

BI Norwegian Business School – Thesis*

Market Timing Ability of Norwegian Mutual Fund Investors†

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Abstract

In this paper, we measure the timing ability of Norwegian mutual fund investors using a “performance gap”. We find evidence that equity fund investors between 1996-2007 reduced their returns by 1.32% annually due to investor timing decisions. Investors in actively managed funds displayed the poorest performance, while investors in index funds actually showed the ability to time the market. Moreover, we find a robust relationship between investor underperformance and the size of the fund. Our results also provide evidence that investors who use monthly fund schemes or passively invest in mutual funds, enjoy an annual performance boost, while investors who actively buy and sell funds exhibit an annual penalty. Finally, we also find results indicating that foreign investors show both higher timing ability and a higher likelihood of picking superior funds than Norwegian investors.

Keywords: Mutual fund, cash flows, investor timing ability, performance gap, activity level, Oslo Stock Exchange, VPS

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1 Introduction

MUTUAL FUNDS are the preferred means of stock investment for individual investors in Norway. Almost 40 percent of Norwegian households own mutual funds directly, with an aggregated investment of NOK 160 billions. The popularity of mutual funds stems from easy access to diversification at a relatively low cost. Historically, mutual funds have given a much higher annual return than bank deposits. Financial experts agree that the optimal way of investing in mutual funds is to have a long-term perspective on the investment, and to move in and out of the fund slowly. However, many mutual fund investors disregard this advice, and invest all of their capital at once, and then transfer their capital in and out of the fund based on their own short-term expectations about where the stock market is heading. The way investors channel capital in and out of funds in an attempt to outperform the funds significantly affects the returns they achieve over the investment horizon.

In this paper, we investigate the market timing ability of mutual fund investors and the consequences of their trading. To do so, we analyse a unique data set consisting of monthly holdings of investors who have invested in Norwegian equity mutual funds. We use a “performance gap” to investigate the difference between the actual investor return, and the return on the fund they invested in. Then we can tell whether the timing ability of different investor groups contributes to or inhibits the process of creating excess return.

Investigating investor return is an interesting subject as there are substantial payoff potentials by gaining an increased understanding of investor behaviour and the consequences of it. Our results illustrate the profitability of actively buying and selling funds according to investors’ own short-term views about the stock market. Hence, we are able to recommend how mutual fund investors should behave to maximize returns. Gaining more knowledge about investor behaviour, for example investor sentiment, may contribute to improved financial theories and models. We believe that investor sentiment may be one of the biggest driving forces behind mutual fund cash flows, and thus an important explanation for investors’ market timing performance.

Our investigation is inspired by the work of Nesbitt (1995). He was the first to examine investor timing ability using the “performance gap”, defined as the fund’s past performance minus the investor’s actual historical return. This measure will show whether investors enhance their returns by the use of cash flow timing, or if they would be better off following a simple buy-and-hold

strategy. A more thorough examination by Friesen and Sapp (2007) has also been a great inspiration for us. We believe that the “performance gap” is a good measure of investors’ timing ability, as it captures the outcomes of the strategic asset allocation decisions of a large portion of individual investors.

Our study contributes to the current timing ability research in several different ways. First, we test market timing ability on a new market as previous studies are conducted in the U.S. or other major European stock exchanges. Secondly, we use monthly holdings on individual investor level for the population, which is unique. Thirdly, we shed light on the timing ability of six different investor types to see which of them are most likely to exhibit poor timing. The six types are individuals, government institutions, financial corporations, non-financial corporations, foreign individuals and foreign mixed investors. Lastly, we separate Norwegian and foreign individuals into subgroups according to their trading activity level to see how this affects their returns. Our data set is unique in the way that we have successfully identified and tagged automatic fund schemes from 60 million transactions.

Our main finding is that investors, during 1996-2007, underperform the funds they invested in by a statistically significant 0.11% per month (1.32% annually). Investors in actively managed funds show even poorer results, while index fund investors actually exhibit the ability to time the market. Investors in the smallest quintile of funds achieve the same return as the fund, while investors in the largest quintile of funds experience an annual penalty of around 2% per year. Norwegian individuals, financial corporations and government institutions experience an annual penalty of about 1%, while the penalty is close to 2.5% for non-financial corporations. Foreign investors show evidence of both having higher ability to time the stock market and pick superior funds.

We also find a strong correlation between number of fund-share changes an investor executes per year and the degree of underperformance. The active investors, exhibits annually about 4% poorer investment return than the passive investors. Overall, our results suggest that the average fund investor should follow a passive investment strategy, to stay clear of timing underperformance and increase the likelihood of maximizing future return.

The rest of the paper is structured in the following way. Section 2 contains a review of the relevant literature. Section 3 describes the data. Section 4 explains the methodology. Section 5 presents and discusses the empirical results. The 6th and final section gives our concluding remarks.

2 Literature review

2.1 FUND FLOWS AND INVESTOR TIMING ABILITY

Most research papers on market timing have concentrated on mutual fund managers' ability to time the market, i.e. the ability to transfer money in to (out of) the equity market before positive (negative) shocks to the market³. However, more recent papers have shifted the focus over to the study of investors' ability to time the market. Nesbitt (1995) was the first to thoroughly examine the timing ability of mutual fund investors by comparing the investors' performance, measured as dollar-weighted return, and the fund's manager's performance, measured as time-weighted return. He uses a U.S. dataset with monthly fund flows from 1983 to 1994, and finds investor underperformance in all his 17 subcategories of funds. The annual "performance gap" for an average investor is 1.08% due to poor market timing. Nesbitt concludes that the average investor is a "bad" market timer. He further suggests that investors act against conventional wisdom, to buy on weakness and sell on strength. He also finds that inflows to mutual funds are strongest following favourable returns, and outflows are largest after negative returns.

Friesen and Sapp (2007) follow in the footsteps of Nesbitt (1995) in their investigation of the returns of mutual fund investors in the U.S. in the period 1991-2004. They find evidence that the returns of mutual fund shareholders on average significantly lag behind the performance of the funds in which they invest. The paper concludes that poor timing ability reduces the investor's average returns by 1.56% annually. Their paper reports that underperformance varies based on a variety of factors, including: high expenses, large size, high portfolio turnover, and active management. Dichev (2007) also uses dollar-weighted returns to examine investors' actual stock returns. He documents that the stock returns of investors are systematically lower than buy-and-hold returns around the world. Underperformance is estimated to be 1.3% for NYSE/AMEX stocks from 1926 to 2002, 5.3% for NASDAQ stocks from 1973 to 2002, and an average of 1.5% for 19 major international stock exchanges from 1973 to 2004. The "bad" performance of mutual funds investors are called the "the dumb money effect" by Frazzini and Lamont (2006). Their focus is not to measure the timing ability of investors, but they find evidence that investors

³ Research papers on mutual fund managers' timing ability include Bollen and Busse (2001), Dellva (2001), Volkman (1999), Daniel et al. (1997), Lee and Rahman (1990) and Henrikson (1984).

lower their wealth in the long run by allocating their capital across different mutual funds.

Another method of examining investors' timing ability is to study the relationship between fund flows and market returns in subsequent periods. Braverman et al. (2005) does this in their study of U.S. returns between 1984–2003, and find a negative relationship, suggesting that mutual fund investors, as a group, realize a lower return than the return on a buy-and-hold position. They suggest that the “bad” performance could either be explained by “behavioural explanations” like investor sentiment, or by “rational market explanations” such as time-varying premiums. In contrast, the papers of Warther (1995), Edwards and Zhang (1998) and Fant (1999) find no relationship between mutual fund flows and subsequent returns. Edelen and Warner (2001) find a weak positive relationship between mutual fund flows and returns when they examine daily fund flows. All of these papers conclude that there is no evidence that investors underperform when they try to time the market. Variation in their results may be explained by differences in sample periods or lengths, and the use of slightly different methodologies.

Two of the authors of the Braverman et al. (2005) article recently presented a paper that studies timing ability and investor sentiment⁴ (Ben-Rephael et al., 2010). Using a U.S. dataset between 1984–2008 they create a sentiment proxy from the movement of cash flows between “risky” equity funds and “safe” bond funds. They subsequently examine the correlation between this sentiment proxy and the subsequent excess market return. Their findings show a negative relationship, indicating that when investors increase (decrease) their holdings in equity funds, the subsequent market return is expected to decrease (increase). The results show that investors who attempt to time the market will, on average, underperform compared to a simple buy-and-hold strategy. Their findings are consistent with earlier empirical evidence, which predicts that optimistic (pessimistic) sentiment implies lower (higher) subsequent market returns. Hence, investors who act on investor sentiment in the market may exhibit poor timing ability.

Our paper also examines the established research field of individuals vs. institutions. This theory posits that institutional investors are informed and make money, while individual investors lose money. Barber et al. (2006) test the

⁴ Sentiment is defined as a measurement of the overall mood of investors in the market; bullish, bearish or neutral.

timing performance of these two investor groups. Their results indicate that individual investors suffers an annual performance penalty of 3.8%, while institutions enjoy an annual performance boost of 1.5%. However, San (2006) shows that individuals actually gain more than institutions, and explains this by suggesting that institution hold winners too long and mistime the momentum cycles. The conflicting results may be explained by the fact that institutional trading data is not publicly available; hence the choice of methodology will significantly impact the results.

The relationship between trading activity and performance is also a relevant area to highlight. Odean (1999) investigates whether investors trade too much. Statistics show that the average annual turnover rate on the New York Stock Exchange (NYSE) was greater than 75%, which seems very high. Nowadays it is even higher. The paper concludes that investors, on average, reduce their returns due to excessive trading, explaining that this is likely to be due to overconfidence among investors. In a subsequent paper, Barber and Odean (2000) examine investor returns according to their trading activity level, between 1991 and 1996. Their results show that households underperform the market annually by 1.5%, while active investors underperform by 6,5% annually.

2.2 RETURN-CHASING AND OTHER ANOMALIES

Prior research papers have investigated the underlying causes behind the average underperformance of investors. Ippolito (1992) finds investor underperformance in his paper, explained it as return-chasing behaviour. This return-chasing anomaly states that mutual fund investors pursue the mutual funds with the strongest past performance. This behaviour is not only noticeable when investors are putting “new” money into the stock market, but it is a constant hunt for mutual funds with a higher return than the return on the mutual fund they have invested in. Sapp and Tiwari (2004) later show that investors still continue to rely on past returns in the process of selecting a fund to invest in, despite the fact that past returns cannot be used to predict future returns (Berk and Green, 2004). The return-chasing behaviour creates disproportionate inflows in winning funds, a phenomenon known as convexity of funds. Hence, the fund flows we examine are not only a view of investors’ strategic asset allocation, but several other explanations, for example, return-chasing behaviour.

Overconfidence among investors is also launched as a plausible cause behind investor underperformance. Overconfidence tends to be most pronounced in situations where information is ambiguous and predictability is low (Griffn and Tversky, 1992) and the task is of moderate to extreme difficulty (Fischhoff et al., 1982). Overconfident investors over-estimate the precision of their information, trade too frequently, and as a result experience poor investment performance (Odean, 1998). Tax-related transactions may also be a possible explanation behind investor underperformance. Pulling capital out of the market for reasons that have nothing to do with where the market is heading, will, on average, lead to underperformance, as the world's stock exchanges in the long run are moving upwards.

Investors also strongly react to the marketing of mutual funds (Jain and Wu, 2000) and other available information that reduces the search costs for the best performing funds. The mutual fund industry in the U.S., for example, used more than half a billion dollars in 1999 on marketing to attract investment flows (Pozen, 1999). Kamstra et al. (2008) documents that fund flows are strongly dependent on seasonality, as well as the riskiness of the funds. Investors move money into "safe" funds during the fall, and into "risky" funds during the spring. They explain these asset allocation patterns with risk aversion associated with the amount of daylight present during different seasons.

The timing ability of investors is also related to the timing ability of the funds themselves. Previous papers state that investor flows induce price pressure on the market level. Consequently, the mutual funds are forced to respond to their investors' flows. Therefore they need to buy "high" and "sell" low, and in this way also become "bad" market timers themselves (Ben-Rephael et al., 2008). The results are consistent with the findings of Edelen (1999), that negative market timing of mutual funds is attributed to their flows. Treynor and Mazuy (1996) and Henriksson and Merton (1981) find evidence that only about 2% of the mutual funds exhibit advantageous market timing ability. However, Warther (1995) and Fant (1999), using monthly data, shows that managers are neither "good" nor "bad" market timers. The findings of Bollen and Busse (2000), using daily U.S. data, are not consistent with either of these results; they find evidence that fund managers actually exhibit significant timing ability.

More than 80% of mutual funds are members of a mutual fund family. Literature on mutual fund families can clarify other reasons why investors channel their cash in and out of funds and thereafter underperform compared to

the fund. Nanda et al. (2003) show that families with a star performer result in greater cash inflow to the fund and to other funds in its family. Moreover, families with higher variation in investment strategies across funds are shown to be more likely to generate star performance. Elton et al. (2007) show that the returns on mutual funds within a mutual fund family are more closely correlated than returns on mutual funds from different families. As a result, investors get a portfolio with lower degree of diversification, meaning higher risk. This may result in lower return to investors.

3 Data

3.1 FINANCIAL FUND SERVICE MARKET IN NORWAY

Internationally it is common for investment firms to register transactions and holdings in-house. Hence, it is difficult to retrieve historical data on large investor holdings across mutual fund families. However, in Norway it is more common to use external services in the registration of investor transactions. Bond funds and companies listed on the Oslo Stock Exchange are obliged to have external transaction registration, while it is optional for equity funds. There are currently two companies that provide administrative services to mutual funds, Verdipapirsentralen (VPS) and Tieto. VPS started operating in the fund segment in 1991, but it was first in 1996, when they launched the website VPS.no, that their services became popular. Today VPS almost has a monopoly in the Norwegian fund market. The funds themselves are VPS' biggest competitor. Tieto is the only other company that delivers similar services in this market, through its Tazett Funds system. Even though they have been active since 1990, their market share remains small. However, they are currently developing a new system together with the large Nordic bank Nordea. To attract new customers they will have to create a system with a much higher value-to-cost ratio than VPS, as changing the funds' data systems is costly and time consuming.

We have talked to the fifteen largest fund families that have been or are currently a customer of VPS. Most of the funds state that they use the systems due to simplicity. VPS has the necessary expertise, develops and runs the systems themselves, and probably has the best solution on the market. On the other side, the greatest disadvantage that the funds report is the relatively high cost of VPS' services. The costs of the VPS systems are based on an

establishment fee, and then a monthly fee dependent on the number of customers, number of transactions and the size of the management capital. Several of the funds say that they have considered leaving VPS in the near future, as they think it will be cheaper and maybe also more functional for the fund itself. Norway's largest bank, DnB NOR left VPS in 2000 due to these two reasons. One of VPS's most profitable current customers told us that they are leaving VPS this autumn in favour of an in-house solution. All of the fund families told us that they would welcome more competitors in this market.

3.2 DATA OVERVIEW

VPS is chosen as database for this paper since it is the largest company operating within this industry, and hence has the most comprehensive database. The database includes all transactions and holdings for a wide range of domestic and foreign investors. Table A.2 in the appendix gives an overview of how many funds Norwegian investors had in their portfolios each year between 1996 and 2007, while Table A.3 shows how many fund-share changes investors had per calendar year in the same period. Due to VPS' privacy rules the data of individual investors have been aggregated in larger investor groups by our supervisor and handed over to us. Hence, it is not possible to identify individual investors. The investors are grouped in the following six investor groups: (1) individual investors, (2) financial corporations, (3) non-financial corporations, (4) government institutions, (5) foreign individual investors and (6) foreign mixed investors⁵. See Table A.5 in the appendix for a detailed description of each sector code. This data set will hopefully show us how each sector group has allocated their cash flows in and out of mutual funds during bull- and bear-markets, and hence what returns they have achieved. Information about fund performance, costs and assets under management have been received by the Norwegian Fund & Asset Management Association (VFF) and Oslo Stock Exchange Information (OBI).

The VPS database is available from January 1993, but it was first in 1996 that they reached a satisfactory activity level to study. Our access to the VPS data ends in April 2007. This is mainly due to increased commercial interest in mutual fund data; it has become costly to collect up-to-date samples. Therefore

⁵ Foreign mixed investors includes both individuals, corporations and government institutions as it is difficult to identify and separate all the transactions and holdings for this investor group.

we have chosen our sample period between January 1996 and April 2007. From this sample size we exclude all funds with fewer than 12 monthly observations. We also exclude all sector funds, balanced funds and international funds, as we want to focus on mutual funds with similar characteristics to stay clear of possible biases. The exclusion leaves us with 79 equity funds that have Norway or the Nordic region as their main investment area. This 11-year sample size window includes about 60 million investor trades, and hence we expect to get significantly valid results. All of the selected 79 funds are listed in Table A.1 in the appendix.

Table 3.1 reports descriptive statistics for the funds. The average fund has nearly NOK 360 million under management, while the median fund has only NOK 184.5 million, due to a few mutual funds with assets under management around NOK 4 billion. These outliers also significantly affect all our std. dev. results giving us a std. in TNA of NOK 804.58 million which is more than twice the mean. The average TNA for the fund sample between January 2000 and December 2005 is NOK 30 billion, which is 43% of the total Norwegian equity mutual fund market at the same time of NOK 70 billion. The average monthly inflow is NOK 9.55 million, while the outflow is slightly higher in this period, NOK 10.38 million. We also note that the average annual management fee is 1.52%, the average front load fee is 2.28% and that the average end load fee is 0.39%. The fee structures of the mutual funds are taken as a snap shot of April 2007, or the last available date if the fund was liquidated before.

Table 3.1: Sample statistics

	Mean	Median	25 th percentile	75 th percentile	Std. dev.
Total net assets (NOK mill)	359.33	184.5	46.49	331.75	804.58
Monthly inflows (NOK mill)	9.55	3.73	0.80	8.18	19.02
Monthly outflows (NOK mill)	10.38	5.12	1.67	11.18	18.8
Monthly net cash flows (NOK mill)	-0.83	-0.60	-2.93	0.40	8.04
Management fee	1.52 %	1.50 %	1.00 %	2.00 %	0.79 %
Front load fee	2.28 %	3.00 %	1.25 %	3.00 %	1.28 %
End load fee	0.39 %	0.30 %	0.00 %	0.50 %	0.48 %

The table presents summary statistics on the mutual fund flows obtained from Verdipapirsentralen (VPS) database. The sample includes all Norwegian mutual funds that have defined Norway or the Nordic region as their main investment area. The sample includes 79 funds that existed at any time during January 1996 through April 2007 for which monthly net total assets (TNA) and monthly net cash flows (NCF) values exist. Sector funds, balanced funds and international funds are excluded. TNA is the funds total net assets at the end of the month. Monthly inflows are all inflows to a fund within a month. Monthly outflows are all outflows of a fund within a month. Monthly net cash flows for fund j in month t is $NCF_{j,t} = TNA_{j,t} - TNA_{j,t-1}(1 + r_{j,t})$. TNA and monthly flows are estimated in a period between 2000101-200512, to get representative flows without any periods that would significantly affect our estimates. Management fee is the annual percent charges investors have to pay for the asset management. Front load fee is the percent charges applied at the time of the purchase of the investors' total amount invested in the fund. End load fee is the percent charges applied at the time of the sale of the investors' total amount withdrawn from the fund. All fee structures are a snap shot of April 2007.

Table 3.2 below reports an overview statistic of the 79 funds to show the availability of VPS investor transactions in each given year. We can see that the number of funds in the VPS database has been steadily increasing in the sample period with a significant increase in the late nineties. There are 250 percent more funds in 2007 than at the start of 1996. None of the funds in our sample were liquidated in the nineties, but between 2003 and 2007 several funds merged with other funds, or just stopped operating. Merging of mutual funds is a well-known strategy to hide bad performance.

Table 3.2: VPS fund statistics

Year	Number of funds	Born	Liquidated	Started reporting	Stopped reporting
1996	27	2	-	7	-
1997	33	6	-	6	-
1998	45	12	-	12	-
1999	52	7	-	4	-
2000	59	7	-	13	4
2001	65	7	1	7	1
2002	71	6	1	9	2
2003	70	1	2	0	1
2004	71	3	2	5	1
2005	71	3	3	4	3
2006	65	0	6	-	4
2007	61	0	4	-	2

Number of funds column show how many funds that exist in the VPS database each year in our sample period. Born column represents how many mutual funds were established that year. Liquidated represents funds that either stopped operating or merged with other funds. Started reporting represents how many mutual funds started using VPS fund services that year. Stopped reporting represents how many mutual funds stopped using VPS investor services that year.

3.3 DATA BIASES

As stated previously, joining VPS is not mandatory for Norwegian equity funds. The decision to join VPS is, however, not performance related: it is only based on costs, simplicity, external competence and other non-performance related decisions, consequently we have no data biases. The sample also includes funds that cease to exist and thus have no survivorship bias.

4 Methodology

In this paper we focus on the question of whether Norwegian mutual fund investors enhance their returns strictly based on the timing of their cash flows. We thereby construct the following research question: Do Norwegian mutual fund investors, on average, beat a simple buy-and-hold strategy by moving capital in and out of mutual funds? To answer this question we solely

focus on the returns achieved by the two different investment strategies. We do not subtract the potential cost of the use of a broker, or the cost of buying or selling a fund.

To investigate our research question we follow the approach used by Nesbitt (1995) and later Friesen and Sapp (2007), as we feel this is the methodology that best reflects the timing ability of mutual fund investors. To examine the performance effects of timing, we measure the time-weighted return, equal to the funds return compared to the dollar-weighted return, equal to the fund investor's performance. As the time-weighted return does not account for the cash variation in assets under management, it will effectively show the net return of the specific fund, meaning the average return from one point in time to another. In comparison, the dollar-weighted return, also known as the internal rate of return, will account for the cash flows the investor moves into and out of the fund over time. Hence, this measure will show us the investors' *real* average return over time. Then, to identify the differences in return between the investors and the fund we introduce the "performance gap," defined as the time-weighted return minus the dollar-weighted return.

To demonstrate how the timing of investor cash flows can create differences between fund returns and investor returns, consider this example: Lets assume that we have three investors, A, B and C. All three investors invest \$1 million at time 0. The fund has a return of 40% in its first year. At the start of year two, investor B invests another \$1 million, while the investor A and C makes no portfolio adjustments. This year the fund declines 20%. At the beginning of year three, investor C invests another \$1 million, while investors A and B makes no portfolio adjustments. The fund performance for year three is an increase of 30%. At the end of year three investor A has achieved a return equal to the fund itself, an annual return of 13%. Investor B has achieved an annual rate of 12%, while investor C has achieved an annual return of 17%. We can therefore say that investor B has underperformed with 1% annually, while investor C has experienced an annual performance boost of 4% annually due to successful timing decisions. In the subsequent section we follow the approach of Friesen and Sapp (2007) to derive the formulas needed to calculate the returns and cash flows.

4.1 MEASUREMENT OF RETURNS AND CASH FLOWS

To measure the past performance of the mutual fund, it is appropriate to use the geometric average return over the time period. We denote fund j 's return in month t to be r_{jt} . Then the geometric average monthly return for fund j , equal to the time-weighted return can be calculated as

$$r_j^g = \left(\prod_{t=1}^T (1 + r_{jt}) \right)^{1/T} - 1 \quad (1)$$

To measure the past performance earned by the fund investors we use the dollar-weighted return. As this measure is the same as the internal rate of return, it may suffer from the problem of multiple solutions, as monthly fund flows frequently change signs. However, most equations have only one realistic solution, as other possible solutions are either complex, or involve numbers that are less than -100%. Therefore, we are confident that our results are correct. The dollar-weighted measure captures the average return earned by investors, weighted for the money they have invested at each point in time. The dollar-weighted average return for fund j is defined as the rate of return at which the accumulated value of the initial TNA plus accumulated value of net cash flows, equals the actual TNA at the end of the period (Friesen and Sapp, 2007):

$$r_j^{dw} : TNA_0(1 + r_j^{dw})^T + \sum_{t=1}^T NCF_t(1 + r_j^{dw})^{(T-t)} = TNA_T \quad (2)$$

where

$$NCF_{j,t} = TNA_{j,t} - TNA_{j,t-1}(1 + r_{j,t}) \quad (3)$$

$NCF_{j,t}$ represents the monthly net cash flow for fund j in month t and $TNA_{j,t}$ is the total net assets for fund j at the end of the month t .⁶ All net cash flows are for simplicity assumed to occur at the end of each month. We follow the procedure of Gruber (1996) and assume that investors in merged funds continue to earn the return of the surviving fund. We do not need to adjust for risk differences to calculate investor timing, as the holdings of the mutual fund shareholders are the

⁶ Ber and Ruenzi (2006) have studied the difference in the use of net cash flows as opposed to actual inflows and outflows. They conclude that the net cash flow measurement method is appropriate and unbiased.

same as the actual holdings of the mutual funds. The measure of investor timing for fund j , referred to as the performance gap is calculated by subtracting the dollar-weighted return in equation (2) from the time-weighted return in equation (1):

$$\text{Performance gap}_j = r_j^g - r_j^{dw} \quad (4)$$

A positive (negative) performance gap indicates that the investors have achieved a return lower (higher) than the return of the fund itself. We recognize that sophisticated investors may shift between different asset classes when they are performing market timing. As a result, our “performance gap” measure will not be able to capture the market timing ability of all investors. Our method of estimating the performance of market timing simply reviews the success of moving cash in and out of a fund, compared to the strategy of keeping the money in the fund and being satisfied with the fund’s performance.

4.2 MEASUREMENT OBJECTIVES

The results are presented in five tables. First, we present a summary statistic of investors in all funds to show the performance of the average investor on the Oslo Stock Exchange. Then we present the same results for both index funds and actively managed funds, respectively. Secondly, we create a table that show the timing performance based on the size of the funds. By creating five quintiles we can investigate whether there is an obvious relationship between timing performance and the size of the funds. Thirdly, we construct a table with six different investor groups to shed light on which investor group performs the best. These groups are: individual investors, financial corporations, non-financial corporations, government institutions, foreign individuals and foreign mixed investors.

Fourthly, we investigate timing performance based on the activity level of the investors. Before we could do this it was necessary to tag all automatic trades so that an investor with an automatic monthly fund scheme in two mutual funds was not counted as 24 active fund-share changes, and hence as a very active investor. See section 4.3 for more detailed information about automatic trade tagging. After tagging of flows three subgroups of both Norwegian individual and foreign individual investors was created, thus active, semi-active and passive/automatic trades. The passive/automatic trade group are defined as

investors with zero fund-share changes over the last 12 months or those investors that only invest in automatic fund schemes. The semi-active investors are defined as investors with one active transaction over the last 12 months. The active group is defined as investors with two or more trades over the last 12 months. By grouping the investors into these subgroups according to their activity level, we can tell whether investors following an active fund investment strategy achieve a higher return than investors with a passive strategy. Both the automatic trade algorithm and investor activity algorithm are developed by our supervisor Janis Berzins, and used in our study with his permission. Finally, we present the timing performance by fund family. We have 19 different fund families in our sample, and can therefore show how investors perform in each of these different fund families.

4.3 AUTOMATIC TRADE TAGGING

The VPS database does not distinguish between cash flows from active investor fund-share changes, and flows that derive from monthly fund schemes. In order to do so, we employ an automatic trade algorithm to the data set to separate these flows. Table A.3 in the appendix shows the count of Norwegian individual investors with the number of fund-share changes per calendar year. These numbers contain both “non-automatic” and automatic flows, and thus create the database for the automatic trade tagging. We can clearly see in this table a large increase in the number of investor fund-share changes that occur at 12, 24 and 36 trades per year. The increases at these trade levels are obviously evidence of automatic fund schemes in respectively one, two and three mutual funds. The investor auto trade algorithm is now employed by looking at fund-share changes of equal amounts that have occurred six times or more during the last twelve months. By selecting exactly six we can locate investor trades and tag them even if the investors adjust the auto amount within that twelve-month period. With approximately 60 million investor trades, 9 million of them are tagged as automatic trades. After tagging, Table A.4 in the appendix now only shows the count of Norwegian individual investors with the number of “*non-automatic*” fund-share changes per calendar year. We can see that the number of trades in the category 12 and 24 trades per year significantly decreases, indicating that most of the automatic trades have been removed. The level of automatic trades is still higher than it should be, but it is impossible to perfectly identify all automatic trades that have been carried out among 60 million investor trades.

5 Results

We compute arithmetic, geometric and dollar-weighted average returns for each fund in our sample, and present the results in five tables. These tables show the timing performance of the investors according to five different characteristics: fund type, fund size, investor type, activity type and fund family.

5.1 TIMING PERFORMANCE BY FUND TYPE

The timing performance for all investors on the Oslo Stock Exchange is reported in Table 5.1. Panel A show that we find an overall performance gap of 0.11% per month. This means that mutual fund investors, on average, underperform the return of a buy-and-hold strategy by a statistically significant 1.32% annually due to poor timing decisions. For the median fund, the monthly performance gap is slightly higher, 0.15% per month (1.8% annually). These findings support earlier U.S. studies that the average investor shows poor evidence of being able to time the market. Panel B and C report returns for actively managed funds and index funds, respectively. Interestingly, investors in the passively managed funds appear to perform market timing much better than investors in actively managed funds. The investors in actively managed funds display an underperformance of 1.56% per year, while investors in index funds actually show signs of being able to time the market well, with an annual performance improvement of 1.92%. Both of these returns are statistically significant. However, it is worth noting that the group of index funds only consist of six funds, which is a small sample. Therefore, the results should be interpreted with caution. Still, all of the six index funds have a negative performance gap, indicating that the investors have gained a higher return than the fund's return. It is also noteworthy that the investors of index funds achieve a monthly return of 1.67% in the period, which is 0.34% more per month than investors in actively managed funds, with 1.33% per month. The index funds themselves achieve a return of 0.05% more per month than the actively managed funds in the period. Hence, index funds seem to be a smart investment, as they display having both higher return and lower fees than actively managed funds.

So, why do investors in actively managed funds perform so much worse than investors in index funds? One explanation might be that investors, who are willing to pay for active management of their capital, also are more likely to attempt market timing. To summarize, Table 5.1 shows that mutual fund

investors on average underperform their chosen funds by around 1.3% per year due to the timing of their cash flows.

Table 5.1: Timing performance by fund type

	Mean	Median	25 th percentile	75 th percentile	Std. dev.
<i>Panel A: All funds (n=79)</i>					
Arithmetic monthly return	1.65	1.51	1.15	2.27	0.93
Geometric monthly return	1.47	1.27	0.97	2.17	0.98
Dollar-weighted monthly return	1.35	1.17	0.77	1.88	1.06
Performance gap (<i>t-stat</i>).	0.11 (3.13)	0.15	-0.12	0.37	0.32
<i>Panel B: Actively managed funds (n=73)</i>					
Arithmetic monthly return	1.64	1.50	1.04	2.21	0.99
Geometric monthly return	1.46	1.24	0.92	2.12	1.04
Dollar-weighted monthly return	1.33	1.09	0.70	1.84	1.10
Performance gap (<i>t-stat</i>).	0.13 (3.93)	0.16	-0.10	0.34	0.30
<i>Panel C: Index funds (n=6)</i>					
Arithmetic monthly return	1.67	1.39	1.23	2.29	0.68
Geometric monthly return	1.51	1.19	1.04	2.19	0.75
Dollar-weighted monthly return	1.67	1.42	1.26	2.33	0.73
Performance gap (<i>t-stat</i>).	-0.16 (-6.92)	-0.14	-0.22	-0.12	0.06

For each fund, we calculate the average monthly arithmetic, geometric, and dollar-weighted returns over the entire sample period. Performance gap is the difference between fund geometric and dollar-weighted returns. A positive performance gap means that the fund has achieved a higher return than the investors. Panel A reports statistics on the full sample of funds. Panel B reports statistics separately for actively managed funds, while Panel C reports statistics only for index funds. *t*-statistics for the mean performance gap are reported in parentheses. Returns are percent per month.

5.2 TIMING PERFORMANCE BY FUND SIZE

A potential concern is that the results presented above may be driven by small funds with scarce total net assets (TNA) under management, as each fund is weighted the same regardless of size. Hence, the average performance gap might not be the correct performance gap for the average dollar invested in the fund. Therefore, we have separated the funds into five quintiles based on their TNA. Table 5.2 show that there are considerable differences between the management capital of Norwegian mutual funds. The smallest quintile has an average of NOK 17 million, while the largest quintile has an average management capital of NOK 1.355 billion. The Table also reveals that there is a noticeable relationship between fund size and performance gap. Although, there is not a perfect relationship between size and gap, we can see that quintile 1 shows practically no sign of poor investor timing, while investors in quintile 5 have an annual performance penalty of around 2%. Medium-sized funds score in the middle in terms of underperformance, but lie closer to the underperformance scores of the largest quintile, than the lowest quintile. These results suggest that a simple average of all funds from table 5.1 may actually understate the underperformance of investors, as the low performance gap of the small funds receives too much

weight. However, it is worth noting that only the largest quintile is significant at a 5% level. Quintile 3 and 4 is significant at a 10% level, while quintile 1 and 2 is not significant.

Table 5.2: Timing performance by fund size

	Quintile 1 (small)	Quintile 2	Quintile 3	Quintile 4	Quintile 5 (large)
Average TNA (NOK mill)	17 309 724	68 936 008	196 028 837	327 202 336	1 355 510 912
Arithmetic return	1.26	1.60	1.39	1.76	1.95
Geometric return	1.02	1.42	1.20	1.59	1.81
Dollar-weighted return	1.00	1.32	1.05	1.46	1.64
Performance gap	0.01	0.10	0.15	0.12	0.17
(<i>t-stat.</i>)	(0.18)	(0.93)	(1.85)	(1.82)	(2.30)

For each fund, we calculate the average monthly arithmetic, geometric, and dollar-weighted returns over the entire sample period. Performance gap is the difference between fund geometric and dollar-weighted returns. A positive performance gap means that the fund has achieved a higher return than the investors. Funds are divided into quintiles based upon average total net assets (TNA). The cross-sectional averages for each TNA-based quintile are reported. Quintile 1 contains the smallest funds and quintile 5 contains the largest funds. Returns are percent per month.

5.3 TIMING PERFORMANCE BY INVESTOR TYPE

Table 5.3 reports the differences in timing performance between each of the six investor types⁷ examined in this study. An examination of the results reveals that all investor groups underperformed compared to their respective fund. The individual investors exhibit an average underperformance of 1.32% per year, while the median is slightly higher with 1.56% per year. The financial corporations and government institutions exhibit about the same annual underperformance as individuals, with 1.08% and 1.20%, respectively. The biggest loser in the Norwegian market, however, seems to be the non-financial corporations. They show an underperformance of 0.20% per month (2.40% annually), which is a relatively large penalty per year. This may be partly due to lack of knowledge about the stock market. Another reason might be the lack of a long-term investment strategy, because unions, associations, and other non-financial organizations might view mutual funds as a temporary place to keep capital, rather than a long-term investment object. It is worth noting that the performance gap is positive and statistically significant for all the Norwegian investor groups.

Regarding foreign investors, it is notable that they display a lower performance gap than the Norwegian investors on the Oslo Stock Exchange. Individual foreign investors have a performance gap of 0.96% per year, while the foreign mixed investors as a group show a performance gap of 0.72% per year. These results indicate that the foreign corporations and foreign government

⁷ Description about each investor group is available in appendix A.5

institutions experiences about the same return as the fund's return. However, the t-statistics of the foreign mixed investors are only significant at a 15% level. The 25th percentile for the two foreign investor groups shows profitable returns of around 1-2% per year, in excess of what the fund generates. Comparing the dollar-weighted return of the different investor groups, we can see that foreign mixed investors achieve the highest return in the period, with 1.61% per year. The closest group is the Norwegian financial corporations, with 1.54% per year, while foreign individuals score third best with 1.45% per year. These results show that foreign investors not only are best at market timing, but also best at picking superior funds.

Table 5.3: Timing performance by investor type

	Mean	Median	25 th percentile	75 th percentile	Std. dev.
<i>Panel A: Individual investors</i>					
Arithmetic monthly return	1.62	1.39	0.98	2.47	1.03
Geometric monthly return	1.43	1.22	0.76	2.29	1.08
Dollar-weighted monthly return	1.32	0.97	0.60	2.12	1.22
Performance gap	0.11	0.13	-0.11	0.37	0.43
(<i>t-stat</i>).	(2.31)				
<i>Panel B: Financial corporations</i>					
Arithmetic monthly return	1.80	1.76	1.07	2.54	1.11
Geometric monthly return	1.63	1.66	0.87	2.44	1.17
Dollar-weighted monthly return	1.54	1.47	0.77	2.46	1.21
Performance gap	0.09	0.01	-0.10	0.33	0.40
(<i>t-stat</i>).	(2.10)				
<i>Panel C: Non-financial corporations</i>					
Arithmetic monthly return	1.64	1.50	1.10	2.43	1.07
Geometric monthly return	1.45	1.23	0.89	2.28	1.12
Dollar-weighted monthly return	1.25	1.24	0.53	2.08	1.24
Performance gap	0.20	0.13	-0.05	0.46	0.43
(<i>t-stat</i>).	(4.19)				
<i>Panel D: Government institutions</i>					
Arithmetic monthly return	1.68	1.66	1.26	2.77	1.37
Geometric monthly return	1.51	1.44	1.13	2.64	1.42
Dollar-weighted monthly return	1.41	1.72	0.67	2.37	1.41
Performance gap	0.10	0.01	-0.15	0.36	0.42
(<i>t-stat</i>).	(2.12)				
<i>Panel E: Foreign individual investors</i>					
Arithmetic monthly return	1.71	1.52	1.17	2.61	0.99
Geometric monthly return	1.53	1.30	0.96	2.45	1.02
Dollar-weighted monthly return	1.45	1.24	0.77	2.33	1.01
Performance gap	0.08	0.06	-0.10	0.22	0.29
(<i>t-stat</i>).	(2.56)				
<i>Panel F: Foreign mixed investors</i>					
Arithmetic monthly return	1.82	1.71	1.18	2.44	0.94
Geometric monthly return	1.66	1.60	1.05	2.30	0.97
Dollar-weighted monthly return	1.61	1.71	0.93	2.11	1.02
Performance gap	0.06	0.07	-0.16	0.26	0.34
(<i>t-stat</i>).	(1.52)				

For each investor type, we calculate the average monthly arithmetic, geometric, and dollar-weighted returns over the entire sample period. Performance gap is the difference between fund geometric and dollar-weighted returns. A positive performance gap means that the fund has achieved a higher return than the investors. Panel A to D are different Norwegian investors, while Panel E to F are foreign investors. See Table A.5 in the appendix for more detailed information about the investors included in each of the investor types. t-statistics for the mean performance gap are reported in parentheses. Returns are percent per month.

5.4 TIMING PERFORMANCE BY ACTIVITY LEVEL

One of the innovations of this study is to show the timing performance of investors with different trading activity level. We can therefore investigate whether investors that actively buy and sell mutual funds beat a simple buy-and-hold strategy. The descriptive statistics are given in Table 5.4.

Table 5.4: Timing performance by activity level

	Mean	Median	25th percentile	75th percentile	Std. dev.
NORWEGIAN INVESTORS					
<i>Panel A: Active investors</i>					
Arithmetic monthly return	1.37	1.36	0.73	2.67	1.53
Geometric monthly return	1.19	1.19	0.39	2.57	1.58
Dollar-weighted monthly return	0.90	0.56	-0.05	2.42	1.64
Performance gap	0.30	0.31	0.20	0.40	0.38
(<i>t-stat.</i>)	(6.95)				
<i>Panel B: Semi-active investors</i>					
Arithmetic monthly return	1.44	1.44	0.94	1.89	0.69
Geometric monthly return	1.28	1.26	0.78	1.72	0.70
Dollar-weighted monthly return	1.18	1.17	0.78	1.36	0.67
Performance gap	0.10	0.00	-0.05	0.16	0.30
(<i>t-stat.</i>)	(2.88)				
<i>Panel C: Passive/automatic investors</i>					
Arithmetic monthly return	1.43	1.31	0.96	1.66	0.95
Geometric monthly return	1.23	1.15	0.73	1.49	0.99
Dollar-weighted monthly return	1.31	1.26	0.60	1.64	1.19
Performance gap	-0.08	0.03	-0.43	0.15	0.41
(<i>t-stat.</i>)	(-1.80)				
FOREIGN INVESTORS					
<i>Panel D: Active investors</i>					
Arithmetic monthly return	1.78	1.67	1.20	2.63	1.24
Geometric monthly return	1.63	1.51	1.00	2.50	1.26
Dollar-weighted monthly return	1.43	1.09	0.64	2.14	1.26
Performance gap	0.20	0.16	-0.06	0.52	0.61
(<i>t-stat.</i>)	(2.89)				
<i>Panel E: Semi-active investors</i>					
Arithmetic monthly return	1.22	1.29	0.52	2.68	1.94
Geometric monthly return	1.05	1.05	0.32	2.56	2.00
Dollar-weighted monthly return	0.99	1.05	0.20	2.56	2.06
Performance gap	0.05	0.00	-0.13	0.17	0.56
(<i>t-stat.</i>)	(0.85)				
<i>Panel F: Passive/automatic investors</i>					
Arithmetic monthly return	1.58	1.43	0.96	1.97	0.89
Geometric monthly return	1.39	1.25	0.71	1.75	0.92
Dollar-weighted monthly return	1.49	1.32	0.79	2.13	1.07
Performance gap	-0.09	0.00	-0.45	0.16	0.42
(<i>t-stat.</i>)	(-1.98)				

For each activity level, we calculate the average monthly arithmetic, geometric, and dollar-weighted returns over the entire sample period. Performance gap is the difference between fund geometric and dollar-weighted returns. A positive performance gap means that the fund has achieved a higher return than the investors. Panel A to C are Norwegian investors, while Panel D to F are foreign investors. Active investors include investors with two or more fund-share changes per year. Semi-active investors include investors with one fund-share change per year. Passive/automatic investors include investors with zero fund-share changes per year, or investors that invest monthly using automatic fund schemes. *t*-statistics for the mean performance gap are reported in parentheses. Returns are percent per month. Cash flows of outliers (3 std. dev.) have carefully been examined and removed if errors have been found.

An examination of the results show that both Norwegian and foreign active investors have an annual performance penalty of 3.6% and 2.4%, respectively. The semi-active investors display a considerably improved timing ability, as the results show that the underperformance is 1,2% for Norwegian investors and 0,6% per year for foreign investors. This is approximately the same result as the average underperformance of their respective investor type. However, the result of the semi-active foreign investors is not significant. The passive/automatic investors, on the other hand, show evidence that they beat the return of the mutual fund they invest in, with an annual performance boost of about 1% for both Norwegian and foreign investors. The result of the passive/automatic Norwegian investors is only significant at a 10% level.

Our results indicate that the most profitable investment strategy is to sit still, since the stock market behaves like a roller coaster. You never know what will happen next. Investors who have little knowledge about the stock market, will be better off sitting out a correction, than attempting to compete with professionals. We suspect that the main driver behind the negative performance gaps is the monthly fund schemes. Using these fund schemes the investor will never have a problem of buying or selling at the wrong time. The fund schemes invest a small amount every month, and in this way achieve an average price that is relatively low compared to the price the average active investor achieves by placing all his or her money in the market at once. On the other side, the biggest driver of the positive performance gap is probably the random periods where the active fund investors sit outside the market and hence miss out on the market return. The main conclusion after the examination of table 5.4 is that the average mutual fund investor should use a monthly fund scheme or a passive investment strategy with long time horizon to maximize the future return.

5.5 TIMING PERFORMANCE BY FAMILY FUND

Finally, we present the trading performance of the investors where each fund is grouped together with its corresponding family fund. Investors in Pareto, Delphi and Avanse have the best annual boost with an almost 2% higher return than their respective funds. Investors in SEB, Odin and Terra are represented on the negative side, with an annual penalty of around 3-4%. It is important to remember that it does not make sense to compare the geometric return of the different fund families, as they have operated in different time periods. It only makes sense to match the investor performance gaps between the fund families.

Table 5.5: Timing performance by family fund

	Mean arithmetic return	Mean geometric return	Mean dollar-weighted return	Mean performance gap
Alfred Berg	1.72	1.52	1.30	0.21
Avanse	1.29	1.21	1.37	-0.16
Carnegie	1.40	1.20	1.16	0.04
Danske Invest	1.52	1.38	1.14	0.24
Delphi	2.70	2.48	2.64	-0.16
DnB NOR	2.92	2.76	2.90	-0.14
Globus	0.44	0.07	-0.15	0.22
Handelsbanken	-0.39	-0.57	-0.47	-0.11
Holberg	1.69	1.46	1.57	-0.11
KLP	2.71	2.64	2.73	-0.09
Odin	2.03	1.91	1.64	0.27
Orkla	1.43	1.24	1.20	0.03
Pareto	2.82	2.69	2.88	-0.19
RF	1.82	1.61	1.59	0.02
SEB	1.18	0.97	0.65	0.32
Skagen	1.73	1.70	1.68	0.02
Storebrand	1.58	1.37	1.15	0.22
Terra	1.56	1.41	1.14	0.27
Warren Wicklund	1.85	1.67	1.80	-0.13

For each fund, we calculate the average monthly arithmetic, geometric, and dollar-weighted returns over the entire sample period. Performance gap is the difference between fund geometric and dollar-weighted returns. A positive performance gap means that the fund has achieved a higher return than the investors. Funds are put in categories according to its family fund. Returns are percent per month.

5.6 DISCUSSION OF RESULTS AND ISSUES FOR FUTURE RESEARCH

The major finding of this study is that the average mutual fund investor would be better off following a simple buy-and-hold strategy than attempting to time the market. One of the most important reasons why market timing steals so much of the investor return is the problem that investors act against conventional wisdom; that investors should be contrarian, buying on weakness and selling on strength. Instead, empirical evidence suggests that inflows (outflows) are largest after positive (negative) returns. This anomaly is basically a product of human greed and fear. However, we cannot state that the performance gap is solely a result of market timing. The “bad” performance of investors documented in this study might be explained by several other reasons, amongst them: investor overconfidence, return-chasing behaviour, investor sentiment, tax-related transactions and fund advertisement. Hence, we need to interpret our results with caution. The true costs of market timing lie somewhere between the investor returns we estimate and the returns of the fund itself. Still, our results undoubtedly show that poor market timing decisions systematically hurt mutual fund investors’ ability to increase their wealth through mutual funds. In general, our results applaud the relative appeal of a simple buy-and-hold strategy for the average investor. We also advise investors

to use a monthly fund scheme, as this effectively results in a low long-term market price.

For future work on market timing we recommend researchers to investigate the timing ability of investors in exchange-traded funds (ETFs). ETFs have one advantageous characteristic that makes them interesting to examine, they are traded on stock exchanges. Hence, as the funds have an instant settlement, they become more attractive for investors who want to attempt market timing. It would also be interesting to examine the timing ability of investors in other countries.

6 Conclusion

Our paper examines the timing ability of Norwegian and foreign mutual fund investors using cash flow data at the individual fund level. We measure this using a “performance gap”, defined as the funds geometric return minus the investors’ dollar-weighted return. Our results show that equity fund investors, in the period 1996-2007, underperform the return on the funds they invested in by a statistically significant 1.32% annually due to their timing decisions. Not only do we show that the average investor is damaging his returns, but we also shed light on which investors are more likely to demonstrate poor timing. Moreover, we show that investors in both large funds and actively managed funds exhibit poor timing performance, while investors in small funds and index funds show evidence of being able to beat the performance of the funds. Our results also provide evidence that investors who use monthly fund schemes or passively invest in mutual funds enjoy an annual performance boost, while investors who actively buy and sell funds significantly underperform the return of the fund they invested in. Finally, our results indicate that foreign investors show both higher timing ability and a higher likelihood of picking superior funds.

Our results are in line with the results of previous international studies. The performance gap of 1.32% per year is right in the middle of the results of Nesbitt (1995) and Friesen and Sapp (2007) with 1.08% and 1.56%, respectively. Hence, these results should be a warning to all mutual fund investors who are tempted to test their market timing skills. Instead of outperforming the fund, the average investor is more likely to underperform a dollar passively invested in the fund. Overall, our results recommend that the average investor should either use a monthly fund scheme or passively invest in mutual funds to maximize future returns.

A Appendices

A.1 LIST OF FUNDS

Table A.1: List of the 79 selected mutual funds in the sample

ABIF Norge ++	KLP AksjeNorge Indeks
Alfred Berg Aktiv	NB Aksjefond
Alfred Berg Aksjef Norge	ODIN Eiendom
Alfred Berg Aktiv II	ODIN Norden
Alfred Berg Etisk	ODIN Norden II
Alfred Berg Gambak	ODIN Norge
Alfred Berg Humanfond	ODIN Norge II
Alfred Berg Indeks	ODIN Robur Miljø
Alfred Berg Nordic Best Selection	Orkla Finans Investment Fund
Alfred Berg Norge	Orkla Finans Nordic
Alfred Berg Norge +	Orkla Finans Nordic II
Avanse Norge (II)	Pareto Aksje Norge
Avanse OBX Indeks	Pareto Aktiv
Carnegie Aksje Norden	RF Aksjefond
Carnegie Aksje Norge	RF Plussfond
Carnegie Norge Indeks	SEB Norden
Danske Fund Nordic	SEB Norden SMB
Danske Fund Norge Aksjer Inst I	SEB Norge
Danske Fund Norge I	Skagen Vekst
Danske Fund Norge II	Storebrand Aksje Innland
Danske Fund Norge Vekst	Storebrand BarneSpar
Delphi Norden	Storebrand Norden
Delphi Norge	Storebrand Norge
Delphi Vekst	Storebrand Norge A
DnB NOR Norge Selektiv (III)	Storebrand Norge I
Gjensidige Norden	Storebrand Optima Norge A
Globus Aktiv	Storebrand PensjonSpar
Globus Norden	Storebrand Vekst
Globus Norden Spar	Storebrand Verdi
Globus Norge	Terra Alpha
Globus Norge II	Terra Norden
Handelsbanken Nordic Small Cap	Terra Norge
Handelsbanken Norge	Terra SMB
Holberg @.	Terra Spar
Holberg Global	Terra Utbytte
Holberg Norden	Terra Vekst
Holberg Norge	WarrenWicklund Indeks+
Holberg Trend	WarrenWicklund Norden
KLP AksjeNorden	WarrenWicklund Norge
KLP AksjeNorge	

The table lists the 79 mutual funds selected for this article. The funds have either Norway or the Nordic region as its main investment area.

A.2 NO. OF FUNDS IN INVESTOR PORTOLIOS PER YEAR

Table A.2: Count of Norwegian individual investors with the following number of funds per calendar year

Funds	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1	60661	138960	203448	222265	250827	267598	268991	254452	253808	255048	273652	293901
2	15431	43350	66634	78492	87008	87921	89889	85612	90253	89166	86239	84560
3	785	3133	7371	12309	15795	15776	17188	15654	16628	16531	16902	17172
4	103	485	1237	2644	3746	3514	4317	3767	4074	4106	4200	4048
5	26	109	242	485	866	782	1150	1004	1083	1248	1271	1178
6	6	23	83	126	190	187	345	246	298	361	398	339
7	1	8	17	30	47	44	99	84	82	108	121	106
8	,	2	7	5	15	16	31	21	32	26	35	37
9	,	,	,	2	5	6	12	17	12	11	12	15
10	,	,	,	1	2	1	5	3	11	6	5	10
11	,	,	2	,	2	2	2	4	3	4	4	4
12	,	,	,	1	1	1	3	4	2	2	4	1
13	,	,	,	1	2	2	3	3	1	,	1	1
14	,	,	,	1	,	,	,	,	2	2	,	,
15	1	,	,	,	1	2	1	,	,	1	1	,
16	,	,	,	,	1	,	,	,	1	,	,	1
17	,	,	,	,	,	1	3	1	,	,	1	1
18	,	,	,	,	,	,	,	1	,	1	1	,
19	,	,	1	,	,	,	,	,	,	,	,	,
20	,	1	,	,	,	,	,	,	,	1	,	,
24	,	,	,	,	,	,	,	,	1	,	,	,
25	,	,	,	,	,	,	,	1	,	,	,	,
Total	77014	186071	279042	316362	358508	375853	382039	360872	366292	366621	382847	401374

The table shows how many funds Norwegian investors had in their portfolio in each given year. The table are created by Janis Berzins and used with his permission.

A.3 NO. OF FUND-SHARE CHANGES PER YEAR

Table A.3: Count of Norwegian individual investors with the following number of fund-share changes per calendar year

Trades	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
-1	4461	13709	43099	61503	67992	38857	27969	31501	15863	11518	42926	23838
0	21604	57014	89844	126078	188335	231080	245339	237895	237218	184474	163230	182063
1	36592	68821	81436	64450	35224	22416	18808	15647	17637	45841	24888	20083
2	5582	17327	16334	11997	8262	6739	7904	8986	8780	12487	11440	11656
3	1264	4506	3726	3087	3689	7196	3937	4371	4444	6012	7361	9688
4	582	2132	2202	2550	3133	4157	4746	4348	4595	5741	7166	9941
5	376	1327	1675	1699	2580	3504	3781	2358	2980	3866	4753	8186
6	323	1172	2084	1819	2498	4020	4923	3224	4003	4975	6836	13178
7	322	1387	2208	1551	2696	3919	4515	1772	2967	3826	4561	18757
8	453	1362	2846	1915	3186	5265	5623	2118	4065	4898	5566	77191
9	415	1671	3104	2199	4183	4407	4511	2388	5266	5619	7735	1614
10	531	2456	3711	3856	7104	5047	4675	4024	6086	8585	8015	1409
11	995	3142	6145	6492	9285	10107	6666	6294	9305	13880	15120	796
12	2906	8133	17191	24010	16880	24229	31911	30024	30960	36307	50958	1824
13	314	727	973	729	596	627	915	595	1019	1537	1359	855
14	64	180	247	253	294	401	739	442	852	1039	1021	3052
15	22	72	87	106	140	607	221	229	421	572	673	1552
16	28	67	174	156	175	332	503	312	794	932	923	11871
17	17	40	98	73	121	129	178	152	354	465	531	225
18	22	69	181	98	187	275	474	280	911	1019	1592	376
19	6	23	97	56	145	171	169	135	339	601	510	112
20	17	108	179	155	304	263	369	297	939	1383	1196	111
21	6	44	96	76	178	158	192	126	525	792	931	333
22	23	113	319	223	360	287	414	470	1358	2431	2393	127
23	5	77	159	175	190	407	201	206	593	1056	1318	148
24	77	360	728	911	561	959	1948	2366	3372	5539	8674	1948
25	5	10	23	32	23	35	64	40	78	195	171	51
26	.	5	8	13	14	21	22	17	42	66	102	30
27	.	4	11	4	14	72	24	14	49	85	127	23
28	.	1	7	10	5	11	21	10	32	58	72	37
29	.	3	.	13	3	12	12	7	17	33	69	16
30	.	2	4	7	12	9	25	13	41	73	118	18
31	1	.	4	3	13	7	15	7	30	33	54	18
32	.	1	5	3	13	9	11	8	32	62	72	161
33	.	1	5	6	17	14	27	15	48	92	114	13
34	.	1	9	3	10	13	17	8	39	62	82	4
35	.	1	4	12	9	14	10	10	32	44	81	7
36	.	2	7	20	29	36	114	131	137	265	545	3
37	.	.	2	3	2	.	8	1	5	20	23	3
38	.	.	.	2	.	.	1	.	3	17	27	5
39	.	.	.	1	3	6	1	1	2	9	17	5
40	.	.	1	3	3	5	2	2	6	13	13	30
41	.	.	1	2	.	1	2	.	3	4	10	.
42	.	.	1	1	1	1	.	1	5	6	5	4
43	1	.	1	.	3	.	1	1	3	6	9	.
44	.	.	1	.	2	1	1	.	6	14	17	.
45	.	.	.	.	1	3	2	1	5	5	7	2
46	.	.	1	.	.	.	2	2	1	7	14	1
47	.	.	.	2	3	3	.	1	2	5	14	.
48	.	.	.	.	7	4	11	12	9	24	53	3
49	.	.	.	.	.	1	1	1	2	1	6	1
50	.	.	.	.	4	1	2	.	1	1	4	1
51	.	.	.	.	.	1	.	.	.	2	2	.
52	.	1	.	1	.	.	1	.	2	3	2	.
53	.	.	.	.	.	1	.	1	1	2	2	1
54	.	.	1	.	2	1	.	1	1	2	3	.
55	.	.	.	1	1	3	1	1	2	.	3	.
56	.	.	.	.	1	.	2	.	.	.	2	2
57	.	.	1	.	1	.	.	1	1	2	4	.
58	.	.	.	.	.	1	1	.	2	3	4	.
59	.	.	.	1	2	.	.	1	1	1	4	.
60	.	.	1	.	9	3	2	2	2	4	8	.
61	.	.	.	.	.	.	.	.	1	.	2	.
62	.	.	.	.	.	.	.	.	1	.	.	.
63	.	.	.	.	.	.	.	.	1	1	.	.
64	.	.	.	.	.	.	.	.	.	.	1	1
65	.	.	.	.	1	1	.	.	.	.	.	.
66	.	.	.	.	.	.	.	.	.	.	1	.
67	.	.	.	.	.	.	.	.	1	.	1	.
69	.	.	.	.	.	.	.	.	.	.	1	.
71	.	.	1	.	.	1	.	.	.	1	.	.
72	.	.	.	.	.	1	2	.	.	2	4	.
77	.	.	.	1	.	.	.	.	.	.	.	.
82	.	.	.	.	.	.	.	.	.	1	.	.
86	.	.	.	1	.	.	.	.	.	.	.	.
90	.	.	.	.	.	.	.	1	.	.	.	.
92	.	.	.	.	1	1	.	.	.	.	1	.
96	.	.	.	.	1	.	.	.	1	.	.	.
103	.	.	.	.	.	1	.	.	.	.	.	.
106	.	.	.	.	.	.	.	.	.	1	.	.
107	.	.	.	.	.	.	1	.	.	.	.	.
112	.	.	.	.	.	.	1	.	.	.	.	.
156	.	.	.	.	.	.	1	.	.	.	.	.
160	.	.	.	.	.	.	.	1	.	.	.	.
Total	77014	186071	279042	316362	358508	375853	382039	360872	366292	366621	382847	401374

The table shows number of trades per year between 1996 and 2007 for Norwegian individual mutual fund investors in 87 Norwegian and Nordic equity funds. “-1” indicates a change in holdings in the previous year if this year had no changes for an investor. The table are created by Janis Berzins and used with his permission.

A.4 NO. OF “NON-AUTOMATIC” FUND-SHARE CHANGES PER YEAR

Table A.4: Count of Norwegian individual investors with the following number of “non-automatic” fund-share changes per calendar year

Trades	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
-1	5135	15877	49466	65664	68679	46975	31430	27079	15921	18080	52776	32673
0	27301	71735	114915	161989	228329	281080	307745	301226	306201	265803	268549	289172
1	37597	73272	89085	70895	43821	32082	23820	17183	23530	54103	33266	27070
2	5365	17800	17789	12423	11021	7021	8440	8124	9679	14587	13331	13243
3	949	4138	3659	2316	2787	3288	3288	2452	3469	4624	4699	10260
4	322	1582	1740	1548	1801	2315	3302	2282	3197	4014	4319	9212
5	150	708	901	621	893	1168	1454	724	1294	1706	1861	6334
6	98	422	742	506	659	1126	1525	1216	1650	1935	2189	7241
7	45	222	293	172	221	336	328	152	315	447	436	2338
8	29	121	182	79	138	192	254	135	331	364	341	1641
9	4	71	73	45	58	75	89	46	143	181	159	329
10	6	27	49	48	43	74	134	59	143	192	218	497
11	7	35	26	13	14	35	39	31	97	153	219	126
12	3	38	83	28	21	59	157	142	234	325	338	496
13	1	5	17	5	3	10	2	8	24	32	39	49
14	.	4	7	4	7	9	14	6	30	25	19	102
15	.	4	5	2	3	4	4	3	7	16	32	148
16	1	3	5	1	4	2	4	1	9	6	23	31
17	.	6	1	1	.	.	3	1	7	5	9	15
18	.	.	1	1	3	2	3	1	2	8	9	207
19	.	1	2	.	.	.	.	.	2	3	.	11
20	1	.	.	.	2	.	1	.	3	1	1	8
21	.	.	.	.	.	.	2	.	2	4	3	115
22	.	.	.	.	.	.	1	.	.	1	2	4
23	.	.	.	.	.	.	.	1	.	2	2	4
24	.	.	.	.	.	.	.	.	.	.	3	36
25	.	.	.	.	.	.	.	.	.	1	.	4
26	.	.	.	.	.	.	.	.	.	1	.	2
27	.	.	.	.	.	.	.	.	.	.	1	2
28	.	.	1	.	.	.	.	.	1	.	.	2
29	.	.	.	.	.	.	.	.	.	.	1	1
30	.	.	.	.	1	.	.	.	.	.	.	.
31	.	.	.	1	.	.	.	.	.	.	.	.
32	.	.	.	.	.	.	.	.	.	.	1	.
35	.	.	.	.	.	.	.	.	.	1	.	.
37	.	.	.	.	.	.	.	.	1	.	.	.
40	.	.	.	.	.	.	.	.	.	.	.	1
45	.	.	.	.	.	.	.	.	.	.	1	.
60	.	.	.	.	.	.	.	.	.	1	.	.
Total	77014	186071	279042	316362	358508	375853	382039	360872	366292	366621	382847	401374

The table shows number of “non-automatic” trades per year between 1996 and 2007 for Norwegian individual mutual fund investors in 87 Norwegian and Nordic equity funds. “-1” indicates a change in holdings in the previous year if this year had no changes for an investor. The table are created by Janis Berzins and used with his permission.

A.5 INSTITUTIONAL SECTOR CODES

Table A.5: Detailed description of the institutional sector codes

Institutional sector	Definition
Norwegian individual investors	Employees, retirees, pensioners, students and self-employees
Financial corporations	Life insurance companies, unit link companies, private and municipal pension funds, insurance companies, investment firms, mutual funds, management companies, stock exchanges, central securities, clearing houses authorized markets, pension and benefit arrangements established by agreements between business organizations
Non-financial corporations	Private non-profit institutions serving households incl. unions, professional associations, political, cultural (incl. sports), religious and humanitarian organizations. Private non-profit institutions serving purposes incl. employers' organizations, technical and financial industry associations and institutions to promote sales and other business interests.
Government institutions	Norges Bank, The Norwegian States Husbank, State Educational Loan Fund, Innovation Norway, The Norwegian Guarantee Institute for Export Credits
Foreign individual investors	Foreign employees, retirees, pensioners, student and self-employed people living outside Norway. Includes any person ordinarily resident outside Norway (regardless of citizenship).
Foreign mixed investors	Foreign individuals, institutional units, banks, other credit institutions, mutual funds, life insurance companies, insurance companies, pension funds and financial auxiliaries.

Institutional sector classification is a statistical standard. The sector classification is based on systems developed by the international organizations UN (System of National Accounts – SNA93) and EU (European System of National Accounts – ESA95).

B Bibliography

- Barber, M. B. and T. Odean (2000). Trading is Hazardous to Your Wealth: The Common Stock Investment Performance of Individual Investors. *The Journal of Finance* 2 (55), 773-806
- Barber M. B., Y. Lee, Y. Liu, T. Odean (2006). Just How Much Do Individual Investors Lose by Trading?. *University of California*.
- Ben-Rephael, A. Kandel, S. Wohl (2008). The price pressure of aggregate mutual fund flows. *Journal of Financial and Quantitative Analysis, forthcoming*.
- Ben-Rephael, A. Kandel, S. Wohl (2010). Measuring investor sentiment with mutual fund flows *Journal of Financial Economics, forthcoming*.
- Ber, S. and R. Stefan (2006). On the usability of synthetic measures of mutual fund net-flows. *Center for Financial Research , Working Paper 06-05*.
- Bollen, N. P. and J. A. Busse (2001). On the timing ability of mutual fund managers. *Journal of Finance* 56, 1075–1094.
- Braverman, O., A. Kandel, and S. Wohl (2005). The (Bad?) Timing of mutual fund investors, *Working Paper*.
- Daniel, K., M. Grinblatt, S. Titman, and R. Wermers (1997). Measuring mutual fund performance with characteristic-based benchmarks. *Journal of Finance* 52, 1035–1058.
- Dellva, W. L. (2001). Selectivity and market timing performance of fidelity sector mutual funds. *Financial Review* 36, 39–54.
- Dichev, I. (2007). What are stock investors' actual historical returns? Evidence from dollar- weighted returns. *American Economic Review* 97, 386-401.
- Edelen, R. M. (1999). Investor flows and the assessed performance of open-end mutual funds. *Journal of Financial Economics* 53, 439-466.
- Edelen, R. M. and J. B. Warner (2001). Aggregate price effects of institutional trading: A study of mutual fund flows and market returns. *Journal of Financial Economics* 59, 195-220.
- Edwards, F. R. and X. Zhang (1998). Mutual funds and stock and bond market stability. *Journal of Financial Services Research* 13(3), 257-282.
- Elton, E. J., T. C. Green, and M. J. Gruber (2007). The Impact of Mutual Fund Family Membership on Investor Risk. *Working paper*
- Fant, L. F. (1999). Investment behavior of mutual fund shareholders: The evidence from aggregate fund flows. *Journal of Financial Markets* 2, 391-402.
- Fischhoff, B., P. Slovic, and S. Lichtenstein (1982). Calibration of probabilities: The state of the art to 1980. *Cambridge University Press, Cambridge*.
-

-
- Frazzini, A. and O. Lamont (2006). Dumb money: Mutual fund flows and the cross section of stock returns. *Journal of Financial Economics* 88 (2), 299-322.
- Freisen, G. C. and T. Sapp (2007). Mutual fund flows and investor returns: An empirical examination of fund investor timing ability. *Journal of Banking and Finance* 31(9), 2796-2816.
- Griffin, D. and A. Tversky (1992). The weighing of evidence and the determinants of confidence. *Cognitive Psychology* 24, 411-435.
- Gruber, M. (1996). Another puzzle: The growth in actively managed mutual funds. *Journal of Finance* 51,783-810.
- Henriksson, R. D. (1984). Market timing and mutual fund performance: An empirical investigation. *Journal of Business* 57, 73-96.
- Henriksson, R. D. and R. Merton (1981). On market timing and investment performance II: Statistical procedures for evaluating forecasting skills. *Journal of Business* 54, 513-534.
- Ippolito, R. (1992). Consumer reaction to measures of poor quality: Evidence from the mutual fund industry. *Journal of Law and Economics* 35, 45-70.
- Jain, P. and J. Wu (2000). Truth in mutual fund advertising: Evidence on future performance and fund flows. *Journal of Finance* 55, 937-958.
- Kamstra, M. J., L. A. Kramer, M. D. Levi, and R. Wermers (2008). Seasonal asset allocation: Evidence from mutual fund flows. *University of Toronto, Working Paper*
- Lee, C. and S. Rahman (1990). Market timing, selectivity and mutual fund performance: An empirical investigation. *Journal of Business* 63, 261-278.
- Nanda, V., J. Wang, and L. Zheng (2003). Family values and the star phenomenon. *University of Michigan, Working Paper*.
- Neal, R. and S. M. Wheatley (1998). Do measures of investor sentiment predict returns?. *Journal of Financial & Quantitative Analysis* 33 (4), 523-548.
- Nesbitt, S. (1995). Buy high, sell low: timing errors in mutual fund allocations. *Journal of Portfolio Management* 22, 57-60.
- Odean, T. (1998). Volume, volatility, price and profit when all traders are above average. *Journal of Finance* 53, 1887-1934
- Odean, T. (1999). Do investors Trade Too Much?. *The American Economic Review* 89 (5), 1279-1298.
- Pozen, R. C. (1999). The Mutual Fund Business. *The MIT Press, Cambridge*.
- San, G. (2006). Who Gains More by Trading – Individuals or Institutions?. *Tel-Aviv University*
-

Treynor, J. and K. Mazuy (1996). Can mutual funds outguess the market?

Harvard Business Review 44, 131-136.

Volkman, D. A. (1999). Market volatility and perverse timing performance of mutual fund managers. *Journal of Financial Research* 22, 449-470.

Warther, V. A. (1995). Aggregate mutual fund flows and security returns.

Journal of Financial Economics 39, 209-235.
