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Flow-Performance Relationship for Norwegian Mutual Funds

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Introduction

Our motivation for writing this paper came from findings of several studies providing evidence against actively managed mutual funds ability to outperform passive mutual funds. Since Jensen's (1968) pioneer work on risk adjusted performance of mutual funds, numerous of academics has found empirical evidence that active mutual fund performance does not persist over time. Regardless of these findings, investors are investing heavily in active mutual funds. From the data received by "Verdipapirfondenes Forening" (VFF), we find that in December 2015 more than NOK 70bn were invested in Norwegian registered active mutual funds, while only NOK 16.5bn were invested in passive mutual funds (see figure 1). If in fact active funds do not outperform passive funds; it is a puzzle why investors are willing to pay a fee for these funds.

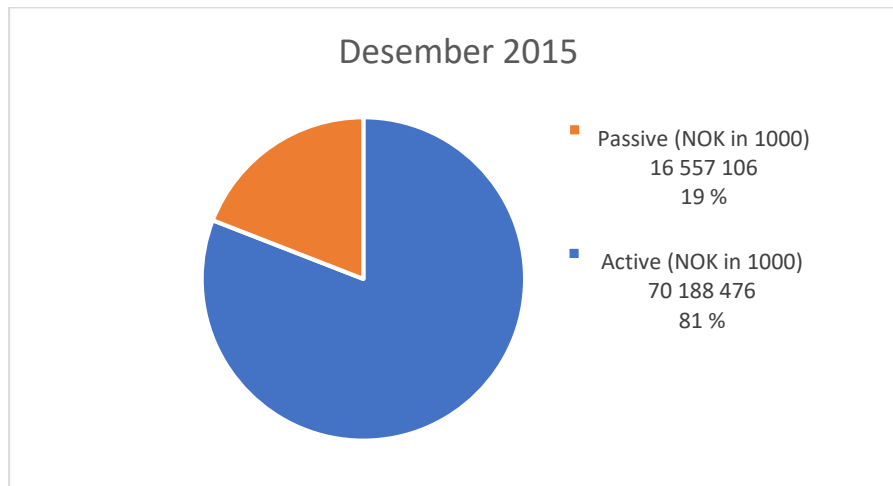


Figure 1

In our thesis, we will do a further investigation into the motivation behind the enormous amounts of money that are invested in active mutual funds. There is a large literature on this topic, but there has not been done a lot of work on Norwegian registered funds. Sørensen (2009), found no statistically significant evidence of risk-adjusted abnormal return for an equally weighted portfolio of Norwegian registered mutual funds. We will build on the work done by Sørensen (2009), but include how investors chase fund performance and discuss whether this chase for performance could be an explanation for why mutual fund performance does not seem to be persistent.

The first part of the thesis will look at how past performance affect inflow and outflow. Several papers such as Ippolito (1992) and Sirri and Tufano (1998), find a strong relationship between flows into and out of mutual funds and lagged measures of abnormal returns. Past returns should be a measure of fund quality, so we predict that we will find the same relationship for Norwegian mutual funds. However, these studies also find that investors are flocking to funds with the highest lagged returns, while tend to stay in funds that has performed poorly. This phenomenon is mostly known as the *convex flow - performance relationship* and there are conflicting arguments on whether this is an anomaly or whether it could be explained by rational behavior. It will be interesting to see whether we will find such a relation for Norwegian mutual funds as well. If we do, papers such as Lynch and Musto (2003) and Ivkovic and Weisbenner (2009) will be used to discuss possible explanations for this convex relationship.

In the second part of the thesis, we will discuss upon whether mutual fund investors' chase after performance could be an explanation for why mutual funds are unable to have persistency in abnormal returns. Berk and Green (2004) argues that there exist skilled fund managers who are able to outperform the market, but that mutual fund investors compete away abnormal returns. This is because managers' ability to outperform the market is assumed to exhibit decreasing returns to scale. Hence, mutual fund performance decrease with fund inflows. We will see whether we could find such a relationship for Norwegian mutual funds.

Research question

Primary research question

The primary research question will be whether there is a relationship between past abnormal performance and fund flows for Norwegian registered active mutual funds. This relation is predicted by financial theory and is not a surprising result. Therefore, we want to extend the research to see whether we could find the puzzling *convex flow - performance relationship*, as found by e.g. Ippolito (1992) and Sirri and Tufano (1998).

Secondary research question

The secondary research question is whether fund flows could be used as an explanatory factor for non-persistence in active mutual fund performance. Theory argues that mutual fund investors chase performance, which implies that fund managers who have performed well will receive an increased fund flow. When fund size increases, transaction costs increase and it becomes more difficult to outperform the market. As argued by Berk and Green (2004) is there a negative relation between abnormal mutual fund performance and fund inflow.

Additional questions to ask

Is there a relationship between performance and the amount of investors in a fund?

Fund managers may change their behavior when there is more or less to lose, that is; taking more or less risk when the fund size changes and/or when the number of investors changes. If this is the case, we could investigate whether there is a change in the funds volatility using index funds as a control group.

Does the effect of fund flows on performance correlate with the lifespan on funds?

If we do find a significant flow-performance relationship, we want to investigate on whether the effect is stronger or weaker in the beginning of a funds life span. To answer this question, we can both compare the significance level on the fund flow variable of funds with different lifespan lengths, and create new regressions on each or some funds by cutting data, and then compare the significance level in the first years and in the last years.

Literature Review

In our literature review, we have chosen a small selection of the research papers we believe will contribute most to our thesis, drawn from the reference list. Each review contains facts and thoughts about the authors' hypotheses and findings, and where necessary; how they can contribute to our analysis. More on the papers' contributions will be elaborated through other chapters. The focus is directed towards theory and evidence concerning active fund management and fund performance. Additionally, some of the papers have looked at the factors fund size, fund flows and asymmetry.

“Mutual Fund Performance at the Oslo Stock Exchange” by Sørensen (2008)

In the paper “Mutual Fund Performance at the Oslo Stock Exchange” by Sørensen (2009). Sørensen provide empirical evidence that there is no persistency in Norwegian mutual fund performance. We want to build our analysis on the models he has used, but add fund inflows and outflows as a possible explanation for the lack of persistency. The results indicated that the estimated alpha, that is excess returns, decreased monotonically as the model had an increased number of variables. Hence, we will use both CAPM one-factor model, Fama & French three-factor model and Carhart four-factor model.

Sørensen’s paper will also be replicated by using most of the same sample restrictions, that is, including funds with 1 year or more of activity to avoid survivorship bias on one hand, and to have at least 12 observations on the other hand. Furthermore, our analysis will replicate the unit of analysis being each fund’s return, and here also fund’s flows. The funds are also exclusively within the category “Norske fond”, which is funds only investing in Norwegian equity. One notice to differences in samples; Sørensen’s study evaluates data from 1982 to 2008, while our data is from 1999 to 2015. The reasons for this mismatch are data unavailability on fund flows up to 1999 and the desire to include recent years after 2008.

“Consumer Reaction to Measures of Poor Quality: evidence from the mutual fund industry” by Ippolito (1992)

Ippolito (1992) study a sample of 143 open-ended mutual funds from the beginning of 1965 through 1984. Using the CAPM-model for abnormal returns, he detects a clear underlying movement of investment money toward recent good performers and away from recent poor performers. In addition, he finds that top performers experience a net inflow which is asymmetric to the net outflow experienced by bottom performers.

“Costly Search and Mutual Fund Flows” by Sirri and Tufano (1998)

In this paper Sirri and Tufano look at the performance-flow relationship for 690 mutual funds from December 1971 to December 1990. They find a strong relationship between performance and flow. However, the relationship is convex.

Mutual fund consumers flock to high performing funds while failing to flee lower performing funds at the same rate.

“How Investors Interpret Past Fund Returns” by Lynch and Musto (2003)

In this paper Lynch and Musto tries to explain the puzzle behind the convex flow-performance relationship. They argue that the convexity is due to a strategy change for the worst performing funds. Funds that have performed badly will change their strategy and past performance will no longer be a good predictor for future performance. Therefore, investors will not flee from poor performers as much as past performance would indicate.

“Mutual Fund Flows and Performance in Rational Markets” by Berk & Green (2004)

In this paper Berk and Green provide a rational model that explains the non-persistency in mutual fund performance. They argue that there in fact exist skilled active fund managers who are able to outperform the market. However, they are not able to outperform the market in the long-term because rational mutual fund investors are constantly chasing performance. Mutual fund investors view past abnormal returns as indication of skills and will actively supply funds to these skilled managers. As the fund grows it become more and more difficult for the manager to sustain the abnormal return. Fund managers’ ability to outperform the market is assumed to exhibit decreasing returns to scale. The process continues until the size of fund reaches a point where the manager is no longer expected to outperform in the future, at which point the inflow of funds will ceases. For poorly performing funds there will be an outflow of funds until the point at which the underperformance ceases.

Theory

This section will briefly describe some of the most relevant and basic topics for our thesis. The first part looks at studies on the flow-performance relationship, while the second part looks at underlying theories for fund performance. The last part provides a brief description of survivorship bias.

Flow - Performance Relationship

Investors chase future performance when allocating their money into mutual funds. Since future performance is difficult to observe, financial literature usually argues that investors estimate a fund's past risk-adjusted expected return, and invest on the assumption that past risk-adjusted expected return will persist into the future. Ippolito (1992) shows to empirical evidence that there is a clear movement of investment money towards mutual funds that has experienced recent good performance and away from recent poor performance.

The same flow-performance relationship is found by several other researchers, and we expect to find the same result for Norwegian mutual funds. A more interesting result would be if we could find a similar convex flow-performance relationship as found by Ippolito (1992) and Sirri and Tufano (1998), among others. There is an ongoing conflict on whether this convexity could be considered as an anomaly or be explained by rational investor theory. If we find the same relationship for Norwegian mutual funds, then we will go deeper into plausible explanations for this puzzle.

Fund Performance

In 1968, Michael C. Jensen wanted to test whether US mutual funds could beat the market, so he performed a test on the coefficient alpha, which equaled excess return, to find out if it was significantly higher than zero, which would suggest that the funds were able to earn significantly higher returns in excess of the market return. In efficient capital markets, the capital asset pricing model (CAPM) suggest that the expected return of an asset is reflected in the covariance between the asset and the market risk premium. However, studies show that the simple one-factor model only captures a small portion of the expected return, while the rest falls into the error term. Predicting Jensen's alpha based on CAPM will therefore often wrongfully suggest that a fund have higher performance than the market. Furthermore, Fama & French introduced a three-factor model in 1993, with the additional factors SMB and HML, that is a factor for size and a factor for value. This model takes into consideration the fact that value and small-cap stocks outperform markets. Hence, when these factors are included, then the model will adjust for the tendency of outperformance. Therefore, it can be a better tool to

evaluate managers than the CAPM. However, when the three-factor model has a positive significant alpha, there could still exist errors due to omitted variables.

The Carhart four-factor model is essentially the Fama & French three factor model with an additional factor; momentum. The momentum factor captures one year momentum in the stock market, and it has been proven to have an effect on persistency of fund performance through several studies.

Overall, all four models might give a positive significant alpha, suggesting that fund managers are skilled at picking stocks such that the fund in fact beats the market – however, it might be due to luck.

After investigating how past performance affect fund flows, we want to look at how fund flows could affect future performance. The theory by Berk and Green (2004) argue that the lack of persistency could be explained by mutual fund investors competition for mutual fund performance. Investors will compete away abnormal returns, since fund managers are experiencing diminishing returns to scale. Berk and Green (2004) provide a theoretical model explaining this phenomenon, but they do not test it empirically. Hence, if we find the results to be insufficient, a theoretical discussion on the topic will be provided.

Survivorship bias

Survivorship bias occurs when funds that fails quickly are excluded from the data because it will cause the overall interpretation to be more positive as only the surviving funds are included. That is, overestimation due to exclusion of bad performers. The bias diminish when all funds are taken into account, however, it is important to have enough observations. Through the entire thesis, we must consider the survivorship bias so we do not draw the wrong conclusions.

Methodology

This section intends to give a brief introduction into the empirical approach in our thesis. The research by Sørensen (2009) and Sirri & Tufano (1998) will serve as a point of departure in the remaining parts of this chapter. We will perform cross-sectional analysis using both one-factor and multifactor models to estimate performance and asymmetry.

Estimating performance

Sørensen (2009) used three models estimating fund performance on Norwegian Mutual Funds. The models were based on CAPM one factor model, Fama & French three factor model and Carhart four factor model. Hence, the preliminary models are as follows;

CAPM one factor model

$$R_{i,t}^e = \alpha_i + \beta_i R_{m,t}^e + \varepsilon_{i,t}$$

Fama & French three factor model

$$R_{i,t}^e = \alpha_i + \beta_i R_{m,t}^e + \beta_{i,SMB} SMB_t + \beta_{i,HML} HML_t + \varepsilon_{i,t}$$

Carhart four factor model

$$R_{i,t}^e = \alpha_i + \beta_i R_{m,t}^e + \beta_{i,SMB} SMB_t + \beta_{i,HML} HML_t + \beta_{i,PR1YR} PR1YR_t + \varepsilon_{i,t}$$

Where $R_{i,t}^e = (R_{i,t} - r_{f,t})$, α_i is the estimated abnormal return, $R_{m,t}^e = (R_{i,t} - r_{f,t})$, that is the market risk premium. The size factor SMB_t , the value factor HML_t and the momentum factor $PR1YR_t$ are return factors, and in our case on the Norwegian equity market.

To estimate if there exist and effect of fund flow on performance, we will add a new factor. That is, fund flow, to both models above. This factor will exhibit the net value of subscriptions – redemptions in period t and/or in period t-1.

Estimating asymmetry

Sirri and Tufano used the following model for estimating net flow as net growth;

$$Flow_{i,t} = \frac{Total\ assets_{i,t} - Total\ assets_{i,t-1} \times (1 + R_{i,t})}{Total\ assets_{i,t-1}}$$

It will not be necessary to compute the variable above the fraction bar as it is included in the data set provided by VFF. However, the variable must be scaled down by $Total\ assets_{i,t-1}$. Furthermore, we want to replicate the creation of the following figure;

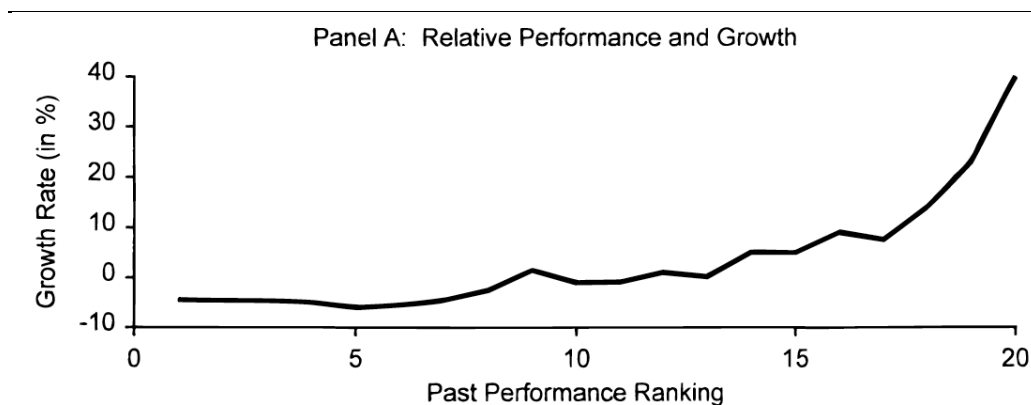


Figure 2: (Sirri & Tufano, 1998)

The figure above ranks funds into one of 20 equal bins according to their past performance. Hence, for the estimation of asymmetry, we will compute the growth rate and rank the funds by performance, to find whether the asymmetric relationship that Sirri and Tufano suggest exist in the Norwegian Mutual Fund market as well.

Tools

All raw data has been received in excel files, but have been sorted into one fund per sheet including returns. Further we expect to use Eviews, Stata or Python when modelling, estimating and performing the empirical analysis.

Background and Data

Fund Flow

Data on fund flows were sent to us by VFF, containing monthly data on all Norwegian Equity Funds with specifications on subscriptions and redemptions during each period. The data goes back to January 1998, however, separation of funds in the data set happened first in June 1999. Hence, we will use monthly data from June 1999 to December 2015.

All fund flow data from VFF is sorted into one excel workbook for each fund manager, and further split into one fund per sheet, in order to get a good overview and to prepare it for modelling.

We define applicable funds as those being free of survivorship bias, that is; existing equal to or more than one year with at least 12 observations. All funds with a lifespan less than one year have therefore been omitted from the data set.

The table below summarizes the total number of Norwegian Mutual Funds, their Total assets and the total number of investors in June 1999 and December 2015. It is interesting to see that the portions of active and passive funds have changed, whereas it seems as if investors are shifting towards passive funds rather than the active which claims to achieve higher returns.

	December 2015	Change	June 1999
Norwegian mutual funds	78	15 %	68
Active	66	10 %	60
Active %	85 %	-4 %	88 %
Passive	12	50 %	8
Passive %	15 %	31 %	12 %
Total assets (NOK in 1000)	86 745 582	185 %	30 414 168
Active (NOK in 1000)	70 188 476	137 %	29 641 174
Active %	81 %	-17 %	97 %
Passive (NOK in 1000)	16 557 106	2042 %	772 994
Passive %	19 %	651 %	3 %
Total subscribers/investors	302 369	-66 %	885 483
Active	289 743	-67 %	877 328
Active %	96 %	-3 %	99 %
Passive	12 626	55 %	8 155
Passive %	4 %	353 %	1 %

Data groups

The data has been sorted into the following categories:

1. All applicable data
2. Funds existing from one to five years
3. Funds existing more than five years (*Survivorship bias may be an issue*)
4. Funds existing more than fifteen years (*Survivorship bias may be an issue*)
5. Index funds

Category 1 includes as stated above funds existing more or equal to one year. This data will be the base set for our research. Next, in Category 2 we have excluded all funds existing more than five years, as we want to investigate whether fund flows have had an impact on the short lifetime of the funds. Further, Category 3 excludes funds with a lifetime less than five years. It could be interesting to compare fund flows and performance the first five years of such funds and compare it to the findings on Category 2. Category 4 will only include funds with lifespans from fifteen years and up, to explore if there exist any evidence on fund flows affecting the survivability of these funds. At last, the Norwegian Index funds may be applied as a control group, searching for evidence that the portfolio compositions change with respect to risk taking by fund managers of funds with increasing capital and investors.

Fund names

The data provided from VFF were created at t+1 for each period. This have raised a problem regarding name changes on the funds, as the excel files do neither specify which funds have changed name, and only occasionally what the name of the funds were at t-1. It has therefore been necessary to manipulate the data set, such that each fund has the same name from start to end, where the last name is given. The same goes for the fund managers, as many Norwegian funds have changed ownership during their life span.

If it becomes relevant as the thesis develop, it could be interesting to investigate whether changing names is a method that the mutual fund manager use to attract new investors, or if it only has a random effect on performance.

Fund Performance

There are several factors necessary to compute fund performance when using the models explained in the methodology chapter, that is;

1. Fund return
2. Risk free rate
3. Market return
4. Norwegian factor returns

Fund returns (1), on each fund, are computed using data provided by VFF and the following rewritten formula given by Sirri and Tufano (1998):

$$R_{i,t} = \frac{(TNA_{i,t} - Flow_{i,t})}{TNA_{i,t-1}} - 1$$

Where $TNA_{i,t}$ is total assets in period t for fund i, TNA_{t-1} is total assets in the previous period for fund i, and $Flow_{i,t}$ is the net inflow of capital by investors in period t for fund i.

The risk-free rate (2) and market return (3) will be retrieved from Datastream. The risk-free rate is not yet defined for our data set; however, we expect it to be a government bond rate with approximately equal maturity time as the lifespan of the funds. The market return, that is; the benchmark, is to be announced but is expected to be of significant relevance for Norwegian Mutual Funds. One could argue that each fund should have individual benchmarks, as Bloomberg do, however, we want to be able to compare the results across funds.

Norwegian Factor returns (4) are the size factor; SMB, HML and momentum factor; PR1YR. All Norwegian factors are to be retrieved from Bernt Arne Ødegaard's home page.

Time Schedule

When	What
January 16th	Hand in the Preliminary Thesis Report
February	Modelling and building theoretical framework <i>Apply empirical methodology</i>
March	Results <i>Discuss; criticize and emphasize</i>
April	Finish quantitative analysis Short break
May	Qualitative analysis
June	Finish qualitative analysis <i>Go through applied material and quality assurance.</i>
June 30th	Hand in the Master Thesis <i>Goal</i>

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Note; we have included several other references than those mentioned in the preliminary report as they may become highly relevant in the future.