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Short-term performance persistence in mutual equity funds:

A relative comparison between four Swedish banks

TOMI KAUKINEN 19399
MARCUS BOSTRÖM 19582

ABSTRACT

This thesis examines the short-term performance persistence of the four largest banks in Sweden from 1994 to 2005. We calculate returns using averages of all equity funds in each bank. Then we evaluate their short-term performance persistence using the median return as benchmark on a monthly basis. The results show that there is no significant short-term performance persistence. Findings using annual returns confirm the non-existence of the short-term performance persistence phenomenon as well. Our study also shows that banks with no significant persistence beat the market on a risk adjusted basis.

Supervisor: Stefan Engström
Opponents: Mattias Säker
Magnus Morin

1. Introduction.....	3
2. Previous research	4
3. Data & Methodology.....	7
3.1 Data Set.....	7
3.3 Survivorship bias problems.....	10
3.4 Methodology	12
3.1.1 Calculating Short-term Persistence.....	12
3.1.2 Overall Winning vs. Repeat winning.....	13
3.1.3 Repeat Winning vs. Excess Returns	13
3.1.4 Top funds' Impact on Bank Performance.....	14
3.1.5 Long-term persistence of banks	15
3.1.6 Economic impact of long-term persistence.....	15
4. Results	16
4.1 Short-term persistence	16
4.2 Overall Winning vs. Repeat Winning.....	18
4.3 Repeat winning vs. excess returns	20
4.4 Individual fund impact.....	21
4.5 Long-term persistence of banks	22
4.6 Economic impact of long-term persistence.....	24

1. Introduction

The mutual fund industry in Sweden is growing with a fast pace and the need for evaluation methods, i.e Sharpe, Jensens Alpha etc, of the mutual fund development is of course an interesting topic for the investor.¹ Investors may want to see how fees, fund managers and other fund specific attributes relate to performance. Morningstar for example rates the best fund managers by looking at the overall development of their funds on a risk-adjusted basis among others. If a mutual fund is portrayed in negative light according to some ratio it will most probably use another measure to show external investors how good its fund really is.

One way of attracting investors to invest in funds is by showing historical performance in ads and other related contexts. In the mutual fund industry the back-to-back superior performance is frequently used as a marketing method. Although this method is applied in the mutual fund ads, they almost certainly do have a fine print stating that historical performance does not guarantee a superior future performance.

How can past performance then be related to future performance and does the track record of a mutual fund contain information about future performance? There is no clear cut answer to this question but numerous papers have targeted this subject with varying results, showing not only that historical performance in fact affects future performance but also that historical performance does not have any effect whatsoever on future performance. Our aim is to deepen the field of study using a somewhat different approach and data than the previous papers. Most studies have used U.S data and only a few have looked at the Swedish mutual fund market.

Sweden has a wide array of mutual funds growing by the day and we have collected data from the four largest suppliers of mutual funds in Sweden, the Swedish banks, Nordea,

¹ The total fund wealth at the end of 2005 for Swedish funds was 1319 billion SEK and an increase of 320 billion SEK compared to 2004. The increase comprised 99 billion in new savings (incl. dividends) and 220 billion in value increase. Since December 2002 the total fund wealth has doubled. Data from the Swedish Investment Fund Association.

SEB, Handelsbanken and Föreningssparbanken. More than 68.8% of all money invested in mutual funds in Sweden are invested in one these banks' funds which makes this choice of funds interesting for Swedish investors.

The aim of this paper is to examine whether top Swedish banks can show signs of persistence when using a relative measure, i.e. comparing the banks to each other and if there are any economic significance between persistence and actual performance. Firstly, we present previous research followed by section three which describes our data set, survivorship bias problems and methodology. Section four describes our results and gives short comments of probable causes and finally section five presents our conclusions.

2. Previous research

The performance persistence research year to date has been extensive and in most cases conclusive, supporting the existence of persistence in both the short and the long run. The question of persistence can be related to many factors and parameters including fund manager skill, fee structures, macroeconomic development etc. While some have targeted one of these factors some have targeted all of them in search of a reason for persistence.

The following statement by the Consumer Guide (1988, p.14) is capturing the relevance of all the research, "Loads, fees, and expenses can be considerable, but most financial professionals suggest that the performance of the fund, not the costs, should be the primary consideration when choosing a fund."

One of the first papers giving a general view on mutual fund performance and the ability to predict it was Sharpe (1966). Sharpe found some long-term persistence in mutual funds measured by Treynors Index in 1944-1953 to 1954-1963, but required further work to properly evaluate this result. Sharpe also showed that if markets are very efficient, the funds spending the least should show the best net performance. Thus both low expense ratios and Treynors Index were to some extent predictors of future performance.

Grinblatt and Titman (1992) conclude that there is positive persistence in mutual fund performance, irrespective of the source or sources, and that the past performance provides useful information for investors. An abnormal return for every 1% in the five previous years gives an expected return of 0.28% greater in the following 5 years. Further, Hendricks, Patel and Zeckhauser (1993) find that mutual funds exhibit short-term persistence with a peak after roughly one year and that an investment strategy based on previous performance can improve risk-adjusted returns up to 6% per year. Although the results are compelling we must point out that they were achieved without taking tax consequences into account which probably would have given different results. As Grinblatt and Titman also noticed the persistence in returns was not driven by any known anomaly such as firm size or dividend yields, but some unexplained phenomenon.

In contrast to this result Carhart (1997) also found performance persistence in mutual funds on a one-year basis, but that the effect is mostly attributed to common factors in stock returns, mutual fund expenses and transaction costs and not to superior stock picking skills. The effect is partly due to a momentum² effect when mutual funds by chance happen to hold on to a greater share of last years winners.

Goetzmann and Ibbotson (1994) examine persistence for yearly, two-year and monthly returns for a 13-year period and find persistence for all categories and also show that the combined R²-value is as high as 15% implying that a fairly large amount of excess performance can be attributed to past performance.

Another study by Brown and Goetzmann (1995) shows that both winners and losers repeat but mostly as a result of funds lagging passive benchmarks. However, they also conclude that persistence is to a high extent dependent on the time period of study. In addition there are also two other reasons for persistence; correlation across managers and the presence of underperformers in the sample. The impact of the time period on the

² An effect that occurs when people believe that the best predictor for tomorrow's return is today's return and not fundamentals and therefore keeps buying shares on their way up. The opposite of contrarian behavior which means buying shares on their way down and selling shares on their way up. These behaviors have shown to affect markets, see Grinblatt and Keloharju (2000).

study is further elaborated by Malkiel (1995) who examines the equity mutual fund space from 1971 to 1991 and finds that persistence was very strong in the 70's but just half of the time in the 80's. He concludes that the results are not robust and that there is no reason to assume that the efficient market theory does not hold.

Blake, Elton and Gruber (1996) state that underperformers are high expense funds but that the removal of them from the sample still tells a lot about the future performance. They also find that alphas from past performance in funds can convey information up to three years into the future stating that performance persistence can be a fairly long-term phenomenon.

A different approach is undertaken by Christopherson, Ferson and Glassman (1998). Instead of focusing on mutual funds they examine the performance of pension funds which act in a somewhat different regulatory environment to see whether the persistence is present there as well. Theoretically, persistence is harder to maintain in pension funds due to the common specialization that exists among them. Christopherson et al. finds that persistence is present but that it is concentrated to funds with poor performance. Thus back-to-back poor performance is the most common performance persistence in pension funds.

Finally we will discuss the results from two studies that have not focused solely on the U.S and its fund space. The other study outside the U.S is concerning Swedish funds and their performance and was conducted by Dahlquist, Engström and Söderlind (2000). Several characteristics of the funds were addressed, including fund size, fee structure and past performance. No significant performance persistence could be found for Equity funds and Bond funds but there was significant persistence for Money market funds. It is interesting to notice that these two studies outside the U.S do not find any significant signs of performance persistence considering that most U.S papers have found performance persistence.

It is worth noting that all of the studies above have used indices or own benchmarks to examine performance persistence effects. Cheng, Pi and Wort (1999) examine mutual fund houses on a relative basis, comparing funds against each other instead of some benchmark, in Hong Kong. By examining mutual funds houses instead of independent funds the authors could examine the effect of correlations among managers previously documented by Brown and Goetzmann. In contrast to almost all previous research no short-term persistence was found for the Hong Kong fund houses. Only two out of thirty-two fund houses could show persistence in returns but these houses would have achieved high returns unconditional of past returns. The possible reasons for persistence in these two funds discussed are management strategies and supervision.

Our study will not use the benchmark approach conducted in most persistence studies but rather a relative approach in the style of Cheng, Pi and Wort's study. The reason is that Engström et al. have already shown the results for the Swedish market with a benchmark approach, concluding no hot-hand effects.

As a final remark we would like to point out that while most people tend to interpret the performance persistence phenomenon only from a positive perspective it is worth noting that most studies have not only documented positive persistence but also negative persistence, in many times to an even higher extent. The worst performers tend to perform bad or even worse in the following period implying that bad performance is an important signaling method for investors to withdraw their investments.

3. Data & Methodology

3.1 Data Set

The data we have gathered is the equity mutual fund returns from 1994 to 2006 for the four Swedish banks, SEB, Handelsbanken, Föreningssparbanken and Nordea. By taking on these four large institutions our approach differs from the ones taken by several other authors, who choose all equity funds in a market during some time period. Our main motives are manifold but two important factors are examined with this approach. Within

the fund space of one bank it is highly possible that they follow similar investment strategies, have the same underlying view on investments, the same people supervising and evaluating, share the research etc. In this way we can shed light on the issue discussed by Brown and Goetzmann (1995) above about correlation across managers as a driver of short-term persistence.

The other is the spill-over effect on the bank's other funds. When one fund in a bank is performing well the whole bank tends to get the attention of investors and reaping the benefits of this single fund's good performance. Because of this it is also important to examine that while some funds might do well, the overall performance of the fund house or bank might be below average.

We have chosen to use equity funds since all previous research has been based on equity funds, but also because mixing of different funds, for example bond funds together with equity funds, can seriously affect the results in an adverse way by creating different risk-profile comparisons. The data is gathered from two sources, Morningstar and SIX TRUST database. To distinguish equity funds from other funds we have used Morningstar's definitions of equity funds which mean that equity funds are funds that comprise more than 75% equity. After having controlled the percentage invested in equity in a fund in Morningstar, we have chosen the funds from the four banks that fulfil these criteria.

With all equity fund names in hand we have used SIX TRUST database to obtain the monthly NAV for all the funds on a cash-dividend adjusted basis from January 1994 to December 2005. All money from dividends is thus reinvested on the ex-dividend day. All funds have not existed since 1994 and below are the aggregate statistics of all the funds in the sample on a year to year basis. Further, we have not included funds that have existed less than 2 years.

Table 1

	Total								
	funds	Handelsbanken		Nordea		FSB		SEB	
1994-12-30	89	13	14,6%	14	15,7%	25	28,1%	37	41,6%
1995-12-29	97	15	15,5%	15	15,5%	28	28,9%	39	40,2%
1996-12-30	101	17	16,8%	15	14,9%	29	28,7%	40	39,6%
1997-12-30	110	18	16,4%	18	16,4%	31	28,2%	43	39,1%
1998-12-30	123	20	16,3%	21	17,1%	35	28,5%	47	38,2%
1999-12-30	138	22	15,9%	26	18,8%	37	26,8%	53	38,4%
2000-12-29	157	27	17,2%	35	22,3%	39	24,8%	56	35,7%
2001-12-28	165	28	17,0%	39	23,6%	41	24,8%	57	34,5%
2002-12-30	168	29	17,3%	40	23,8%	42	25,0%	57	33,9%
2003-12-30	174	29	16,7%	43	24,7%	44	25,3%	58	33,3%
2004-12-30	174	29	16,7%	43	24,7%	44	25,3%	58	33,3%
2005-12-30	174	29	16,7%	43	24,7%	44	25,3%	58	33,3%

Notes:

Table 1 shows the funds over the whole sample period on an aggregated basis. Column 2 shows the total amount of funds for the different years while the first column under each bank shows the bank's amount of equity funds that year. The second column under each bank shows the bank's relative weight to the total amount of funds.

We can see from the table that the number of equity funds has increased with almost 100 percent during the 12 years of our sample. Handelsbanken and Nordea have increased the relative amount of equity funds compared to each other while FSB and SEB have decreased their relative share of equity funds. During the whole time period there is a slight overweight for the FSB and SEB funds' relative share of the total amount.

It has become acceptable to compare funds with each other rather than against a benchmark such as the S&P 500 to see if a fund is "hot" or not. Our benchmark in this study will be the monthly median return of the banks in the sample. In this way the banks will compete only against each other and we will see which bank is "hot" by looking how often it has beaten the benchmark, the monthly median returns of all banks', two months or more in a row. By using median returns instead of CAPM or APT- based models we

can protect ourselves from the strong assumptions that follow these models, for example perfect markets.

Since most of the previous research show persistence in performance for equity mutual funds there is an obvious conflict with the theory of random walk and efficient markets. Efficient market theory states among other things that fund managers with good track records should not be able to keep up the good performance by nothing else than chance; i.e. luck. The market has no memory and behaves like a stochastic variable, purely random. Still much of the literature regarding persistence in performance for mutual funds tends to find this persistence. We are personally aware that investors are in many cases acting irrationally and that there are many psychological phenomena related to the stock market and its development such as January effects, momentum and contrarian behavior etc. but we still believe that markets are efficient and that money managers are nonetheless not, on average, better than chance. Thus, our null hypothesis in this study will be that of no persistence.

3.3 Survivorship bias problems

A problem that is related to all the research within the area of performance persistence is the problem of survivorship bias, a problem that affects the outcome of the study to a major or minor part. Survivorship bias occurs when a dataset of funds does not take in to account the poor performers that are liquidated or merged into other funds. In datasets like that only surviving funds affect the outcome thus biasing it upwards. Many research papers have also addressed this question in combination with their persistence study obtaining, in some cases, very serious implications for persistence studies. Blake, Elton and Gruber writes: “Failing to account for survivorship bias can introduce the appearance of predictability when none exists.” Thus the question of survivorship bias is very important.

Another serious implication of the survivorship bias is that fund managers that take on large amounts of risk will have a high probability of failure. Should the manager succeed and survive, the manager thus took a large risk and won. Consequently, the high risk and returns will persist since these funds are in our sample.

When comparing a previous time period to a following time period survivorship bias occurs because a comparison between the two time periods is not possible if the fund has not survived and has been merged into some other fund. Therefore survivorship bias will always be present to some extent in studies of this kind. The million-dollar question is thus how large the survivorship bias actually is. The papers outlined above have in several cases provided own studies of survivorship bias, using several different methods, which have resulted in estimates of the size of the survivorship bias.

Brown and Goetzmann (1995) estimate the bias to 0,2-0,8 percent depending on the weighting for the period 1977-1988. Malkiel (1995) estimates the bias for the time period between 1982-1991 to 150 basis points which is a very high result compared to other studies. Carhart, Carpenter, Lynch and Musto (2002) states that the survivorship bias depends on the length of the sample. They find that survivorship bias is 0,07% for one year samples, 0,37% per year for five-year samples and for samples longer than 15 years 1% per year is a good approximation. Dahlquist, Engström and Söderlind (2000) examine survivorship bias for Swedish equity mutual funds and find that it ranges between 0,6-0,7% per year for the years 1993 to 1997.

It is conclusive that survivorship bias really exists and biases studies of performance persistence and that it should be corrected for when performing a study. Our dataset is not different from other studies and most certainly exhibit survivorship bias problems in the percentage ranges outlined above. In our relative approach we do not have any reason to assume that one bank has more survivorship bias than another. Because of this problem, and the relative benchmark approach described above, our study will stand on a different empirical approach considering only banks' relative performance thus comparing only

funds that have survived with each other. This is a way of mitigating the survivorship problems in most studies, although not totally wiping them away.

3.4 Methodology

3.1.1 Calculating Short-term Persistence

For our first tests we have used non-parametric tests to test for hot-hand effects. First we have calculated an average of the monthly returns of all equity funds offered by the bank in order to get the monthly return of each bank. After that we classify the banks into two groups, above-median or below median performers by using the median bank return as a benchmark. This is calculated every month for the whole time period. Since there are four banks the median is calculated as the average of the two middle medians.

After having calculated the median returns for the whole time period the banks can be classified into one of the four categories:

1. Superior performance in the previous month and in the subsequent month.
2. Superior performance in the previous month but inferior in the subsequent month
3. Inferior performance in the previous month but superior in the subsequent month.
4. Inferior performance in the previous month and inferior in the subsequent month.

Consequently, a win-win bank is a bank that has beaten the other banks in two subsequent months. A win-lose bank is a bank that has beaten the other banks in the previous month but lost in the subsequent month. A lose-lose bank is a bank that has lost to the other banks in two subsequent months and finally a lose-win bank is a bank that has lost in the first period but showed better performance in the subsequent period. By calculating these four outcomes we can find the repeat winning (losing) probability, i.e. the probability of winning (losing) given that a bank has won (lost) initially. This is calculated by taking the number of win-win outcomes and dividing it with the sum of win-win and win-lose outcomes. Repeat losing is calculated as the number of lose-lose

divided by the sum of lose-lose and lose-win outcomes. Using a Z-statistic we will measure if the repeat winning (losing) probabilities are significantly different from 0,5 which it would be if next months winning (losing) was pure chance. The Z-statistic is calculated:

$$Z = \frac{(Y - np)}{\sqrt{np(1 - p)}}$$

where p = is the probability of winning (losing); Y = number of times of winning (losing) in consecutive months; n = total number of times of winning (losing).

3.1.2 Overall Winning vs. Repeat winning

After calculating short-term persistence we have to correct for the possible problem of clustering of results. In worst case a bank can have achieved its good results during one small period of the time, thus biasing its repeat winning ratio upwards. For example, in an extreme case, a bank can have achieved only above-median performance in only two periods that are subsequent in the whole time period giving it a repeat winning ratio of 100 percent. This has to be corrected for and we have to examine whether a bank is a superior performer given that it has a high repeat winning ratio.

We will also report the average monthly economic gains when a bank has had win-win (lose-lose) months. These excess returns are calculated as the monthly differences between the win-win (lose-lose) months' returns and the median for the whole time period divided by the number of consecutive winning (losing) by the bank. Logically, the average excess returns should be positive for win-win months and negative for lose-lose months.

3.1.3 Repeat Winning vs. Excess Returns

Is there a relationship between a high repeat winning ratio and the returns for investors, implying that hot-hand banks also earn the most for their investors? Hendricks, Patel and Zeckhauser (1993) among others have investigated and found support for the possibility of high risk-adjusted returns through hot-hand investment strategies. We examine this issue by calculating the average monthly returns in excess of the median for the sample period on an annual basis. Thus it is the annualized difference between average monthly return of the bank and the median of all banks. According to previous research the banks with the highest repeat winning ratio should thus provide the highest excess returns as well making it a good investment strategy.

3.1.4 Top funds' Impact on Bank Performance

To further investigate the hot-hand phenomenon of mutual funds we will have to examine the impact of the top performers in the banks' funds to their overall performance. So far we have only examined the persistence for banks and not their funds. By analyzing only the banks' performance our results could be biased and lead to false conclusions regarding the banks performance. A bank's results could in fact be driven by a few star funds accounting for the whole superior performance of that bank. In that case it might be difficult to give credit to the bank as a whole, and interest should thus be directed towards that star fund.

We investigate all of the individual funds in each bank by first calculating the total amount of repeat winning for all of the bank's funds and then comparing it to the fund with the highest frequency of repeat winning. Consequently we will get a proportion of the top fund's ratio of win-win to the bank's whole win-win frequency and therefore demonstrate if this top fund is, to some extent, behind the performance of that bank.

3.1.5 Long-term persistence of banks

As some previous studies have stated, funds tend not to only exhibit short-term persistence but also long-term persistence ranging from one to several years ahead.³ Therefore we will also investigate if persistence is present in the longer run as well and if we can support the evidence in earlier studies. Annual returns will first be calculated as the annual returns of all individual funds in the fund house. Then we compute the average of all the funds in each bank for each year to obtain annual returns for the banks.

As before, the median of annual returns of all the banks will serve as the benchmark for winners and losers. Since many funds in the sample have not existed for the whole time period, and because we need to have some minimum amount of years to avoid funds with perhaps only two years of returns, we require that all of the funds in this calculation have at least been in the sample for 7 years.

3.1.6 Economic impact of long-term persistence

To remain consistent with the analysis performed on the monthly data we also need to control for the relation between the repeat winning probability, win-win percentage and the annual returns. In the same way as above we will perform a relative comparison but also risk-adjust our results to be able to compare it to the markets risk-adjusted returns over the same period. Previous research has documented that even though fund houses do not tend to exhibit persistence they still tend to beat the market on a risk-adjusted basis. The average annual returns are calculated by taking the mean of banks annual returns over the period and the standard deviation is simply the annual standard deviation of the banks returns. The risk-adjusted return is consequently the former divided by the latter.

³ Grinblatt and Titman (1992), Hendricks, Patel and Zeckhauser (1993), Carhart (1997).

4. Results

We now turn to the results we have obtained when trying to find signs of persistence in equity mutual fund performance for the four Swedish banks. The results will be described in the same order as in the previous section and some theoretical viewpoints will be added as comments to the obtained results.

4.1 Short-term persistence

A “hot-hand”-bank is a bank that has a probability significantly higher than one half to beat the median after beating it the previous month. Thus it is a conditional probability measure and a repeat winning probability of one half means that the bank has no greater possibility to beat the median than pure chance, i.e. there is no persistence in performance. As many previous research papers have found there are also cold-hand phenomena related to persistence in performance and our tables also include repeat losing statistics to examine whether there are signs of cold-hand banks.

Table 2

								Z- statistic	Z- statistic	
	Win- Win	Win- Lose	Lose- Win	Lose- Lose	Total Wins	Total Lose	Repeat win	repeat Win	Repeat Lose	repeat lose
Handelsbanken	40	33	34	35	74	68	0,548	-0,128	0,507	0,123
Nordea	22	33	32	55	55	87	0,400	0,000	0,632	0,000
FSB	48	36	37	21	85	57	0,571	-0,125	0,362	0,100
SEB	34	38	37	33	72	70	0,472	0,000	0,471	0,000

Notes:

Table 2 presents the statistics of win-win, lose-lose, win-lose, lose-win and repeat winning for the four banks. A winner is a bank that has a monthly average above the median for all banks.

Conversely, a loser is a bank that has a monthly average below the median for all banks. Win-win is the number of times a bank has achieved above-median returns in any two subsequent months.

Win-lose is the number of times a bank has had above-median returns in the previous month and

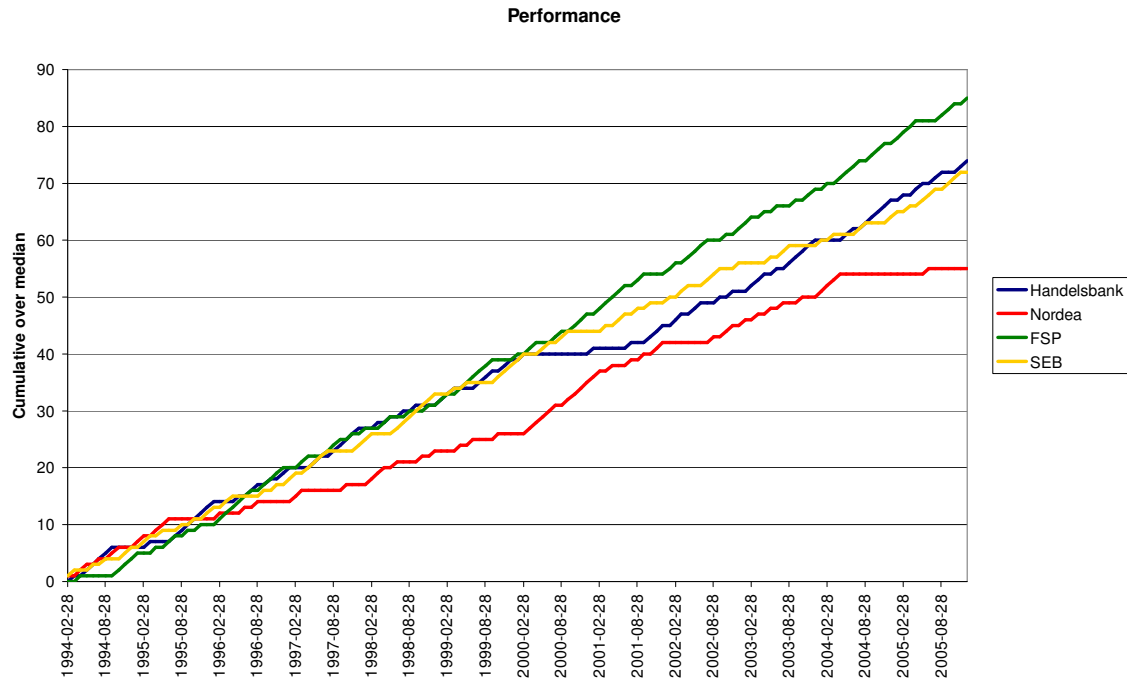
below-median returns in the following. Lose-lose is the number of times a bank has had below-median returns in any two subsequent months. Lose-win is the number of times a bank has had below-median returns in the previous month and above-median in the following. Repeat winning describes the probability of winning two consecutive months when the bank has already won initially, while repeat losing describes the probability of losing in two consecutive months given that it has lost initially. For both of the results we have calculated a Z-statistic to see whether the results are significantly different from the expected value of 0,5 which would occur if there was no persistence in performance. The Z-statistic is calculated:

$$Z = \frac{(Y - np)}{\sqrt{np(1 - p)}}$$

where p = is the probability of winning (losing); Y = number of times of winning (losing) in consecutive months; n = total number of times of winning (losing).

From the table we can see that none of the banks seem to exhibit any form of statistically significant persistence in performance. Föreningsparbanken shows the highest win-win and also the lowest lose-lose situations. They also show a fairly high percentage of repeat winning but despite these high percentages they fail to show any statistically significant signs of positive persistence. In addition to high repeat winning they also have the lowest repeat losing percentage, although insignificant. Thus we cannot conclude anything from these results.

The absolutely worst performer is Nordea with the lowest amount of win-win and the highest amount of lose-lose situations, but as in the first case all the results are insignificant and therefore not statistically safe. The probability of repeat winning is insignificantly the lowest and the probability of repeat losing is by far the highest. Handelsbanken and SEB come in second and third place respectively when ranked by probability of repeat winning but not accounting for significance. These results lead us to believe that there is no inverse relation between repeat winning and repeat losing implying that the higher probability of repeat winning, the lower probability of repeat losing, as other studies have concluded.



The table shows the four banks and their cumulative performance over the median. If the banks would be equally good performers over the period all four lines would form only one line in a 45 degree angle. Now we can see that Nordea have from the beginning been lagging behind and also that much of Föreningssparbanken's above-median performance has come after 2000.

4.2 Overall Winning vs. Repeat Winning

Table 3

	repeat	WW%	win-win	WW	WW	lose-	LL	LL	
	w	rank	%	excess	excess	ll%	lose	excess	excess
				mean	sd	rank	%	mean	std
FSP	57,1	1	33,8	1,003	0,818	4	14,8	-1,163	0,742
Handelsbanken	54,8	2	28,2	0,824	0,542	2	24,6	-0,970	0,490
SEB	47,2	3	23,9	1,099	0,815	3	23,2	-1,199	0,979
Nordea	40,0	4	15,5	0,845	0,676	1	38,7	-0,763	0,664

Notes:

Table 3 describes and compares the difference between the repeat winning (losing) ratio and the overall win-win or lose-lose for each bank over the sample period. In column 1 the banks are ranked after their repeat winning probabilities while column 3 ranks according to the overall win-win ratio and column 4 shows the overall win-win percentage. Column 7 ranks the lose-lose percentage and column 8 shows the percentage of lose-lose situations over the period. Columns 5 and 6 shows the excess mean and excess standard deviation respectively for the win-win months while columns 8 and 9 shows the same for lose-lose months.

In table 3 we have classified the results and we can see if a repeat winner is also a superior performer in general. If a high probability repeat winner is a superior performer then Föreningssparbanken would have the highest percentage of win-win percentage and this is the case. Föreningssparbanken has a win-win percentage of over 33 percent and is clearly a superior performer in any month compared to the other banks. Moreover, Föreningssparbanken also has the lowest lose-lose percentage as well making it a better performer in general once again. The amount of consecutive losses to the whole period is only 14 percent. However, since the repeat winning probabilities for all banks are not statistically significant we cannot draw any meaningful conclusions from these results.

Overall, these results does not seem to confirm the fact that “hot-hand” banks are also superior performers in general and that banks with high win-win percentage also tend to

have lower lose-lose percentage because our results are insignificant. Thus, our results are in line with those results obtained in the study by Cheng, Pi and Wort (1999).

4.3 Repeat winning vs. excess returns

Some studies have come to the conclusion that an investment strategy based on hot-hand houses will lead to high returns. Our study shows that the banks with the insignificantly highest repeat winning ratio also yield the highest returns. Although the returns are not high in absolute terms they are at least positive for the banks who have higher repeat winning ratio, Föreningssparbanken and Handelsbanken.

Table 4

	Annualized excess return %	Excess Return Rank	Repeat Winning Rank
FSB	0,31	2	1
Handelsbanken	0,50	1	2
SEB	-0,04	3	3
Nordea	-0,63	4	4

Notes:

This table reports the annualized excess returns for the four banks and ranks them in order to search for relationships between the magnitudes of returns and repeat winning probability. The average annualized excess returns are computed as the annualized difference between the monthly average of each bank and the monthly median. Column 2 reports these average excess returns while column 3 and 4 reports the rank based on magnitude of excess returns and repeat winning respectively.

Since our benchmark is the median of all banks and a winner (loser) is a bank that only has above (below)-median it is not expressing the magnitude of excess returns when a bank beats (loses) the median. Theoretically, banks that have very low repeat winning probability could have very high excess returns and vice versa which is actually the case

in another study.⁴ The fund houses with the highest significant repeat winning probabilities had the lowest excess returns.

In line with previous research we conclude that there does not seem to be a relationship between high repeat winning probability and higher excess returns and high repeat losing probability and lower excess returns. This suggests that investing in fund houses that tend to have persistence in performance will not give you higher returns than other fund houses.

4.4 Individual fund impact

The individual fund impact on bank performance is a necessity in this study and we have investigated if the high repeat winning probabilities of the banks are actually just a result of a few star funds.

Table 5. Individual fund impact on bank performance

Bank	Rank in repeat winning	Max pos. WW	Total WW	Proportion of Top fund's WW of Total WW %
Handelsbanken	2	3175	800	6,13
Nordea	4	4010	932	5,47
FSP	1	5098	1380	3,99
SEB	3	7045	1747	3,21

Notes:

This table shows if individual fund performance can explain the repeat winning probability of the four banks. Column 2 shows the rank in repeat winning as reference. Column three shows the maximum possible amount of win-win situations for all the funds in a fund house given that they have had above-median returns since their existence in our sample. Thus it is the sum of all trading days in the sample. Column 4 describes the actual amount of win-win months for all of the funds in each bank. Finally, column 5 describes the proportion of each bank's top fund to the

⁴ Cheng, Pi and Wort (1999)

actual total win-win for all of the funds. The average proportion of an equity fund to all funds in a bank is about 2,5 percent.

We can see from the table that the number of maximum possible win-win situations, i.e. the number of total trading days varies a lot between the four banks and that the bank with the most funds, SEB, has the least affective proportion of its top fund to overall performance. It also seems like the banks with the smallest number of equity funds tend to have funds that affects their performance persistence the most.

The average proportion of an equity to all funds in a bank is approximately 2,5 percent which means that all banks have a fund that is better than the average weight of all banks. We can also see that no bank has a fund that is exceptional and accounts for very large parts of its persistence. The bank that has the highest proportion explained by individual fund performance is Handelsbanken with 6,13 percent which is more than two times over average but still very low. Another interesting point is that although Föreningssparbanken has the best performance in both repeat winning and win-win percentage, although insignificant, they have a very low impact on their performance by their top fund. It could support previous theories about cross-correlation among fund managers and indicate that Föreningssparbanken's fund managers tend to perform well at the same periods of time.

4.5 Long-term persistence of banks

Since previous research has found persistence not to be a short-term phenomenon alone we have examined the effects of long-term persistence for our four banks as well. The results are found in the table below.

Table 6. Long-term persistence of the banks

	Win- win	Win- lose	Lose- win	Lose- lose	Repeat w%	Repeat w Z	Repeat lose%	Repeat lose Z
Handelsbanken	2	3	3	3	40,0	-0,33	50,00	0,0000
Nordea	4	3	2	2	57,1	0,00	50,00	-0,4472
FSP	3	3	3	2	50,0	0,00	40,00	-0,3333
SEB	1	3	4	3	25,0	-0,26	42,86	0,0000

Notes:

The table describes the long-term persistence of the banks with an identical approach as the monthly one. Instead of monthly returns we have calculated the annual returns for the banks. The annual returns are computed for all individual funds in a bank and they are the aggregates of monthly returns. From all the individual funds we have then computed an average for every year for each bank. We have excluded all funds which have not been in the sample for more than 7 years. As before, a win-win situation is when a bank's annual return exceeds the median for all banks in two consecutive years and a lose-lose is when a bank's annual return is below the median in two consecutive years. The repeat winning (losing) probability is when a bank has above-median (below-median) return after having above-median (below-median) return initially

in the previous year. The Z-statistic is calculated:
$$Z = \frac{(Y - np)}{\sqrt{np(1 - p)}}$$

where p = is the probability of winning (losing); Y = number of times of winning (losing) in consecutive years; n = total number of times of winning (losing).

First of all, as in the monthly analysis, none of the results are statistically significant stating that the existence of yearly persistence among the banks is, at least statistically, non-existent. As in the case of the Hong Kong study our results point to the fact that there seems to be no short-term persistence neither on a monthly basis nor an annual basis.

4.6 Economic impact of long-term persistence

	Repeat	Win-	Repeat	Lose-	Avg. Annual	Risk-
	w%	win %	lose%	lose %	ret	adjusted return
Nordea	57,1	36,4	50,00	18,2	11,3	0,49
FSP	50,0	27,3	40,00	18,2	11,9	0,51
Handelsb.	40,0	18,2	50,00	27,3	11,3	0,45
SEB	25,0	9,1	42,86	27,3	10,3	0,45

Notes:

This table shows the economic impact on performance on an annual basis. Column 2 describes repeat winning probability while column 3 shows the win-win percentage on an annual basis. Columns 4 and 5 show the same for repeat losing and win-win percentage. Column 6 describes the average annual returns for the sample period. The average annual returns are computed first by calculating the annual returns for individual funds in each house. All funds that have not existed for at least 7 years are excluded from the sample. Then we compute the average for each bank for every year and obtain the bank's annual return. Finally we compute the average over the whole time period. The risk-adjusted return is simply the average annual return divided by the annual standard deviation for the time period. The market's (OMXS30) RARR is 0,46 for the same time period.

Previous studies have found that although no significant persistence can be found the fund houses have beaten the market on a risk-adjusted basis. The Swedish market's RARR (risk-adjusted return ratio) is 0,46 for the sample period which means that two of our four banks performs better than the market while two of the banks are slightly below the RARR of the market. It interesting that although Nordea has had a very bad performance on a monthly basis the annual performance differs quite a lot from it exhibiting high average annual returns and higher than market risk-adjusted returns.

Conclusion

Since the beginning of the introduction of mutual funds there has been quite a large amount of research aimed at explaining and examining the predictability of these funds. Not only academics have showed interest in the topic but also everyday investors looking to earn abnormal profits. Many research papers have found evidence showing that there is actually some predictability in mutual fund performance, i.e. performance persistence. Most of the research has been focusing on the US equity mutual fund space and only a few outside the US.

Our paper takes a somewhat different approach and explores the Swedish equity mutual fund in a constrained form, comprising four of the largest Swedish banks from 1994 to 2005. We examine persistence in performance using the median of the four banks as a benchmark on a monthly and an annual basis. Our research shows that no significant performance persistence can be found for the banks. On a monthly basis as well as on an annual basis the results are unconditionally insignificant. As in a similar study done for the Hong Kong mutual equity mutual fund space, which only found 2 out of 32 fund houses to exhibit performance persistence, we conclude that, using median as benchmark, no performance persistence can be found in the Swedish bank's equity mutual fund space.

Despite the negative results we obtained we show that all of the banks beat the Swedish market on a risk-adjusted basis showing that persistence in performance has no correlation with overall performance.

Since our study was constrained to four large institutions a suggestion for future research would be an even thorough examination of several equity mutual fund houses or perhaps using a different benchmark.

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Appendix

SEB Funds weighted after Morningstar Categories

Asien ex Japan	3	5,17%
Asien, övriga landfonder	0	0,00%
Australien & Nya Zeeland	0	0,00%
Belgien	0	0,00%
	0	0,00%
Branschfond, allmännyttigt	0	0,00%
Branschfond, bioteknik	1	1,72%
Branschfond, energi	0	0,00%
Branschfond, fastigheter, enskilda	0	0,00%
Branschfond, fastighetsbolag	0	0,00%
	0	0,00%
Branschfond, finans	0	0,00%
Branschfond, kommunikation	0	0,00%
Branschfond, konsument	0	0,00%
Branschfond, läkemedel	3	5,17%
Branschfond, ny teknik	4	6,90%
	0	0,00%
Branschfond, råvaror	0	0,00%
Branschfond, ädelmetaller	0	0,00%
Branschfond, övriga	0	0,00%
Danmark	0	0,00%
Euroland	0	0,00%
	0	0,00%
Euroland, medelstora bolag	0	0,00%
Euroland, småbolag	0	0,00%
Europa ex Storbr	0	0,00%
Europa ex Storbr, små-/medelstora	0	0,00%
Europa, medelstora bolag	0	0,00%
	0	0,00%
Europa, mix bolag	3	5,17%
Europa, småbolag	4	6,90%
Europa, tillväxtbolag	0	0,00%
Europa, värdebolag	1	1,72%
Europa, övriga enskilda länder	0	0,00%
	0	0,00%
Frankrike	0	0,00%
Frankrike, små-/medelstora bolag	0	0,00%
Global & Sverige	1	1,72%
Global, mix bolag	5	8,62%
	0	0,00%
Global, små-/medelstora bolag	0	0,00%
Global, tillväxtbolag	0	0,00%
Global, värdebolag	0	0,00%
Hongkong	1	1,72%
Indien	0	0,00%

	0	0,00%
Italien	0	0,00%
Japan	3	5,17%
Japan, små-/medelstora bolag	1	1,72%
Kanada	0	0,00%
Kina	0	0,00%
	0	0,00%
Kina & närliggande	0	0,00%
Korea	0	0,00%
Latinamerika	2	3,45%
Nederländerna	0	0,00%
Norden	4	6,90%
	0	0,00%
Norge	0	0,00%
Ryssland	0	0,00%
Schweiz	1	1,72%
Schweiz, små-/medelstora bolag	0	0,00%
Singapore	0	0,00%
	0	0,00%
Spanien	0	0,00%
Storbritannien, medelstora bolag	0	0,00%
Storbritannien, mix bolag	1	1,72%
Storbritannien, småbolag	0	0,00%
Storbritannien, tillväxtbolag	0	0,00%
	0	0,00%
Sverige	6	10,34%
Sverige, små-/medelstora bolag	2	3,45%
Taiwan	0	0,00%
Tillväxtmarknader	4	6,90%
	0	0,00%
Tyskland	0	0,00%
Tyskland, små-/medelstora bolag	0	0,00%
USA, medelstora bolag	1	1,72%
USA, mix bolag	1	1,72%
USA, småbolag	0	0,00%
	0	0,00%
USA, tillväxtbolag	2	3,45%
USA, värdebolag	0	0,00%
Österrike	0	0,00%
Östeuropa	3	5,17%
Östeuropa ex Ryssland	1	1,72%
	58	100,00%

Handelsbanken funds weighted after Morningstar Categories

Asien ex Japan	2	6,90%
Asien, övriga landfonder	0	0,00%
Australien & Nya Zeeland	0	0,00%
Belgien	0	0,00%
	0	0,00%
Branschfond, allmännyttigt	0	0,00%
Branschfond, bioteknik	0	0,00%
Branschfond, energi	0	0,00%
Branschfond, fastigheter, enskilda	0	0,00%
Branschfond, fastighetsbolag	0	0,00%
	0	0,00%
Branschfond, finans	0	0,00%
Branschfond, kommunikation	0	0,00%
Branschfond, konsument	0	0,00%
Branschfond, läkemedel	1	3,45%
Branschfond, ny teknik	2	6,90%
	0	0,00%
Branschfond, råvaror	0	0,00%
Branschfond, ädelmetaller	0	0,00%
Branschfond, övriga	0	0,00%
Danmark	0	0,00%
Euroland	2	6,90%
	0	0,00%
Euroland, medelstora bolag	0	0,00%
Euroland, småbolag	0	0,00%
Europa ex Storbr	0	0,00%
Europa ex Storbr, små-/medelstora	0	0,00%
Europa, medelstora bolag	0	0,00%
	0	0,00%
Europa, mix bolag	2	6,90%
Europa, småbolag	0	0,00%
Europa, tillväxtbolag	0	0,00%
Europa, värdebolag	0	0,00%
Europa, övriga enskilda länder	0	0,00%
	0	0,00%
Frankrike	0	0,00%
Frankrike, små-/medelstora bolag	0	0,00%
Global & Sverige	3	10,34%
Global, mix bolag	1	3,45%
	0	0,00%
Global, små-/medelstora bolag	0	0,00%
Global, tillväxtbolag	0	0,00%
Global, värdebolag	0	0,00%
Hongkong	0	0,00%
Indien	0	0,00%
	0	0,00%
Italien	0	0,00%

Japan	0	0,00%
Japan, små-/medelstora bolag	0	0,00%
Kanada	0	0,00%
Kina	0	0,00%
	0	0,00%
Kina & närliggande	0	0,00%
Korea	0	0,00%
Latinamerika	1	3,45%
Nederländerna	0	0,00%
Norden	3	10,34%
	0	0,00%
Norge	0	0,00%
Ryssland	0	0,00%
Schweiz	0	0,00%
Schweiz, små-/medelstora bolag	0	0,00%
Singapore	0	0,00%
	0	0,00%
Spanien	0	0,00%
Storbritannien, medelstora bolag	0	0,00%
Storbritannien, mix bolag	0	0,00%
Storbritannien, småbolag	0	0,00%
Storbritannien, tillväxtbolag	0	0,00%
	0	0,00%
Sverige	7	24,14%
Sverige, små-/medelstora bolag	1	3,45%
Taiwan	0	0,00%
Tillväxtmarknader	1	3,45%
	0	0,00%
Tyskland	0	0,00%
Tyskland, små-/medelstora bolag	0	0,00%
USA, medelstora bolag	0	0,00%
USA, mix bolag	2	6,90%
USA, småbolag	0	0,00%
	0	0,00%
USA, tillväxtbolag	0	0,00%
USA, värdebolag	0	0,00%
Österrike	0	0,00%
Östeuropa	1	3,45%
Östeuropa ex Ryssland	0	0,00%
	29	1

Nordea Funds weighted after Morningstar Categories

Asien ex Japan	3	6,98%
Asien, övriga landfonder	0	0,00%
Australien & Nya Zeeland	0	0,00%
Belgien	0	0,00%
	0	0,00%
Branschfond, allmännyttigt	0	0,00%
Branschfond, bioteknik	1	2,33%
Branschfond, energi	0	0,00%
Branschfond, fastigheter, enskilda	0	0,00%
Branschfond, fastighetsbolag	0	0,00%
	0	0,00%
Branschfond, finans	0	0,00%
Branschfond, kommunikation	0	0,00%
Branschfond, konsument	0	0,00%
Branschfond, läkemedel	1	2,33%
Branschfond, ny teknik	2	4,65%
	0	0,00%
Branschfond, råvaror	0	0,00%
Branschfond, ädelmetaller	0	0,00%
Branschfond, övriga	1	2,33%
Danmark	0	0,00%
Euroland	1	2,33%
	0	0,00%
Euroland, medelstora bolag	0	0,00%
Euroland, småbolag	0	0,00%
Europa ex Storbr	0	0,00%
Europa ex Storbr, små-/medelstora	0	0,00%
Europa, medelstora bolag	0	0,00%
	0	0,00%
Europa, mix bolag	2	4,65%
Europa, småbolag	0	0,00%
Europa, tillväxtbolag	0	0,00%
Europa, värdebolag	0	0,00%
Europa, övriga enskilda länder	0	0,00%
	0	0,00%
Frankrike	0	0,00%
Frankrike, små-/medelstora bolag	0	0,00%
Global & Sverige	5	11,63%
Global, mix bolag	9	20,93%
	0	0,00%
Global, små-/medelstora bolag	1	2,33%
Global, tillväxtbolag	2	4,65%
Global, värdebolag	0	0,00%
Hongkong	0	0,00%
Indien	0	0,00%
	0	0,00%
Italien	0	0,00%

Japan	1	2,33%
Japan, små-/medelstora bolag	0	0,00%
Kanada	0	0,00%
Kina	0	0,00%
	0	0,00%
Kina & närliggande	0	0,00%
Korea	0	0,00%
Latinamerika	1	2,33%
Nederländerna	0	0,00%
Norden	3	6,98%
	0	0,00%
Norge	0	0,00%
Ryssland	0	0,00%
Schweiz	0	0,00%
Schweiz, små-/medelstora bolag	0	0,00%
Singapore	0	0,00%
	0	0,00%
Spanien	0	0,00%
Storbritannien, medelstora bolag	0	0,00%
Storbritannien, mix bolag	0	0,00%
Storbritannien, småbolag	0	0,00%
Storbritannien, tillväxtbolag	0	0,00%
	0	0,00%
Sverige	6	13,95%
Sverige, små-/medelstora bolag	0	0,00%
Taiwan	0	0,00%
Tillväxtmarknader	0	0,00%
	0	0,00%
Tyskland	0	0,00%
Tyskland, små-/medelstora bolag	0	0,00%
USA, medelstora bolag	0	0,00%
USA, mix bolag	3	6,98%
USA, småbolag	0	0,00%
	0	0,00%
USA, tillväxtbolag	0	0,00%
USA, värdebolag	0	0,00%
Österrike	0	0,00%
Östeuropa	1	2,33%
Östeuropa ex Ryssland	0	0,00%
	43	1

Swedbank weighted after Morningstar Categories

Asien ex Japan	1	2,27%
Asien, övriga landfonder	0	0,00%
Australien & Nya Zeeland	0	0,00%
Belgien	0	0,00%
	0	0,00%
Branschfond, allmännyttigt	0	0,00%
Branschfond, bioteknik	0	0,00%
Branschfond, energi	0	0,00%
Branschfond, fastigheter, enskilda	0	0,00%
Branschfond, fastighetsbolag	1	2,27%
	0	0,00%
Branschfond, finans	1	2,27%
Branschfond, kommunikation	0	0,00%
Branschfond, konsument	0	0,00%
Branschfond, läkemedel	1	2,27%
Branschfond, ny teknik	2	4,55%
	0	0,00%
Branschfond, råvaror	2	4,55%
Branschfond, ädelmetaller	0	0,00%
Branschfond, övriga	0	0,00%
Danmark	0	0,00%
Euroland	0	0,00%
	0	0,00%
Euroland, medelstora bolag	0	0,00%
Euroland, småbolag	0	0,00%
Europa ex Storbr	0	0,00%
Europa ex Storbr, små-/medelstora	0	0,00%
Europa, medelstora bolag	0	0,00%
	0	0,00%
Europa, mix bolag	4	9,09%
Europa, småbolag	1	2,27%
Europa, tillväxtbolag	0	0,00%
Europa, värdebolag	0	0,00%
Europa, övriga enskilda länder	0	0,00%
	0	0,00%
Frankrike	0	0,00%
Frankrike, små-/medelstora bolag	0	0,00%
Global & Sverige	8	18,18%
Global, mix bolag	3	6,82%
	0	0,00%
Global, små-/medelstora bolag	0	0,00%
Global, tillväxtbolag	0	0,00%
Global, värdebolag	1	2,27%
Hongkong	0	0,00%
Indien	0	0,00%
	0	0,00%
Italien	0	0,00%

Japan	1	2,27%
Japan, små-/medelstora bolag	0	0,00%
Kanada	0	0,00%
Kina	0	0,00%
	0	0,00%
Kina & närliggande	0	0,00%
Korea	0	0,00%
Latinamerika	0	0,00%
Nederländerna	0	0,00%
Norden	2	4,55%
	0	0,00%
Norge	0	0,00%
Ryssland	1	2,27%
Schweiz	0	0,00%
Schweiz, små-/medelstora bolag	0	0,00%
Singapore	0	0,00%
	0	0,00%
Spanien	0	0,00%
Storbritannien, medelstora bolag	0	0,00%
Storbritannien, mix bolag	0	0,00%
Storbritannien, småbolag	0	0,00%
Storbritannien, tillväxtbolag	0	0,00%
	0	0,00%
Sverige	11	25,00%
Sverige, små-/medelstora bolag	1	2,27%
Taiwan	0	0,00%
Tillväxtmarknader	0	0,00%
	0	0,00%
Tyskland	0	0,00%
Tyskland, små-/medelstora bolag	0	0,00%
USA, medelstora bolag	0	0,00%
USA, mix bolag	1	2,27%
USA, småbolag	0	0,00%
	0	0,00%
USA, tillväxtbolag	0	0,00%
USA, värdebolag	0	0,00%
Österrike	0	0,00%
Östeuropa	2	4,55%
Östeuropa ex Ryssland	0	0,00%
	44	1