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Norwegian Mutual Fund Market: Impact and Causes

Navn: Mikkel Solbakken, Ole Martin Larsen

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INTRODUCTION

Mutual Funds are managed in two different ways – active or passive. Investors in passive funds get the value-weighted return on the market portfolio. Active funds strive to achieve excess return than that of the market portfolio. Hence, the return of an actively managed portfolio must be higher than the market portfolio before cost for the investor to break even. In addition, the presence of survivorship bias tends to overestimate the performance of funds since poor performing funds are more likely to be closed and merged with better performing funds. The closed funds increase the value of the merged fund and consequently appear better than it is.

This phenomenon is what is called survivorship bias and it can be defined as the performance difference between a biased and an unbiased portfolio of funds. It is important to consider survivorship bias in studies on mutual fund performance in order to avoid biased results in empirical analysis of the fund performance in particular, and also enable investors to make informed decisions regarding their investment strategy. In general, survivorship bias overestimates the performance of funds, as most commercial datasets only include the surviving funds, thus affecting almost every study of mutual fund performance.

Extensive studies have been carried out on the topic of survivorship bias internationally, but very little research has been conducted on the Norwegian market. It is proved that survivorship bias has a significant effect on measures of fund performance. We wish to extend this research to measure the significance and the drivers of survivorship bias in the Norwegian Mutual fund market.

RESEARCH QUESTION

Primary research question

The primary objective of the thesis is to provide a measure of survivorship bias in the Norwegian mutual fund market. We know that survivorship bias is present in the available data since closed funds are ignored and we know it makes the surviving funds appear to perform better than they do in reality. However, the magnitude of the survivorship bias has not yet been systematically examined in the Norwegian market, thus the actual effect on fund performance remain unknown. Our primary research question is:

What is the magnitude/significance/impact/amount of survivorship bias present in the dataset on Norwegian Mutual Fund market?

Secondary research question

International research suggests that funds that has performed poorly are more likely to be closed. Thus, poorly performing funds can be said to be the main cause of survivorship bias. Further, fund size has been shown to have a significant impact on decisions regarding closing of funds. We will investigate whether these tendencies are present in the Norwegian market as well. Thus, our secondary research question is:

Is there a connection between why funds close and the performance/size of these funds prior to the closing?

It is important what causes and the impact of survivorship bias in order for investors to make informed decisions regarding their investment strategy and will be increasingly important in the future. Rohleder, Scholz, Wilkens (2007) addresses similar topics in the US mutual fund market (further description under literature review).

THEORY

Capital Asset Pricing Model

The Capital Asset Pricing model was developed by Sharpe (1964), Lintner (1965) and Mossin (1966). The model is widely used for measuring the relationship between risk (systematic) and expected return for an asset.

$$R_i = R_f + \beta_i(R_m - R_f)$$

Where R_f is the risk free rate, β_i is the risk factor of the asset and the last part represents the risk premium. The main idea is that investors need to be rewarded for taking higher risk and for the time value of money.

Since the development of the CAPM, academics have discovered various empirical regularities in stock returns, such as firm size, book value relative to market value (B/M) and momentum. Since such regularities were incompatible with the CAPM these factors were termed as “anomalies”. These anomalies have been proved to have explanatory power for an asset’s return, and has shown remarkable persistence across markets and over time. Næs, Skjeltorp and Ødegaard (2009) find proof that these anomalies can explain stock returns in the Norwegian market as well.

Fama-French three-factor model

In an attempt to improve the accuracy of the CAPM, Eugene Fama and French found in their article Fama & French (1993) that a multi-factor model including anomalies had better explanatory power than the CAPM alone. The new model consisted of two more factors, namely the Small-minus-big (SMB) and High-minus-low (HML) in addition to market risk. SMB is the performance of small companies versus big companies and that investments in small companies on average have had a return premium relative to investments in big companies. HML is the performance of firms with high book to market ratio versus firms with low book to market ratio and studies have found that companies with the

highest book-to-market ratio have systematically higher risk-adjusted returns than those with the lowest book-to-market ratio.

$$R_i = R_f + \beta_1(R_m - R_f) + \beta_2(SML) + \beta_3(HML)$$

Carhart four-factor model in Mutual funds

In addition to the two factors Fama and French added in 1993, Mark M. Carhart added the momentum factor to the Fama-French multifactor model in 1997. A momentum investment strategy means that investors buy the stocks that have generated high returns over the last period and selling companies that have had low returns over the same period. The momentum factor is the average asset returns on the assets that have performed well in the relevant period

$$R_i = R_f + \beta_1(R_m - R_f) + \beta_2(SML) + \beta_3(HML) + \beta_4(MOM)$$

METHODOLOGY

Construction of dataset

In our paper we will need to gather the Net Asset Value (NAV) of the all Norwegian equity mutual funds with 80% or more invested in the Norwegian market traded on the Oslo Stock Exchange during the period 1997-2017. In addition, we would need a benchmark for comparison of data and the OSEFX for the same period should provide a comparable benchmark.

In order to provide a measurable impact of survivorship bias, we will compare a biased and an unbiased dataset consisting of historical performance results from Norwegian mutual funds over the last 20-year period (1997-2017). We chose to limit the time period to 20 years as the OSEFX was established in 1996. The biased dataset consists of all the funds that were operational on December 31st 2017. To our knowledge, it does not exist a survivorship bias free dataset on the Norwegian mutual fund market for the relevant period, thus the creation of the

unbiased dataset will be part of the contribution in this thesis. However, we have contacted VFF (The Norwegian Fund and Asset Management Association) and Lars Sørensen, the author of *Mutual Fund Performance on Oslo Stock Exchange*, who created a survivorship bias free dataset some years ago.

To create the biasfree dataset, we first need to identify all the funds that have been closed or merged with other funds throughout our sample period. According to Oslo Stock Exchange's web page, Oslo Børs Information (OBI) and the Norwegian Fund and Asset Management Association there are 79 operational Norwegian equity funds at OSEFX today. From Oslo Børs Information we got fund returns on every fund traded on Oslo Stock Exchange in the period 1982-2015. Through Oslo Børs' web page we can obtain the ISIN-numbers of every operational Norwegian fund which we can use to obtain necessary data from Bloomberg/Eikon. So far, we have identified 21 funds that have been closed or merged with other funds from 2000-2017 and found 39 inactive Norwegian funds in total on Bloomberg. We will use this information to extract the identity of the remaining funds closed in the period 1997-2000, if any. Below we have included a list of the closed funds we have identified so far.

Tabell 1: Dagens Næringsliv article (Eriksen & Linderud)

Non-surviving funds

Name

Globus Norge II

Globus Norge

Globus Aktiv

Pareto Equity Edge A

RF Plussfond

Nordea SMB

DNB NOR Fund Equity Norway

First Norway Delta KI.IV (LAMP)

Nordea Vekst

DNB Norge (Avanse II)

DNB Norge (Avanse I)
Terra Norge
Delphi Vekst
NB Askjefond
Eika SMB
RF Aksjefond Acc
Alfred Berg Norge Etisk
Odin Norge II
DNB Norge (I)
Landkreditt Norge
Alfred Berg Aktiv II
Alfred Berg Norge +

After we have identified the closed funds we need to investigate what happened to them and where the assets in the particular funds ended up. Did they merge with another fund? If so, we need to reverse the process by subtract the NAV of the closed fund from the merged fund and calculate the returns of the two funds separately. By doing that, we will end up with a dataset free of survivorship bias. As the funds NAV increases as a consequence of a merger, more investors will choose to invest in these funds. While we are able to split up the merged funds, we cannot adjust for the value added from the increased attractiveness of the funds caused by the mergers and the additional value will remain in the new fund.

[Analysis of data](#)

The OSE operates with four different classifications of mutual funds according to their respective investment universe. In this study, we will limit the dataset to only include the Norwegian equity funds as the purpose of the study is to investigate the impact of survivorship bias strictly in the Norwegian mutual fund market.

Further, we define surviving funds as funds that have been operational for at least 1 year and therefore include all funds with return histories of 1 year or

more. We will use monthly statistics (NAV and returns). Funds that does not meet these criteria will be excluded from the dataset. By including funds that have relatively short return histories (minimum 1 year), we run the risk of getting imprecise regression estimates. On the other hand, excluding these funds will cause survivorship bias to remain in the dataset and we face a trade-off between long return histories and mitigating survivorship bias. As the main purpose of this study is to measure the impact of survivorship bias it makes sense to include short-lived funds in order to gain an accurate and survivorship bias free dataset as long as they fulfill the 1-month return history criterion.

We will use Net Asset Value (NAV) to compute the return of the funds, both before and after separating the merged funds. The net asset value is net of costs (trading and management costs), but gross of tax.

$$\text{Return (1 month)} = \frac{NAV(t_1)}{NAV(t_0)} \left(1 + \frac{D(t_d)}{NAV(t_d - 1) - D(t_d)} \right) - 1$$

For periods when there are no dividend payments the following formula is used to calculate the monthly return.

$$\text{Return (1 month)} = \frac{NAV(t_1)}{NAV(t_0)} - 1$$

We assume dividends payments are reinvested in the funds. This method of calculating returns corresponds to the way Oslo Stock Exchange calculate returns and its assumed that payments are reinvested in the fund. This formula will account for the change in Net Asset Value (price of the fund) that occur when funds merge and we will get an accurate return for each fund. To find a comparable measure we will find alpha in the following models, both in the unbiased and biased dataset and compare the difference. We will use (1) mean excess return, (2) Jensen's 1 factor model (CAPM), (3) Fama French 3-factor model, and (4) Carhart's 4-factor model to measure the alpha.

$$(1) R_{it} = r_i - r_f$$

$$(2) R_{it} = \alpha + \beta_i(R_m - R_f) + \varepsilon$$

$$(3) R_{it} = \alpha + \beta_1(R_m - R_f) + \beta_2(SMB) + \beta_3(HML) + \varepsilon$$

$$(4) R_{it} = \alpha + \beta_1(R_m - R_f) + \beta_2(SMB) + \beta_3(HML) + \beta_4(MOM) + \varepsilon$$

Where R_{it} is the excess return of the fund i in month t (the fund return minus the risk free rate); R_m is the excess return on the Oslo Stock Exchange in month t ; SMB is the excess return on small stocks in month t , measured by the return on an equally weighted average of the smallest firms at OSEX; HML is the excess return on high book-to-market assets; MOM is the excess return of the momentum funds.

When we calculate the alpha for Fama French 3-factor and Carhart 4-factor model we need to sort the funds into the factors; SMB (small-minus-big), HML (high-minus-low) and MOM (Momentum) for Carhart's 4-factor model. To investigate the effect from the SMB and HML factors we will follow the same approach as Næs, Skjeltorp & Ødegaard (2009) who sort companies in portfolios based on the size of the companies. The same method is used for constructing the HML factor, whereas companies are sorted in portfolios based on whether their book value relative to the market value is high or low. By averaging the period differential return between a portfolio of the smallest companies and the largest companies and the period differential return between a portfolio of high book-to-market values and a low book-to-market portfolio, we will obtain our factor values. Similarly, the momentum factor can be calculated by subtracting the equal weighted average of the lowest performing firms from the equal weighed average of the highest performing firms (Carhart, 1997). By sorting the funds the same way, we should be able to construct our multi-factor models.

We will also look at the characteristics of the funds that do not survive up until they are closed. To determine what caused a fund to close down or merge we have to compare it to a benchmark, hereby OSEFX which consist of surviving funds only. We suspect funds are more likely to merge or to be liquidated if their performance is lower than their respective benchmark over a period of time. In

addition, we will test whether the size of the funds have an impact on the funds faith. Previous research from the US mutual fund market has found evidence that fund size has a significant effect on decisions regarding the closing and merger of funds, particularly that small funds (low NAV) are more likely to be closed or merged. We will test if this this is the case in the Norwegian fund market as well. By measuring the alpha of the non-surviving funds, we can test the performance of the closed funds prior to the closing versus the index for the period up until they ceased to exist. Thereafter, investigate whether the size of the fund is a significant factor for the survival of funds.

LITERATURE REVIEW

The topic of survivorship bias has been a hot research topic internationally for a while and there exist a lot of research papers addressing the importance of accounting for survivorship bias. Most research addresses the topic as a sub-category, usually related to research on active vs passive fund management, however, some articles mentioned below addresses survivorship bias specifically. Research shows that there are several approaches to address issues regarding survivorship bias and various ways to carry out the research.

[Survivorship Bias and Mutual Fund Performance: Relevance, Significance, and Methodical Differences by Rohleder, Scholz & Wilkens.](#)

Rohleder, Scholz, Wilkens (2010) investigates the relevance and significance of survivorship bias and methodical differences regarding the estimation of this bias. They find that regardless of the methods applied there exists significant survivorship bias in form of the performance difference of an unbiased and a biased portfolio. Another important finding in their research is that different definitions of surviving funds (full-data or end-of-sample) provide significantly different estimates of survivorship bias. They also look into two different weighting schemes (equally weighted and value weighted) for aggregating fund performance and their result show that the estimates are significantly different in the two approaches. They also conclude that size is an important driver for

survivorship bias, as the small funds are more likely to get closed than bigger funds.

[Survivor Bias and Mutual Fund Performance by Elton, Gruber & Blake.](#)

Elton, Gruber, Blake (1996) has carried out similar research. They examined the frequency of mutual fund disappearance and the impact of this on investor return as well as the characteristics of funds that merge and their partner funds. They found that the impact of size on performance in their biased portfolio is more or less non-existent, while the unbiased portfolio clearly shows that large funds tend to outperform small funds. They also conclude that large funds are more likely to survive than small funds.

[Mutual Fund Performance at the Oslo Stock Exchange by Sørensen.](#)

Sørensen (2009) measured the performance of mutual funds on Oslo Stock Exchange using a dataset free of survivorship bias. His work is, as far as we know, the only research conducted on the topic of survivorship bias in Norway. His findings are consistent with international research and he concludes that survivorship bias have a significant effect on fund performance in Norway as well.

[What factors affect the Oslo Stock Exchange? by Næs, Skjeltorp & Ødegaard.](#)

The participants in the Norwegian financial markets have assumed that classical financial theory conducted internationally holds for the Norwegian market. Næs, Skjeltorp, Ødegaard (2009) investigates if the factors affecting stock prices at Oslo Stock Exchange can be explained by classical financial theory and to what extent results found in other countries applies to the Norwegian stock market. They find that all the most common factors included in Carhart's 4-factor model, as well as a liquidity factor, have reasonably good explanatory power regarding stock returns on OSE.

There are many more relevant articles that have researched this topic, some of which are mentioned in the reference list. However, in general, they provide more of the same information and we therefore choose not to elaborate on these articles.

TIME SCHEDULE

Month	Agenda
January	Gather data, i.e. collect NAV on all funds from 1997-2017, investigate where closed funds ended up
February	Ready and prepare dataset for empirical analysis.
March	Analysis of the data
April	Interpret results and compose results
May	Compose thesis
June	Proofreading and finishing touches of the dissertation

LITERATURE

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