} = \frac{\overline{R_P} - \overline{R_B}}{\text{Tracking Error}}$$

Jensen's Alpha:

Jensen's alpha is a measure for active fund performance. It takes the average return discounted by market returns. Alpha aims to evaluate whether the investor is rightfully compensated for taking on increased volatility risk. We will use CAPM one-factor model, Fama & French three and five-factor models, and Carhart's four-factor model to measure Alpha.

$$R_{it} - R_{Ft} = a_i + b_i (R_{Mt} - R_{Ft}) + e_{it}$$

A positive alpha indicate that the fund delivered superior risk adjusted return while a negative alpha indicate that the fund underperformed the market index.

Beta:

Beta is a measure of the sensitivity of fund performance in relation to changes in benchmark performance. Beta is measured from -1, where the fund moves in the complete opposite direction of the benchmark, to 1, in which the fund and benchmark moves simultaneously.

$$\beta_{iM} = \frac{\text{Cov}(R_i, R_M)}{\sigma^2(R_M)}$$

Sharpe Ratio:

In 1966 William F. Sharpe developed a new risk-adjusted measure of the performance of mutual funds in which he referred to as the “*reward-to-variability ratio.*” This is what is more commonly known today as the Sharpe Ratio or Sharpe Index.

$$SR_p = \frac{E[R_p] - R_f}{\sigma_p}$$

Sharpe ratio takes the average excess return and divides it by the standard deviation of excess return. A high Sharpe ratio indicates that the fund’s risk adjusted performance is high.

Treynor ratio:

The Treynor ratio was developed by Jack Lawrence Treynor in 1965, and is based on CAPM. It is a risk - adjusted measure of performance that takes the average excess return and divides it by beta.

$$\textit{Treynor Ratio} = \frac{R_i - R_f}{\beta_i}$$

By this estimation Treynor introduced the “characteristics line”, that shows the relationship between the mutual funds return and the benchmark. Treynor ratio is similar to the Sharpe Ratio, except that it uses systematic risk (Beta) as opposed to the standard deviation.

Data

To figure out what funds to include within our fund categorization of global funds, we will use Verdipapirfondenes Forening (VFF), that provides yearly reports on all mutual fund activity in Norway. As of January 2018, there exists according to VFF about 97 global mutual funds in Norway. We are going to include each one of these, excluding those that would fall into the passive management category. We have not started this classification process yet, but we are confident that this will not impose any issues. To extract the data needed for our analysis we will use Thomson Reuters Datastream available at BI Oslo. This is a platform that contains historical datasets of financial time series and cross-sectional statistics. The sample period that we are most likely going to use in this paper are monthly observations that ranges from 2008 to 2018. This time period is not final, as we are yet to decide whether we are going to account for survivorship bias in our dataset.

Since there are no investment instruments that guarantees an absolute risk free rate, we would need to establish a proxy for that purpose. As we use dollar as our base currency, we find treasury bills to be the best option. Our data is based on monthly return, so we find it applicable to use the 1-month T-bill denominated in US dollars. The most common benchmark for global funds in Norway are according to Morningstar the MSCI World NR USD. The MSCI World Index is a broad global equity benchmark that represents mid and large-cap performance across 23 developed markets countries (www.msci.com/world). By that fact, we will use that as our primary benchmark when evaluating both the activeness of the funds and its performance.

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