What Are the Effects of Security Selection and Market Timing on Mutual Fund Performance?

A Study of Portfolio Returns and Manager Activity in Sweden

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Abstract: We study the activity of Swedish equity mutual funds by splitting fund manager activity into two different components: market timing and security selection. This is done through a decomposition of the Tracking Error, a method that requires data of the portfolio and index returns exclusively. No portfolio holdings data is needed. We identify with high statistical significance that market timing has a negative correlation with future performance for the funds in our sample, both for the large cap and small/mid cap group. For security selection we see no clear effect on future performance for the large cap funds, but a positive effect for the small/mid cap funds. Furthermore, we find with high statistical significance that fund managers are loyal to their strategies, as there is a strong persistence in stock picking and market timing over time. The results we find are mostly in line with a similar study conducted on the U.S. market, as well as other studies regarding the relationship between fund activity and alpha on the Swedish market.

Keywords: Mutual Fund Activity, Tracking Error, Market Timing, Security Selection

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Contents

1 Introduction **1**

2 Previous Research **4**

3 Data **6**

3.1 Data Issues 7

4 Methodology **8**

4.1 Tracking Error Decomposition 8

4.2 Regressions 10

5 Results **11**

5.1 Descriptive Statistics 11

5.2 Regression Results 16

5.3 Testing Persistence of Fund Manager Activity 18

5.4 Potential Biases In Results 20

6 Analysis **21**

7 Conclusion **23**

8 Future Research **24**

9 References **25**

10 Appendix **26**

1 Introduction

Swedish fund managers have come under attack in recent years, as they have been accused of abysmal performance. Recently the critique has been levelled at the lack of activeness among the Swedish equity mutual funds. Funds that are marketed and priced as being actively managed are in many cases performing very close to an index. Such funds are often called "closet indexers" since they are in fact index funds posing as active funds. The problem with closet indexers is that if a fund is too close to its index there is very little chance that it will be able to outperform the market enough to make up for a management fee around 1.5%, which is typical for actively managed mutual funds. Investors in active mutual funds pay for the possibility of receiving a return higher than the market return. If the fund they invest in is a closet indexer, they are paying for a service that they will not receive. This kind of critique has culminated in a lawsuit of Swedbank filed by Aktiespararna, an interest group for Swedish investors.

A majority of people in Sweden invest in the mutual fund market. Many invest privately in mutual funds and the public pension system is largely constructed around investments in mutual funds. Employers are obligated to contribute 2.5% of gross salaries to the funded part of the pension system, which employees can then choose to invest in more than 800 different mutual funds (Flam and Vestman, 2014). The performance and activities of mutual funds in Sweden is therefore of great importance to the general public since it affects both private savings and future pensions. As active funds have been more and more criticized, investments in index funds have increased markedly in recent years. The share of index funds of the total net worth of equity funds in Sweden has increased from 8% in 2010 to 13% in the beginning of 2016.

Flam and Vestman (2014) studied Swedish explicitly active mutual funds from 1999-2009 and found that they underperform relative to their index net of fees. They found that the funds generated an average positive alpha of 0.9% per year before expenses, but a negative alpha of -0.5% after fees. This means investors are losing money by letting these active funds invest their money, as opposed to putting their savings in a cheap index fund that tracks the market return. The authors were also unable to find any evidence of persistence in returns among fund managers, implying an absence of true management skill.

In this thesis we will explore if the activeness of Swedish equity mutual funds has any predictive ability for their future performance. Inspired by Ekholm's (2012) paper on the U.S. mutual fund market, we investigate the magnitude of active behaviour of explicitly active mutual funds in Sweden. As a proxy for activeness we use the Tracking Error measure, which describes how much a fund has deviated from its index over time. We calculate the Tracking Error of the funds in our data set and split it into two components; security selection and market timing. These are the two ways a fund can be active in its management in order to deviate from its index. Security selection implies picking individual stocks that the fund manager expects will outperform the market as a whole. Market timing implies betting on systematic risk factors. We see that Swedish equity mutual funds engage in both these types of active behaviour.

We estimate security selection and market timing activity for each fund in our sample during ten years that are split into five periods of two years each. Then we regress them against the fund alpha to see if these types of activity have a causal effect on performance. In doing this we use the two-year lagged values in order to see if activity levels can be predictive of performance in the future. The results from our regressions on the large cap funds in our sample show a significant negative relationship between market timing activity and performance among Swedish fund managers and an insignificant positive relationship between security selection activity and performance. This means that when Swedish fund managers try to time the market they seem to have performed worse in the 2006-2015 time span. The activity of stock picking has not had any statistically significant effect on performance.

The small/mid cap funds in our sample are tested separately from the large cap funds. This is because we compare the small/mid cap funds to a different index when estimating the Tracking Error, the Carnegie Small Cap return index. When testing the security selection and market timing activeness of the small/mid cap funds against performance, we get similar results as for the large cap funds. However, among the small/mid cap funds we find statistically significant results that a positive relationship exists between security selection and performance, implying that funds that stock pick more have achieved better performance than funds that stock-pick less. Just as we find in the large cap funds, market timing leads to worse performance among our small/mid cap funds.

Our results are similar to Ekholm's (2012) findings about the U.S. equity mutual fund market, where security selection had a positive effect on alpha and market timing had

a negative effect on alpha. The negative effect for market timing is identified in our Swedish context as well. This holds for both the large cap group and the small/mid cap group, the latter of which in addition proved a positive effect on alpha for security selection, just like Ekholm found.

Our findings regarding the effect of security selection for small/mid cap funds are consistent with recent research that has been done using the Active Share measure, which is based on portfolio holdings data to calculate activeness and should be similar to our returns based ActiveAlpha. Cremers and Petajisto (2009) found that a high magnitude of stock picking led to better performance on the U.S. equity mutual fund market, and Johansson and Häckner Posse (2015) found the same for large cap funds in the Swedish equity mutual fund market.

When we test the Tracking Error solely, containing information on both the security selection component and the market timing component of activity, we find no significant results that it deviates from zero for the large cap funds. In terms of the small/mid cap funds, we detect some evidence of a positive relationship between Tracking Error and alpha. The decomposed Tracking Error enables us to investigate the relationship between fund performance and magnitude of activity more in detail.

Furthermore we find that there is high persistence in activity by Swedish fund managers, both when it comes to security selection and market timing. The fund managers remain loyal to their styles over time, which further validates the idea that fund manager activity can be predictive of performance in the future.

Since market timing activity among Swedish equity mutual funds shows a negative relationship with performance, we naturally recommend investors to avoid market timing mutual funds when investing. Although previous research points to investors being better off by investing in explicit index funds with low fees, if there is any benefit to be found in active fund management it seems to be in funds with a high magnitude of stock picking activity.

2 Previous Research

Flam and Vestman (2014) studied 124 explicitly actively managed Swedish equity mutual funds between 2002 and 2013 and found no evidence of investment manager skill. They found that the funds generated an average positive alpha of 0.9% before expenses but a negative alpha of -0.5% after fees. Furthermore, there wasn't any persistence in performance by fund managers over time.

The Active Share measure was introduced by Cremers and Petajisto (2009) and is an alternative measure of portfolio manager activity. It is based upon portfolio holdings data and describes how much of a portfolio's holdings differ from its benchmark index. Cremers and Petajisto saw a positive effect on performance when funds were active in stock picking.

In the Swedish equity mutual fund market, Johansson and Häckner Posse (2015) found that a high Active Share, implying a high deviation of a fund's holdings from the holdings of its benchmark portfolio, had a positive relationship with a high relative performance in the Swedish mutual fund market between 2005 and 2014. Large cap funds with a low Active Share were found to have underperformed relative to its benchmark.

Cremers et al. (2015) studied the activeness of funds in 32 countries by using the Active Share measure. They found that in countries where explicit index funds were prevalent, funds that were actively managed lowered their fees and became more active. In the countries where there was more explicit indexing, the actively managed funds average alpha was higher, and in countries where there were more closet indexers the average alpha of actively managed funds was lower. Of the countries examined, only Poland had a larger share of closet indexers than Sweden. Closet indexers were shown to charge even higher fees than truly active funds, having a total shareholder cost of 1.47% as opposed to 1.42% for the truly active funds.

Kacperczyk et al. (2008) reveal that in the U.S. fund market, portfolio holdings disclosed to the SEC on a quarterly basis are not representative of portfolio holdings in between disclosure dates. This raises doubts on the validity of studies of mutual funds that are based on the reported portfolio holdings. Since Swedish mutual funds also report portfolio holdings on a quarterly basis (to Finansinspektionen), this issue may be prevalent

within the Swedish fund market as well. An incentive for this could be that fund managers want to hide information on certain holdings to the public.

Ekholm (2012) developed a new method for detecting portfolio manager activity, decomposing the Tracking Error into a market timing component and a security selection component. He found robust results that security selection activity in the past was predictive of good performance in future periods, while market timing in the past was predictive of negative performance in future periods. He also found that portfolio manager activity was highly persistent over time. We have not found any previous research in Sweden that applies the Tracking Error decomposition model on Swedish mutual funds, which should make this thesis a meaningful contribution to the existing literature.

3 Data

We use a fund sample similar to the one used by Flam and Vestman when conducting their study from 2014, which included active equity mutual funds regulated under both UCITS[3] and AIMFD[4]. However, their data set did not include funds that were launched after 2011. Therefore we have manually extended the data by adding new active funds registered on Morningstar that had been in business for at least two years, giving us a fund universe consisting of 130 funds in total.

All of the funds in our dataset publicly categorize themselves as domestic Swedish all-equity mutual funds, some of which invest in each other's funds. Many of them also hold a small share of foreign stock, and they are all required to hold a certain volume of liquid assets.

The Swedish Investment Fund Assication has provided us with day-to-day data of the funds' Net Asset Value and dividends. The data stretches from 2006 to 2015 and is net of fees, which is the relevant number as we are taking an investor perspective in this study. That means some funds may have negative alphas as per this paper, but positive excess gross returns.

As a benchmark index used to calculate Tracking Error for the large cap funds, we use the SIX Portfolio Return Index, SIXPRX. For small/mid cap funds, we use the Carnegie Small Cap Index, CSRXSE. The SIXPRX adjusts for UCITS restrictions saying that mutual funds are allowed to invest at most 10% of the fund's assets in the stocks of a single company, and that companies with a market weight over 5% can't weigh more than 40% combined. Dividends are reinvested in both the SIXPRX and CSRXSE.

In terms of risk-free rate, we use the SSVX 1M, Swedish one-month treasury bills (statsskuldsväxlar), as a proxy. Historical rates are publicly available through the web page of Sweden's central bank, Riksbanken.

In Table 1 below, descriptive statistics are reported for large cap funds and small/mid cap funds respectively. For the large cap group, the average fund lifespan was 2106 days, whereas the corresponding number for the small/mid cap group was 2054 days.

[3] UCITS is an abbreviation of Undertakings for Collective Investment in Transferable Securities and is a set of European Union directives that strive to promote investments funds' prospects to operate across the EU.
[4] AIFMD is short for Alternative Investment Fund Managers Directive, which is a EU directive governing alternative investment fund managers that operate in the EU.

Moreover, each month included 74 large cap funds as well as 29 small/mid cap funds on average. In total, our sample consisted 130 funds, where 93 were classified in the large cap bracket, and 37 in the small/mid cap bracket.

Table 1: Descriptive Statistics, Data Set

	Large Cap Funds			Small/Mid Cap Funds		
	mean	sd	N	mean	sd	N
Average fund lifespan	2106	562		2054	526	
Average nr of funds each day	74	9		29	5	
Total nr of funds			93			37
Observations	183311			70082		

Notes: Numbers have been rounded to the nearest integer. Average fund lifespan is expressed in number of daily observations.

3.1 Data Issues

In the data we obtained on the one-month treasury bills there were a few daily rates missing, leading us to exclude those days from our sample.

The NAV data for the funds also had some suspicious observations where some daily NAV's differed to such a degree from the NAV of the day before and after that the values were clearly incorrect. When that was the case we proceeded to drop those observations from our sample.

4 Methodology

4.1 Tracking Error Decomposition

As much as possible we try to emulate the method of Ekholm (2012) for assessing activity in the equity mutual fund market, which we do through a decomposition of the Tracking Error. We use the Tracking Error measure as a proxy for the magnitude of portfolio manager activity. We define the Tracking Error as the second moment of the unexplained residual return in the Jensen (1968) model:

$$r_i - r_f = \alpha + \beta * (r_M - r_f) + \epsilon$$

where r_i is the return of portfolio *i* at time *t*, r_f is the risk free rate, r_M is the benchmark index return and ϵ is the error term. The Jensen model seeks to explain the excess portfolio return by the excess market return. Often when Tracking Error is discussed, the definition is another one than the one we use here and Ekholm uses in his paper. In that case it is most often referred to as the standard deviation of the difference between a fund's portfolio return and the return of its index. In both cases the measure tries to capture the deviation of a fund from its index.

In our sample, we have separated funds investing in large cap companies from those investing in small/mid cap companies, dividing our sample into two groups that are evaluated in relation to their respective benchmarks, the SIXPRX for the large cap funds and CSRXSE for small/mid cap funds. Comparing small/mid cap funds to the SIXPRX might lead to misleadingly high levels of activity.

We have computed Tracking Error for our 93 large cap funds and 37 small/mid cap funds in the 2006-2015 time period. During this period, many of the funds were not in business the whole time, meaning that the amount and set of funds will vary from year to year.

The Tracking Error is useful as a proxy for activeness since the only way it can deviate from zero is through portfolio manager activity. Fama (1972) defined two different types of portfolio manager activity: security selection and market timing. If a fund manager exhibits a high magnitude of security selection he is taking on a lot of excess idiosyncratic

risk, while a high magnitude of market timing activity implies raising portfolio systematic risk.

We will decompose the Tracking Error into these two different types of activity. The method we use is related to the method of Tracking Error decomposition proposed by Ammann et al. (2006), although that method requires data on the portfolio holdings. The method used by Ekholm enables us to measure the magnitude of activity for Swedish mutual funds using only excess portfolio and excess market returns, thus avoiding the disadvantages of using portfolio holdings data described by Kacperczyk et al. (2008), which was expanded upon under Previous Research. We divide our data (both large cap and small/mid cap) into five consecutive two-year periods in order calculate the Tracking Error for each fund within the time span.

To obtain the Tracking Error and alpha for our funds in each two-year period we run ordinary least squares (OLS) regressions using the one factor model of Jensen (1968), based on daily portfolio returns and daily index returns. We use the SIXPRX and CSRXSE indices as proxies for the market return and the SSVX one-month rate (Swedish T-bills) as a proxy for the risk free rate.

We then use the squared residual as the dependent variable in a regression with the squared market excess return as the independent variable:

$$\varepsilon_{p,t}^2 = \theta_{0,p} + \theta_{2,p} r_{m,t}^2 + \eta_{p,t}$$ [5]

where $\theta_{0,p}$ measures the idiosyncratic residual return standard deviation while $\theta_{2,p}$ measures the excess systematic risk standard deviation and $\eta_{p,t}$ is the error term. Going further, we will refer to $\sqrt{\theta_{0,p}}$ as ActiveAlpha, which is a measure security selection activity (idiosyncratic residual return standard deviation). $\sqrt{\theta_{2,p}}$ gauges market timing activity (excess systematic risk standard deviation), and will hereafter be called ActiveBeta.[6]

[5] For convencience, this equation will be referred to as the Residual Return Analysis Model

[6] When we get negative parameter estimates we set ActiveAlpha and ActiveBeta to zero as the negative parameter estimates represent estimation errors by definition

4.1 Regressions

Having obtained ActiveAlpha and ActiveBeta for our two-year periods, the next step is to do a regression on our unbalanced panel data between the funds' two-year lagged ActiveAlpha and ActiveBeta against the funds' alpha. This way, we are able to study the relationship between the funds' magnitude of the two types of activity and the subsequent performance of the funds.[7]

$$\alpha_{p,t} = \mu_{0,p} + \mu_{1,p} Active\ Alpha_{p,t-2} + \mu_{2,p} Active\ Beta_{p,t-2} + \eta_{p,t}$$

We will also test our calculated Tracking Error against alpha using the two-year lagged values on Tracking Error, in order to see how it relates to our findings on the relationship between performance and ActiveAlpha and ActiveBeta respectively. Doing so will show us if the decomposition of the Tracking Error can provide us with different results than if we had only looked at the regular Tracking Error.

$$\alpha_{p,t} = \mu_{0,p} + \mu_{1,p} Tracking\ Error_{p,t-2} + \eta_{p,t}$$

In order to test the persistence of fund manager activity we will regress our calculated ActiveAlpha and ActiveBeta against its own two-year lagged values.

$$Active\ Alpha_{p,t} = \mu_0 + \mu_1 Active\ Alpha_{p,t-2} + \eta_{p,t}$$

$$Active\ Beta_{p,t} = \mu_0 + \mu_1 Active\ Beta_{p,t-2} + \eta_{p,t}$$

In all our panel data regressions we use robust standard errors to account for possible heteroscedasticity.

[7] When making our panel regressions, we chose to only include funds with at least 150 observations of return data within each two-year period, meaning funds were not included if either alpha or activity measures were calculated using less than 150 observations.

5 Results

5.1 Descriptive Statistics

The data in Panel A of Table 2 shows an average R^2 statistic of 75.38% in the two-year periods from 2006 to 2015 for the large cap group, and 80.34% for the small/mid cap group. These numbers are rather low compared to the corresponding ones in Ekholm's study. Nonetheless, it still suggests valid models and a representative sample. Panel B indicates that portfolio managers of large cap funds on average generate an annualized negative alpha of -0.22% (calculated using daily returns), whereas small/mid cap funds on average generate an annualized alpha of -0.06%.

The statistics in Panel C of Table 2 reveal that portfolio managers take part in stock picking and market timing activities. Our estimations tell that the average large cap manager generates a monthly standard deviation of 0.61% in idiosyncratic returns and a corresponding number of 0.17 in systematic risk. The average small/mid cap manager's ActiveAlpha is slightly lower at 0.54%, whereas ActiveBeta is very near the same level, averaging 0.16. In comparison to Ekholm's paper, we find implications for a more homogeneous portfolio manager activity within the large cap segment, as the standard deviations of ActiveAlpha and ActiveBeta are closer to one half than two thirds of their averages. The same is true for ActiveBeta within the small/mid cap segment, but that group seems to be more dispersed in terms of ActiveAlpha, with a coefficient of variation at 81%.

Table 2: Descriptive Statistics: Large and Small/Mid Cap Funds

	Large Cap Funds, 2006-2015					Small/Mid Cap Funds, 2006-2015				
	Average	Median	StDev	Min	Max	Average	Median	StDev	Min	Max
Panel A: Jensen (1968) Models from 2006 to 2015										
R^2	75.38%	76.95%	16.50%	0.01%	98.11%	80.34%	80.25%	7.50%	52.43%	96.43%
Tracking Error	0.67%	0.59%	0.33%	0.14%	2.41%	0.51%	0.46%	0.18%	0.18%	1.09%
Panel B: Jensen (1968) Models from 2006 to 2015										
α	-0.23%	-0.12%	6.75%	-39.56%	35.33%	-0.06%	0.20%	7.42%	-18.30%	22.63%
β	0.84	0.87	0.18	-0.03	1.07	0.90	0.89	0.11	0.56	1.15
Panel C: Residual Return Analysis Models from 2006 to 2015										
ActiveAlpha	0.61%	0.56%	0.27%	0.16%	2.25%	0.54%	0.48%	0.44%	0.22%	4.86%
ActiveBeta	0.17	0.16	0.08	0.00	0.53	0.16	0.15	0.07	0.00	0.39
Number of observations = 290						Number of observations = 112				

Table 2 reports descriptive statistics for large and small/mid cap funds operating at some point for more than 36 months in the 2006-2015 time span. Panel A: R^2 is the coefficient of determination and Tracking Error the equation error population standard deviation for Jensen (1968) models estimated on daily returns in four consecutive two-year periods from 2006 to 2015. Panel B: α is the annualized daily equation intercept and β the equity market beta for Jensen (1968) models estimated on daily returns in four consecutive two-year periods from 2006 to 2015. Panel C: ActiveAlpha and ActiveBeta are measures for stock picking and market timing activities (estimated using daily residual returns) for four consecutive two-year periods from 2006 to 2015. The number of observations refers to the number of funds having more than 150 daily observations within the 2006-2015 two-year periods.

Figure 1 demonstrates how stock picking activities have developed through time. As is shown, ActiveAlpha circulated around the 0.60% level during 2006 and 2007, before taking a considerable but ephemeral jump in 2008. After 2008, the level dives significantly, suggesting a severe reaction to the financial crisis.

Since the collapse of Lehmann Brothers, the average fund manager appears to have established a more moderate stock picking strategy, reaching a low in 2013 at a level less than 0.40%. In 2014 and the first half of 2015 levels rise somewhat, but then shrink during the last six months of 2015. Furthermore, these patterns hold for both the large and small/mid cap funds, as we see that the groups closely track each other during the entire time span.

Figure 2 presents to what extent the average fund manager have engaged in market timing activities over time. The graphs propose that ActiveBeta levels remained rather stable around the 0.15 level from 2006 until the second half of 2010. This stands in contrast to the relative progress of ActiveAlpha during the same period, which appears to have been more volatile.

Over the coming five years, ActiveBeta resume at a slightly lower level until the second half of 2015, when it takes a dramatic upswing. Since we look at the lagged effects of manager activity, however, ActiveAlpha and ActiveBeta for these two years have not been included in our statistical tests. Moreover, market timing activities for large and small/mid cap funds seem to coincide well. Remember that the number and composition of funds will vary between years.

Figure 1: ActiveAlpha Over Time, Large and Small/Mid Cap Funds

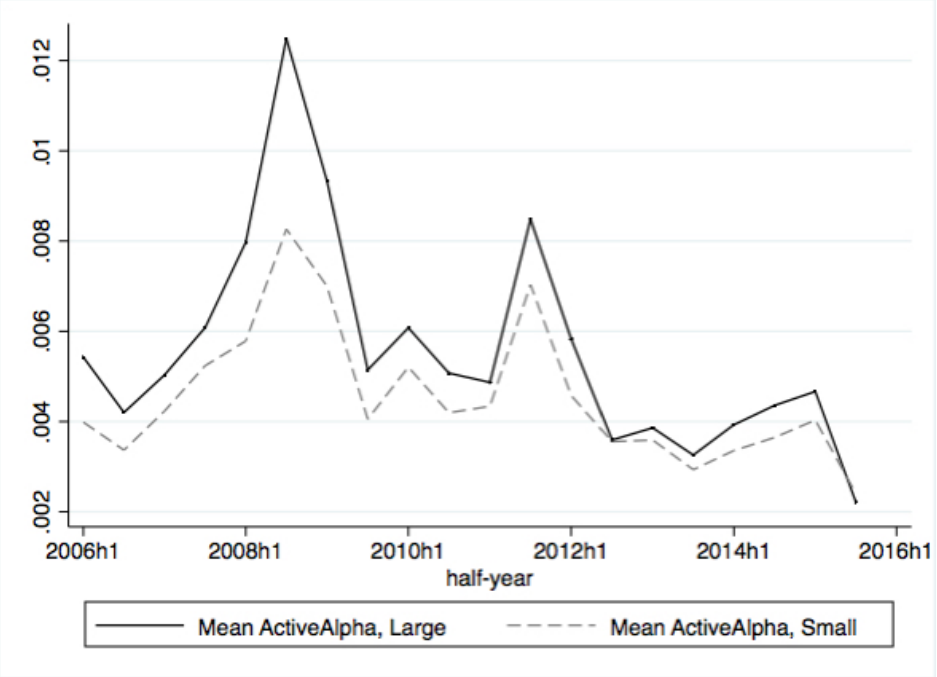

Figure 1 illustrates the mean ActiveAlpha each year between 2006 and 2015 for both large and small/mid cap funds. The composition and number of funds may differ from year to year.

Figure 2: ActiveBeta Over Time, Large and Small/Mid Cap Funds

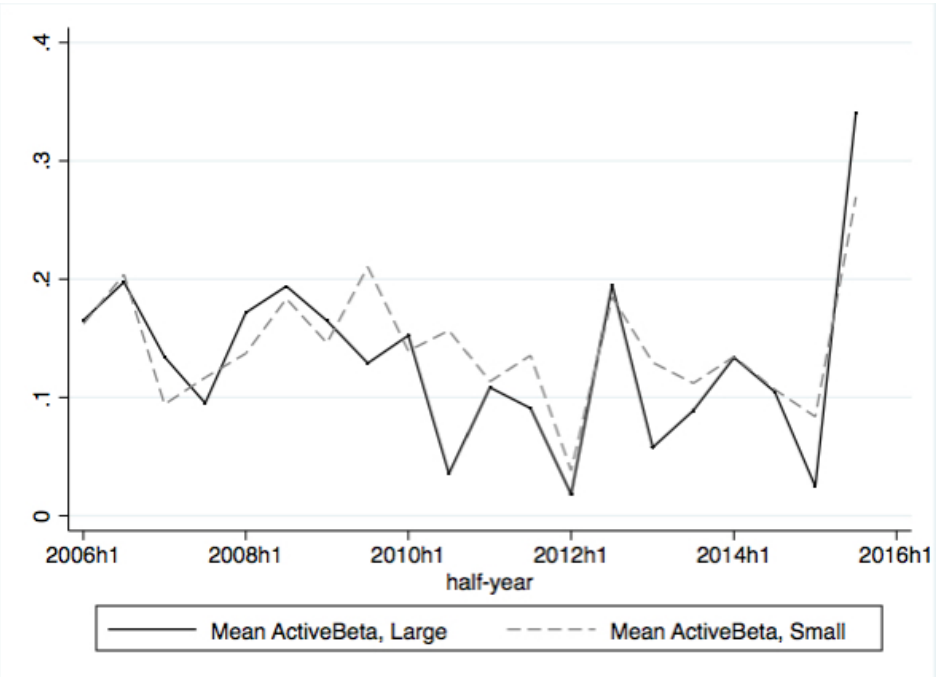

Figure 2 illustrates the mean ActiveBeta each year between 2006 and 2015 for both large and small/mid cap funds. The composition and number of funds may differ from year to year.

Table 3 shows the ten best and the ten worst performing funds concerning excess returns for the large cap bracket. It highlights the fact that extreme values of excess return are due to high levels of activity. Out of these 20 observed alphas, 14 relate to an above-normal Tracking Error in the previous period, with the median Tracking Error being 0.59% for large cap funds.

The same goes for ActiveAlpha, where 14 out of 20 observations contain above median (0.56%) stock picking levels. ActiveBeta values appear to be somewhat higher within the worst performing group than the best performing group. Table 4 displays the small/mid cap funds ranked by alpha, but does not appear to develop any discernible connection between alpha and manager activities.

Table 3: Ten Best and Ten Worst Large Cap Funds in Terms of Alpha

Rank	Alpha	Tracking Error	ActiveAlpha	ActiveBeta	Period	N
1	.0009679	.0045669	.0043914	.1264216	4	500
2	.0009041	.0240805	.0224793	.4024922	2	216
3	.0006587	.0151946	.0141537	.3669945	3	481
4	.0004482	.0050277	.0048902	.0936668	1	502
5	.0004308	.0111481	.011091	.0899298	4	480
6	.0003948	.006319	.0056293	.1953315	3	500
7	.0003709	.0109688	.0093089	.4828672	1	479
8	.0003575	.0033153	.0032237	.077597	4	499
9	.0003571	.0023344	.0023258	.0141402	4	499
10	.0003502	.01372209	.01294714	.09717865	2	311
275	-.0002591	.0077121	.0074635	.1292173	3	500
276	-.0002592	.0109691	.0097226	.2381106	2	506
277	-.0002645	.0055902	.0053839	.1203298	1	410
278	-.0003051	.0104548	.0093456	.2175955	2	506
279	-.0003686	.0153436	.0128842	.3908704	2	506
280	-.0003758	.0071816	.0064501	.2600398	1	501
281	-.0003851	.0169618	.0159531	.3701846	1	474
282	-.0004124	.0052132	.0050347	.109388	1	296
283	-.0007443	.0101081	.0092778	.2599534	1	474
284	-.00108393	.01029841	.00711539	.46258089	1	466

Alpha has been calculated through the Jensen (1968) model using daily returns. N stands for number of observations. Period express to what period the numbers come from, where Period 1 corresponds to Tracking Error, ActiveAlpha and ActiveBeta from 2006 and 2007, with alpha from 2008 and 2009, etc. Tracking Error here is the RMSE for the period previous to the one in which the alpha value was collected.

Table 4: Ten Best and Ten Worst Small/Mid Cap Funds in Terms of Alpha

Rank	Alpha	Tracking Error	ActiveAlpha	ActiveBeta	Period	N
1	.0006198	.0473875	.0485998	0.00000	2	275
2	.0004244	.0044483	.0042539	.0972151	3	500
3	.0004235	.0037419	.0035084	.1531479	4	499
4	.0003966	.0039852	.0038339	.1255181	4	487
5	.0003895	.0062717	.0055808	.216939	3	498
6	.0003596	.0047453	.0044051	.1325534	3	488
7	.0003503	.0038615	.0036747	.1371702	4	497
8	.0003396	.0040108	.00351	.1293285	3	500
9	.0003257	.003303	.0030406	.1504551	4	497
10	.0002775	.00431779	.0039824	.12599067	3	499
103	-.0002840	.0064192	.0069017	0.00000	4	499
104	-.0002859	.0064596	.0060676	.1296811	3	500
105	-.0002861	.0066766	.0063882	.1056417	2	506
106	-.0002892	.0034366	.0033153	.1039374	4	499
107	-.0002933	.0052088	.0049541	.1862905	4	500
108	-.0003000	.0061381	.0054298	.1583092	2	496
109	-.0003419	.0031125	.0029705	.1073798	4	499
110	-.0003435	.0059778	.0053198	.2474766	1	497
111	-.0003764	.0055752	.0054469	.1343371	4	497
112	-.0005015	.00773424	.00617764	.25949347	2	506

Alpha has been calculated through the Jensen (1968) model using daily returns. N stands for number of observations. Period express to what period the numbers come from, where Period 1 corresponds to Tracking Error, ActiveAlpha and ActiveBeta from 2006 and 2007, with alpha from 2008 and 2009, etc. Tracking Error here is the RMSE for the period previous to the one in which the alpha value was collected.

5.2 Regression Results

Table 5 presents the regression results of alpha against two-year lagged versions of ActiveAlpha and ActiveBeta. As demonstrated, we find robust results, significant at a five percent level, that for large cap funds, ActiveBeta has a negative relationship with future alpha. ActiveAlpha has an insignificant relationship with future alpha. What this tells us is that more market timing activity has led to decreasing performance among the large cap funds in our sample, while security selection activity has not affected alpha significantly.

The results for the small/mid cap funds also show a negative relationship between ActiveBeta and alpha that is significant at the five per cent level. However for this category of funds, the positive relationship between ActiveAlpha and alpha is significant at the one

per cent level. It seems that the small/mid cap funds achieve better performance through stock picking than the large cap funds, while both categories of funds achieve worse returns by trying to time the market.

Table 5: Regression Output, ActiveAlpha and ActiveBeta with Future Alpha

VARIABLES	Large Cap Excess Return (2006-2015)	Small/Mid Cap Excess Return (2006-2015)
$ActiveAlpha_{t-2}$	0.0143	0.0102***
	(0.0123)	(0.00261)
$ActiveBeta_{t-2}$	-0.000805**	-0.000518**
	(0.000347)	(0.000241)
Constant	4.78e-05	2.65e-05
	(4.72e-05)	(5.10e-05)
Observations	284	112
R-squared	0.071	0.092

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5 presents the two factor regression results of large and small/mid cap funds. Observations is the number of funds included in the consecutive two-year periods for large and small/mid cap funds respectively. Some of these funds recur in several two-year periods.

Table 6 displays the regression results for the relationship between Tracking Error and future performance alpha for both the large and small/mid cap funds. For the large cap group, the coefficient is negative but statistically insignificant meaning we cannot tell if the effect of the Tracking Error on alpha is different from zero. For the small/mid cap group, we get a positive coefficient that is significant at the ten percent level, suggesting that fund manager activity is positively related to performance.

Table 6: Regression Output, Tracking Error and Future Alpha

VARIABLES	Large Cap Excess Return (2006-2015)	Small/Mid Cap Excess Return (2006-2015)
Tracking Error$_{t-2}$	-0.00581	0.00955*
	(0.00785)	(0.00485)
Constant	3.63e-05	-5.76e-05*
	(4.91e-05)	(3.41e-05)
Observations	284	112
R-squared	0.010	0.042

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 6 presents the one factor regression results of large and small/mid cap funds. Observations is the number of funds included in the consecutive two-year periods for large and small/mid cap funds respectively. Some of these funds recur in several two-year periods.

5.3 Testing Persistence of Fund Manager Activity

In Table 7 we see the results of testing ActiveAlpha and ActiveBeta against lagged values of itself. We see with a very high statistical significance that $ActiveAlpha_{p,t-2}$ and $ActiveBeta_{p,t-2}$ has a positive relationship for $ActiveAlpha_{p,t}$ and $ActiveBeta_{p,t}$, respectively. This shows us that there is a strong persistence within funds regarding their magnitude and specific undertakings of activity. If a fund exhibits a lot of security selection or market timing in one two-year period, there is a high chance that it will do so in the next period as well. That is, fund managers are loyal to their strategies.

Our findings suggest a robust persistence for both large and mid/cap fund managers regarding both types of activity, but they are particularly so concerning the large cap group and market timing within the small/mid cap group. The outcomes of our regression make it plausible that causality exists between portfolio manager activity and performance. The findings are in line with studies done on the Swedish fund market that have looked at the persistence of Active Share over time, such as Johansson and Häckner Posse (2015).

Table 7: Regression Output, ActiveAlpha and ActiveBeta Persistence

	Large Cap Funds		Small/Mid Cap Funds	
VARIABLES	ActiveAlpha (2006-2015)	ActiveBeta (2006-2015)	ActiveAlpha (2006-2015)	ActiveBeta (2006-2015)
Lagged Active	0.448***	0.446***	0.152***	0.412***
	(0.0846)	(0.0717)	(0.0124)	(0.0753)
Constant	0.00353***	0.0920***	0.00402***	0.0922***
	(0.000457)	(0.0129)	(0.000165)	(0.0161)
Observations	261	261	94	94
R-squared	0.188	0.217	0.225	0.184

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 7 presents the regression results of ActiveAlpha and ActiveBeta against lagged versions of themselves. ActiveAlpha is regressed individually against $ActiveAlpha_{t-2}$, and ActiveBeta is regressed individually against $ActiveBeta_{t-2}$. Lagged Active thus means $ActiveAlpha_{t-2}$, for the ActiveAlpha regression, and $ActiveBeta_{t-2}$ for the ActiveBeta regression. Observations are the number of funds included in the consecutive two-year periods for large and small cap funds respectively.

5.4 Potential Biases In Results

The alphas that we estimate for the funds are estimated through a simple single factor model based on the market return. Using a Fama and French three factor model or a Carhart four factor model that take into account a larger number of factors when estimating alpha could give different results. When Ekholm performed test on the Carhart alpha he found an insignificantly positive relationship between past ActiveAlpha and future Carthart alpha and an insignificantly negative relationship between past ActiveBeta and future Carhart alpha. In contrast, Flam and Vestman (2014) used one, three and four factor models when estimating alpha for Swedish equity mutual funds and did not see significant differences in the results.

Our index that we use for the small/mid cap funds, the CSRXSE, includes both mid cap and small/mid cap companies in the Swedish market. This might have a distorting effect on the Tracking Error, ActiveAlpha and ActiveBeta for the small/mid cap funds. However it is not likely to find a benchmark index that is a perfect fit for every fund in our sample. Also, some of the funds in our sample may hold a small portion of their assets in foreign securities, which can have a distorting effect since the tests are done using indices that track the Swedish stock market only.

6 Analysis

Our results show that security selection and market timing activity, being the two components of the Tracking Error, have different effects on fund performance when we look at the large cap funds in our sample. Market timing has a significantly negative predictive relationship with performance, whereas security selection has an insignificantly positive predictive relationship with performance. When we look at only the Tracking Error for small/mid cap funds, we find a positive relationship to performance with statistical significance at the ten percent level. However, when looking solely at Tracking Error for the large cap funds, we are unable to see statistically significant results that its effect on fund performance is different from zero. This shows the value of the Tracking Error decomposition model that we use, as the decomposition of the Tracking Error into a security selection and a market timing component allows us to look at fund activeness in a more detailed manner that shows different types of fund manager activity can have different effects on performance. If the two components of the Tracking Error have opposite effects on performance it may falsely appear as if fund manager activity has no effect on performance when you assess only the Tracking Error against performance.

The negative effect we see on alpha from market timing is in line with the results found by Ekholm in his study of the decomposed Tracking Error in the U.S. equity mutual fund market. The effectiveness of a market timing approach has been heavily debated in financial research. According to the efficient market hypothesis, securities are efficiently priced at all times and you have no more than a 50% chance of predicting market upswings or downswings correctly. Empirical studies such as Henriksson (1984) have found no evidence that mutual fund managers are able to find investment strategies that successfully time the market. Our findings indicate that Swedish fund managers lack the skill to be successful in market timing. It is however a bit surprising that the activity of market timing leads to worse performance, if timing the market is a 50/50 proposition we might think that performance should be unaffected by market timing activity.

We see no statistically significant effect on performance from security selection activity among the large cap funds in our sample. However the small cap funds show a statistically significant positive relationship between ActiveAlpha and alpha at the five percent level. The small cap funds seem to be better able to generate good performance

through stock picking than large cap funds. As our sample for the small/mid cap funds is smaller than what it is for the large cap funds we should however be more careful when drawing conclusions from the results seen on that sample.

Our ActiveAlpha measure should be comparable to the Active Share measure of stock picking activity that is based on portfolio holdings. Using the Active Share measure Cremers & Petajisto (2009) found that funds with a high Active Share (a high magnitude of stock picking) outperformed their indices significantly both before and after fees. Similar results were found by Johansson & Häckner Posse (2015) in their study of the Swedish fund market. Their study showed a positive effect on alpha from a high Active Share in the Swedish fund market from 2005 to 2014. Our results for our small cap funds support this theory on the positive effect of stock picking on performance while the large cap results do not achieve enough statistical significance to support these previous findings. If the efficient market hypothesis holds, funds should not be able to beat the market through finding stocks that are undervalued in relation to the overall stock market since all securities are already fairly priced. It should be noted that even though security selection shows a positive relationship with performance for the small/mid cap funds, this does not mean that funds that stock pick a lot necessarily will make up for their investor fee to become more profitable than index funds with lower fees.

The fact that market timing activity seems to be of less value than stock picking indicates that idiosyncratic information is less efficiently priced than systematic information in the Swedish equities market. This is consistent with the concepts of equilibrium market efficiency presented by Grossman and Stiglitz (1980).

7 Conclusion

We find that mutual fund managers who think they can generate positive returns for investors through timing the market are probably incorrect, since our results indicate a negative correlation between market timing activity and performance. Naturally, this should make investors weary about investing in funds that focus a lot on market timing. Predicting upswings and downswings in the market with any consistency is notoriously difficult, and a strategy based on market timing is not something you would expect to be successful in the long run. Not only should investors themselves refrain from investing in mutual funds with market timing strategies. Mutual fund managers that wish to provide positive value for their investors should not be putting their time and effort into timing the market.

Judging from the results on our small/mid cap funds and some previous research it seems that security selection activity could be one way for equity mutual funds to improve their performance. It is possible that mutual funds have better information than the average investor and therefore can achieve superior returns, although this is clearly a question of debate.

8 Future Research

We believe there is a lot of research that can be made on the Swedish mutual fund industry. The performance of Swedish equity mutual funds has been so poor in this millennium that the fund managers should be examined in detail. The funds that have suffered the most criticism for bad performance and closet indexing are the funds managed by the four big banks that dominate the financial sector in Sweden. It would be interesting to see a study made where the activeness of the big bank mutual funds and the mutual funds of the smaller fund managers in the Swedish market were separated. In this way you could see if the big bank funds are in fact less actively managed than the funds of the smaller fund managers.

If you would use the Tracking Error decomposition method that we have used in this thesis, it would be enlightening to see what category of managers achieve what effect on performance from their stock picking and market timing activities. It is possible that the issues surrounding Swedish equity mutual funds have not been created by the fund market as a whole but rather by the big bank funds. The big banks have such a great marketing advantage through their distribution channels compared to the smaller market actors that they might be able to get away with poor performance and less active management.

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10 Appendix

Figure 3: Tracking Error Over Time

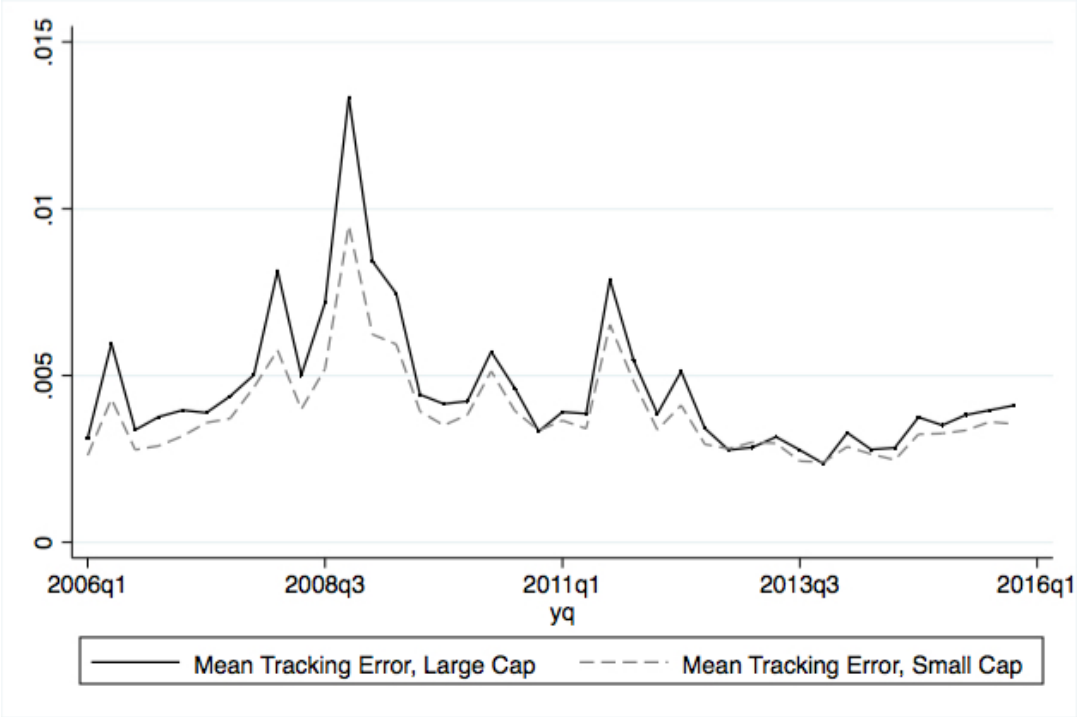

Figure 3 illustrates the mean Tracking Error each year between 2006 and 2015 for both large and small/mid cap funds. The composition and number of funds may differ from year to year.

Table 8: Funds Included in Data Sample

Fund Name	ISIN	Type
SPP Aktiefond Sverige Aktiv	SE0000522526	Large Cap
Folksams Aktiefond Sverige	SE0000434714	Large Cap
Didner & Gerge Aktiefond Sv.	SE0000428336	Large Cap
Robur Ethica Sverige	SE0000709016	Large Cap
SEB Hållbarhetsfond Sverige Lu	LU0047322432	Large Cap
Radiohjälpsfond	SE0000356032	Large Cap
Bofond	SE0000355968	Large Cap
Sverigefond	SE0000427726	Large Cap
Sweden Fund	LU0087941380	Large Cap
Robur Allemansfond I	SE0000538886	Large Cap
Robur Sverigefond	SE0000996233	Large Cap
Sverige Aktiv	SE0000837221	Large Cap
Skandia Sverige	SE0000810913	Large Cap
Banco Svensk Miljö	SE0000709099	Large Cap
Banco Hjälp	SE0000709115	Large Cap
Banco Ideell Miljö	SE0000708984	Large Cap
Banco Kultur	SE0000708976	Large Cap
Världsnaturfonden	SE0000432742	Large Cap
Skandia Cancerfonden	SE0000432759	Large Cap
Banco Samaritfond	SE0000708943	Large Cap
Robur Humanfond	SE0000708950	Large Cap
Banco Sverige	SE0000709339	Large Cap
Carnegie Sverige	SE0000429789	Large Cap
Robur Ny Teknik	SE0000709123	Large Cap
Carnegie Sverige	SE0000433344	Large Cap
Sverigefond	SE0000493512	Large Cap
Sverigefonden HQ	SE0000429789	Large Cap
Aktie-Ansvar Sverige	SE0000735789	Large Cap
ABN AMRO Sverige	SE0000709339	Large Cap
Eldsjäl Sverigefond	SE0000433369	Large Cap
Eldsjäl Gåvofond	SE0000433377	Large Cap
Catella Reavinstfond	SE0000577322	Large Cap
SEB Stiftelse Sverige utd	SE0000433278	Large Cap
Sverigefond 2 A	SE0000432767	Large Cap
Robur Sverigefond MEGA	SE0000537771	Large Cap
AMF Aktiefond Sverige	SE0000739195	Large Cap
Carnegie Swedish Equity Fund A	LU0093407939	Large Cap
Carnegie Swedish Equity Fund B	LU0093408150	Large Cap
Folksam LO Sverige	SE0000540593	Large Cap
Folksam LO Västfonden	SE0000540619	Large Cap
Sverige	SE0000569691	Large Cap
Banco Etisk Sverige Special	SE0000709164	Large Cap
Sverigefond	SE0000582033	Large Cap
Swedish Stars icke-utd	SE0000625238	Large Cap
Enter Sverige	SE0000813917	Large Cap
Enter Sverige Pro	SE0000813925	Large Cap
Folksams Tj.mannafond Sverige	SE0000615890	Large Cap

Selekta Sverige	SE0000665655	Large Cap
Alfred Berg Sverige Plus A	SE0000709271	Large Cap
Lannebo Sverige	SE0000740680	Large Cap
Banco Human Pension	SE0000734071	Large Cap
Banco Samarit Pension	SE0000734089	Large Cap
Öhman Sverige Koncis	SE0000810806	Large Cap
SEB Sverigefond	SE0000775298	Large Cap
SEB Sverige Expanderad	SE0000984197	Large Cap
SEB Sverigefond C/R	SE0000775280	Large Cap
Royal Skandia Swedish Eqty	GB0003717393	Large Cap
SRI Sverige	SE0000855181	Large Cap
Robur Hockeyfond	SE0000840381	Large Cap
Robur Vasaloppsfond	SE0000840399	Large Cap
Coeli Sverige	SE0000856973	Large Cap
Privat Banking Svenska Portf	SE0000865578	Large Cap
SEB PB Svensk Aktieportfölj	SE0000819260	Large Cap
Robur Ethica Sverige MEGA	SE0000987216	Large Cap
Spiltan Aktiefond Sverige	SE0001015355	Large Cap
Spiltan Aktiefond Stabil	SE0001015348	Large Cap
SKF Allemansfond	SE0001039561	Large Cap
Gustavia Sverige	SE0001091018	Large Cap
Indecap Guide Sverige -A-	SE0001114695	Large Cap
Skandia Swedish Growth Fund	IE0031388014	Large Cap
Sverige Selektiv	FI0008808258	Large Cap
Utdelningsaktier Sverige	N/A	Large Cap
Sverige Fokus	SE0001472937	Large Cap
Carnegie Svea Aktiefond	SE0001538125	Large Cap
Robur Svensk Aktieportfölj	SE0001195843	Large Cap
Cliens Sverige A	SE0001338799	Large Cap
SEB Swedish Value Fund	SE0001838004	Large Cap
SEB Swedish Focus Fund SEK	SE0001838012	Large Cap
Sverigefond	SE0001882309	Large Cap
Awake Swedish Equity Fund	SE0001688201	Large Cap
Ethos Aktiefond Utd	SE0001714676	Large Cap
SEB Special Clients Sverige	SE0002159871	Large Cap
Skandia Svea Aktiv	SE0002343855	Large Cap
Sparbanken Aktiefond Sverige	SE0002623884	Large Cap
Lannebo Sverige Plus	SE0002686584	Large Cap
Private Banking Sverige Plus	SE0002866152	Large Cap
Nordic Equities Sweden	SE0002469353	Large Cap
Humle Kapitalförvaltningsfond	SE0002229641	Large Cap
Inst Aktief Sverige utd	SE0000524407	Large Cap
Lannebo Utdelningsfond	SE0003462126	Large Cap
Spiltan AF Investmentbolag	SE0004297927	Large Cap
Swedish Stars utd	SE0004330249	Large Cap
PriorNilsson Sverige Aktiv A	SE0004636447	Large Cap
SEB Sverige Småbolag C/R	SE0000434201	Small/Mid Cap
Svenska Småbolag	SE0000356065	Small/Mid Cap
Banco Småbolag	SE0000709230	Small/Mid Cap

Småbolagsfond A	SE0000432775	Small/Mid Cap
Ålandsbanken Swedish Small Cap	SE0000436958	Small/Mid Cap
ODIN Sverige	NO0008000023	Small/Mid Cap
Robur Stella Småbolag	SE0000433351	Small/Mid Cap
Sweden Micro Cap	SE0000432809	Small/Mid Cap
Småbolag Sverige	SE0000837239	Small/Mid Cap
Skandia Småbolag Sverige	SE0000810814	Small/Mid Cap
Robur Exportfond	SE0000602294	Small/Mid Cap
Robur Småbolagsfond Sverige	SE0000602302	Small/Mid Cap
SEB Sverige Småbolag	SE0000577389	Small/Mid Cap
Cicero MÖ Sverige	SE0000620312	Small/Mid Cap
Lannebo Småbolag	SE0000740698	Small/Mid Cap
Cicero SRI Sverige	SE0000731135	Small/Mid Cap
Västernorrlandsfonden AB	SE0001112319	Small/Mid Cap
Enter Select Pro	SE0001172362	Small/Mid Cap
AMF Aktiefond Småbolag	SE0001185000	Small/Mid Cap
Spiltan Aktiefond Dalarna	SE0001938788	Small/Mid Cap
Robur Sweden High Dividend	SE0002023036	Small/Mid Cap
Enter Select	SE0002096545	Small/Mid Cap
GustaviaDavegårdh Sverige Maxi	SE0002321414	Small/Mid Cap
Evli Sverige Småbolag	FI0008813142	Small/Mid Cap
Spiltan Aktiefond Småland	SE0002566349	Small/Mid Cap
Didner & Gerge Småbolag	SE0002699421	Small/Mid Cap
Gustavia Småbolag	SE0002729210	Small/Mid Cap
Humle Småbolagsfond	SE0002229658	Small/Mid Cap
Solidar Fonder Sverige	SE0003207638	Small/Mid Cap
Carnegie Swedish Small Cap	LU0424682077	Small/Mid Cap
Inside Sweden	SE0003495654	Small/Mid Cap
Småbolag	SE0003695790	Small/Mid Cap
Småbolagsfond Sverige	SE0003653302	Small/Mid Cap
Cliens Sverige Fokus A	SE0003910314	Small/Mid Cap
Norron Active	LU0619829491	Small/Mid Cap
Carnegie Småbolagsfond	SE0004392025	Small/Mid Cap
Select Sverige	SE0004546778	Small/Mid Cap

Table 8 reports the funds that were included in our data sample, as well as their ISIN code and type.

Table 9: Descriptive Statistics: Large and Small/Mid Cap Funds

	Large Cap Funds, 2006-2015					Small/Mid Cap Funds, 2006-2015				
	Average	Median	StDev	Min	Max	Average	Median	StDev	Min	Max
Panel A: Residual Return Analysis Models from 2006 to 2015										
R^2	3.04%	2.02%	3.99%	0.01%	44.55%	3.99%	1.92%	5.05%	0.01%	28.74%
Number of observations = 320						Number of observations = 115				

Table 9 reports descriptive statistics for large and small/mid cap funds operating at some point for more than 36 months in the 2006-2015 time span. Panel A: R^2 is the coefficient of determination for Residual Return Analysis Models estimated on daily returns in four consecutive two-year periods from 2006 to 2015. The number of observations refers to the number of funds having more than 150 daily observations within the 2006-2015 two-year periods.