The Value of Experience in Actively Managed Mutual Funds*

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Abstract

In this paper, we investigate the relationship between active management, manager experience and fund performance among Swedish all-equity mutual funds between 2003 and 2016. To measure different aspects of active management we combine two measures of active management—active share and tracking error—similar to Cremers and Petajisto (2009). We find the average actively managed fund to, on average, underperform the benchmark index, SIXPRX, when fees are taken into consideration. Examining different degrees of active management, we find active share to be positively correlated with fund performance. We find that the most actively managed funds perform better relative the benchmark index than the less actively managed funds. Although, we do not find the most actively managed funds to perform significantly better than the benchmark index. Thus, we conclude that active share is a predictor of fund performance among actively managed funds. On the contrary, the value of fund manager experience (proxied by manager tenure) is questionable. We find no distinct relationship between manager experience and fund performance. Even conditional the most active funds, the value of manager experience is not pronounced. Overall, our findings suggest that investing in an index fund may be the best option. Even though, we argue that active share should be considered by investors in the selection process of actively managed funds. Lastly, we find a positive relationship between manager tenure and active share. It is, however, difficult to distinguish whether a higher level of active management is really derived from having a more experienced manager or if the most actively managed funds just happen to be managed by more experienced managers.

Keywords: Active Management, Active Share, Manager Experience, Manager Tenure, Mutual Fund Performance

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1. Introduction

The mutual fund industry serves an important function in the financial system. Mutual funds provide liquidity to the financial markets by pooling capital from investors and invest the capital in different types of securities, such as equity, bonds and money instruments. For investors, the main benefit of investing in a mutual fund is the easy access to a diversified portfolio, at a relatively low cost. The discussion in the literature regarding the value that mutual funds add to investors has mainly been related to actively managed equity mutual funds, i.e. mutual funds that primarily invest in stocks. More specifically, the question that previous literature has asked is whether the costlier actively managed equity funds are able to outperform a more passive strategy that low-cost equity index funds provide when fees are considered.

In Sweden, the presence and importance of the mutual fund industry is significant. Around 80% of the adult population have money saved in mutual funds. Including the savings through the premium pension system, almost the entire adult population is at least passively investing in mutual funds (Swedish Investment Fund Association, n.d.-b). Out of the total financial wealth, Swedish households have around 8% of the market value saved in mutual funds and about 3% of the market value in equity funds (Statistics Sweden, 2019). In 2013, it was estimated that approximately 89 % of the total capital in equity mutual funds is in actively managed funds, while the index funds consequently account for about 11%. Nevertheless, the interest in index funds has steadily increased (Swedish Investment Fund Association, 2014-a).

The significant presence of the mutual fund industry and the high participation rate among non-professionals makes the Swedish mutual fund market particularly interesting and the choice of what type of equity funds to invest in of great importance to many Swedish households. Should investors target index funds, with a passive investment strategy, or are equity mutual funds able to add additional value through a more active investment approach? Are there any factors that should be considered in the selection process for an investor? The aim of this paper is to help investors in the

decision-making process of selecting mutual funds and to further contribute to the research on this topic.

Whether or not investing in actively managed equity funds is the more beneficial option is extensively covered in the literature with ambiguous results. Although, a majority of the research has evaluated actively managed equity mutual funds as a homogenous group without considering the degree of active management in the different funds. Cremers and Petajisto (2009) touch upon this in their paper by evaluating the performance of 25 portfolios consisting of US equity mutual funds, sorted by the degree of active management, between 1990-2003. In their paper, they introduce a new metric that measures the degree of active management called "Active Share". Active Share measures the share of the portfolio holdings that differ from the benchmark index holdings. They use active share in combination with tracking error, a more traditional measure of active management, to sort funds into 25 portfolios to cover different aspects of active management. Cremers and Petajisto (2009) find that the funds with the highest active share, in other words the most actively managed, significantly outperform their benchmark even after fees.

Previous literature has also tried to explain why some actively managed mutual funds perform better than others. Some of the literature has focused on the characteristics of the fund manager to see if the best-performing fund managers share some common characteristics. One characteristic that has been investigated is the experience of the fund manager and to what extent it explains the performance of the fund. Golec (1996) uses manager tenure as a proxy for manager experience and find it to be the most significant factor to predict mutual fund performance. In contrast, Chevalier and Ellison (1999) find no robust results for manager tenure being a predictor of fund performance. Costa and Porter (2003) find similar results as they find the more experienced managers to not perform significantly better than their less experienced colleagues. Thus, we conclude that there is a presence of ambiguity within this research field.

An interesting question that has not been covered as extensively, to the best of our knowledge, in previous literature is whether experience is a predictor of fund performance for the more actively managed mutual funds and we intend to bridge this gap. We argue that manager experience may have different effects on fund performance depending on how actively managed the fund is. The more actively managed a fund is the more important will the stock-picking skills of the fund manager be. The experience of the manager should intuitively have an effect on the stock-picking skills as valuable expertise is accumulated continuously throughout the career. In their paper, Kempf et al. (2017) find experience to be a first-order driver of observed mutual fund manager skill which supports this argument. Building on this argument, manager experience should have a larger effect on fund performance for more actively managed funds than for less actively managed funds. Whether this is the case is one of the main research questions in this paper.

In this paper we first examine active management and its relation to fund performance, in a similar manner as Cremers and Petajisto (2009), using data on Swedish mutual funds during the time period 2003-2016. The main reason why we delimit ourselves to this time period is related to the findings of Flam and Vestman (2017). In their paper, they evaluate the performance of Swedish mutual funds between 1993-2013, where they find a substantial downward shift in the performance of actively managed funds after 2001. They argue that this shift may be due to the increased competition in the Swedish mutual fund industry that the new pension system, which was implemented in 2000, brought. Second, we investigate the relationship between manager experience and fund performance. Similar to previous literature, we use manager tenure as a proxy for manager experience. Lastly, we examine the interaction of different degrees of active management with manager experience to investigate if experience has a more pronounced effect on fund performance for the more actively managed funds. We mainly use portfolio sorts in our empirical approach where the mutual funds in our sample are sorted into portfolios based on the degree of active management and the level of manager

experience both separately and in combination. We also complement the nonparametric portfolio sorts with multivariate regressions.

In our paper, we find that the funds with the highest active share perform better than funds with lower active share on a net fee basis. Although, we do not find these funds to perform significantly better than the benchmark index, SIX Portfolio Return Index (SIXPRX), which contradicts the findings of Cremers and Petajisto (2009). A possible explanation could be that the Swedish mutual funds may not be active enough in combination with charging excessive fees. Cremers et al. (2016) find that mutual funds in markets with a high proportion of "closet indexers" (they find Sweden to have among the highest proportions) and a low proportion of explicitly indexed funds (Sweden has a proportion below the world average) generate lower alpha and charge excessive fees.

Furthermore, we find no distinct relationship between manager experience and fund performance in line with findings of Chevalier and Ellison (1999). Interestingly, we find manager experience to be positively related with active share which could imply that fund managers with more experience are more confident.

To conclude our paper, we are unable to identify a relationship between manager experience and fund performance for the more actively managed funds. Although, we dive deeper into this relationship in complementary portfolio sorts and unravel some interesting findings. First, we find that the most active funds that perform the best are also the funds that, on average, are managed by the most experienced managers. Second, we find the funds managed by the most experienced managers that perform the best to, on average, be the most actively managed. These two findings highlight that the interaction between active management and manager experience may have positive implications on fund performance which motivates further research in this topic to reach consensus.

The remainder of our paper is structured as follows. First, we introduce related literature in section 2 before we present and motivate our hypotheses in section 3. In section 4 we describe the methodology used before we lay out

the data sources and dataset construction in section 5. We present, analyze and discuss our finding in section 6 and 7 and conclude our paper in section 8. Lastly, in section 9 we highlight the study limitations and present suggestions for future research.

2. Literature Review

2.1 Active Management and Fund Performance

2.1.1 Efficient markets

Jensen (1968) evaluates the risk-adjusted returns based on the CAPM framework of 115 mutual funds between 1955-1964. In his paper, he finds that the funds in his sample on average were not able to predict security prices well enough to perform better than a "buy-the-market-and-hold policy" (passive investment strategy). His findings even hold when gross returns are considered which implies that mutual fund managers on average do not possess enough stock-picking skills to outperform the market even on a gross of fee basis. Thus, in terms of risk-adjusted returns mutual funds are not able to add sufficient value but he highlights that mutual funds may provide other benefits of value to investors in the form of diversification.

Fama (1970) extends the work of Jensen (1968) and develops the efficient markets model, from which the efficient-markets hypothesis arose. In his paper, Fama argues that stock prices reflect "all available" information and that stocks should therefore always be traded at their fair value. Based on this argument, investors should not be able to predict the future movements of stock prices. Thus, it should not be possible for investors to generate abnormal risk-adjusted returns, also referred to as "Jensen's alpha" or 1-factor alpha.

Sharpe (1991) highlights that it is perfectly possible for some active fund managers to outperform the market. Although, he emphasizes that the average active fund manager will generate returns in line with the market before fees and underperform the market after fees are taken into account. One of the main insights of Sharpe (1991) is that an active investor's gain is

another active investor's loss. Thus, there is a zero-sum game between active investors.

Pedersen (2018) argues that Sharpe's (1991) framework may show to be true when the set of securities is fixed over a fixed period of time, which he concludes is rarely the case in the real world. In reality, the set of securities available in the market constantly changes as new firms, and thus shares, are created and some firms "die" or disappear from the market. Pedersen (2018) argues that even a passive investor needs to trade to always hold the market portfolio, as the market portfolio continuously changes, and they might do this at higher costs than active investors which would oppose Sharpe's equality. In opposition to Sharpe (1991), Pedersen (2018) argues that the capital market is not a zero-sum game, but a positive-sum game. He claims that active management *can* be value-adding and worth the fees charged, but *if* and *how* much depends on the level of fees.

A lot of research has been done in between Sharpe (1991) and Pedersen (2018), considering the relationship between active management and mutual fund performance.

Carhart (1997) investigates the relationship between active management and fund performance, measured by net alpha, and find no evidence of managerial skills. Wermers (2000) finds that funds, on average, hold stocks that outperform the market by 1.3% yearly but underperform by 1% yearly when performance is measured net of expenses. Even though the negative net return, which Wermers (2000) finds attributable to underperformance in non-stockholdings and other transaction costs, he concludes that active managers are able to create value as the overperformance in terms of stock picking is higher than the fee charged. Later Wermers (2003) uses tracking error with respect to S&P 500 and evaluate actively managed funds and their performance in regard to active bets. He finds that active managers who take on larger active bets (i.e. higher return volatility) are rewarded in line with the higher total risk, even after adjusting for market and different style loadings. Thus, he concludes that active managers who take larger active bets

are better at stock-picking, even though the average active manager do not beat benchmarks.

Later, Berk and Green (2004) find a flow-performance relationship, i.e. that capital flows respond to past performance in a rational way. In their model, an active manager is, on average, able to generate a positive net alpha. However, as investors identify skilled managers based on past performance they redirect their capital to these skilled managers' funds resulting in an increase in capital inflows. Based on the underlying assumption of decreasing returns to scale made by the authors, the increase in capital inflows will lead compensation to adjust and the initial positive net alpha to diminish. Consequently, the net alpha provided to investors is zero (Berk & Green 2004).

Fama and French (2010) find that actively managed funds, on average, perform *in line* with the market before fees and *worse* than the market net of fees. More specifically, they find that the vast majority of active mutual funds generate negative net alphas which contradicts the findings of Berk and Green (2004). Moreover, Fama and French (2010) suggest that if there are managers with sufficient skills to outweigh the fees charged, their performance is balanced and hidden by the mass of managers who do not possess sufficient skills.

On the other hand, Berk and van Binsbergen (2015) find evidence in line with Berk and Green (2004). The authors find that actively managed funds perform better than the market before fees and in line with the market after fees are taken into account. More specifically, they find that the average net alpha provided to investors is close to zero and find little evidence that even the best funds can generate positive net alphas. Furthermore, Berk and van Binsbergen (2015) argue that net alpha is a good measure of investors' rationality and the competitiveness of capital markets. A positive net alpha would indicate that capital markets are not competitive, and a negative net alpha would signal that too much money are invested in active investments.

2.1.2 Different degrees of active management and fund performance

A lot of literature focus on mutual fund performance in relation to active management. Although, *how* to measure the degree of active management and how the different degrees of active management relate to fund performance is not as covered in the literature. The traditional measure of active management has historically been tracking error. Tracking error measures a fund's volatility that does not derive from fluctuations in the benchmark index and is calculated as the standard deviation of the difference between the returns of a fund and its benchmark index (Cremers & Petajisto, 2009). However, Cremers and Petajisto (2009) introduce a new complementary measure which they call "active share" that provides an additional dimension to the measurement of active management. Contrary to tracking error, active share focuses on the holdings of the mutual fund and measures the share of the portfolio holdings that differ from the benchmark index holdings.

Cremers and Petajisto (2009) study US mutual funds between 1980-2003 and use a two-dimensional approach to construct portfolios where they sort funds first by active share and further by tracking error. Cremers and Petajisto (2009) find that funds with the highest active share outperform their benchmark on average even when fees are considered while the funds with the lowest active share underperform their benchmark before fees. By combining active share and tracking error, Cremers and Petajisto (2009) are able to illustrate different dynamics of active management. Their study shows that the worst performers tend to be the funds with low active share and high tracking error and the best performers are the funds with high active share and high tracking error, in terms of both gross and net returns. When considering benchmark-adjusted returns, higher active share improve performance, even after adjusting for Carhart's four factors.

Petajisto (2013) uses the same methodology as Cremers and Petajisto (2009), with a few adjustments. For example, instead of using the benchmark index that produces the lowest active share, Petajisto (2013) assigns the benchmark index reported in the fund prospectus. In his papers, he finds similar results as Cremers and Petajisto (2009). More specifically, he finds

that actively managed funds, on average, underperform their benchmark indices by -0.41% net of fees. In contrast, he finds the most active funds (in terms of active share) to outperform the benchmark indices on average.

2.1.3 Previous research related to the Swedish mutual fund market

Up to date, most of the research concerning the relationship between active management and fund performance is done in the context of the US. However, Dahlquist et al. (2000) conclude that on average, Swedish equity funds generated alpha close to zero during the period of 1993-1997 and find some evidence that actively managed funds outperform more passively managed funds. They also examine which factors positively affect fund returns and find fees and fund size to be negatively related to fund performance in contrast to turnover ratio which they find to be positively related to fund performance. Furthermore, Engström (2004) shows that actively managed funds on average generate positive alpha, based on net returns.

Later, Cremers et al. (2016) perform cross-country research and find evidence that the average alpha of actively managed funds is lower in countries with more closet indexing[4] and higher in countries with more explicitly indexed funds (index funds and ETFs). Cremers et al. (2016) find that actively managed funds are more active and charge lower fees when they face more competitive pressure from low-cost explicitly indexed funds. In order to deal with the competitive pressure, actively managed funds pursue more differentiated product strategies (thus exhibit higher active share) and also charge lower fees to deliver alpha to investors. On a worldwide basis, they find the average proportion of explicitly indexed funds and closet indexers to constitute 22% and 20% respectively of total assets under management in the mutual fund industry. The authors find Sweden to have a proportion of explicitly indexed funds below average and among the countries with the highest proportion of closet indexers.

[4] Closet indexers are funds that claim to be active but have holdings similar to their benchmark index. They are defined as funds with an active share <60% (Cremers et al., 2016).

Flam and Vestman (2014) evaluate Swedish equity mutual funds over the period 1999-2009. Across all funds, they find an average gross four-factor alpha of 0.90% per year and an average net four-factor alpha of -0.45% per year. To the best of our knowledge, the most recent research within this field in the context of Sweden is likewise presented by Flam and Vestman. Flam and Vestman (2017) evaluate Swedish equity mutual funds over the period 1993-2013. In their analysis, they find a substantial difference in 1-factor alpha depending on how they delimit the time period. Across all funds, the average yearly gross and net 1-factor alphas were 3.55% and 2.14% respectively for the period 1993-2001 and -0.18% and -1.47% respectively for the period 2002-2013. Flam and Vestman (2017) explain the shift in return by increased competition due to the Swedish pension reform. Due to this, they decide to limit their study to the latter period for higher reliability. For the period 2002-2013, 12 out of 113 funds were found to, on average, generate positive gross 1-factor alpha and only 5 out of 113 funds were found to generate positive net 1-factor alpha. In terms of active management, they do not find a positive effect of active management on net 1-factor alpha. When they regress net 1-factor alpha over two different measures of active management, active share and $1-R^2$, no predictive ability is found for neither of the two measures.

2.2 Manager Experience and Fund Performance

If and how manager experience is related to fund performance is also discussed in the literature. Although, no consensus has been reached which may be related to the difficulty of measuring manager experience.

Golec (1996) find evidence of manager tenure as the most significant factor to predict mutual fund performance, which implies that experience among managers is valuable. In addition to manager tenure, the highest risk-adjusted returns are generated by funds of young managers with MBA degrees. A few years later, Chevalier and Ellison (1999) find that mutual fund managers with a graduation from a more prestigious undergraduate institution generate higher risk-adjusted excess returns than managers with a degree from a less prestigious undergraduate institution. This result holds

even after adjusting for differences in factor loadings (in Carhart's four-factor model) and fees charged. In line with Golec (1996), Chevalier and Ellison (1999) also find evidence that younger managers outperform older managers and that the probability of losing your job is not as sensitive to performance for older managers as it is for younger managers. Furthermore, Chevalier and Ellison (1999) find a weak positive relationship between manager tenure and fund performance, although not statistically significant.

Webster (2002) quantifies manager tenure with the usage of a dummy variable. The dummy variable obtains the value of zero if the fund manager's tenure is less than the sample mean and the value of one if above. Thus, a value of one is an indication of "stable management" of the fund. Webster (2002) find a statistically significant and positive relationship between stable management and fund performance, both in terms of benchmark-adjusted returns and market-adjusted returns.

In contrast, Costa and Porter (2003) find that longevity in manager tenure does not imply higher excess returns. More specifically, funds managed by fund managers with a tenure of less than ten years do not underperform funds managed by fund managers with a tenure of at least ten years. Porter and Trifts (2014) find that managers with at least ten years of tenure outperformed less experienced managers but the outperformance was almost in line with how often they underperformed. Examining the four-factor alpha, they find no evidence that more experienced managers are able to outperform the market after adjusting for risk. Furthermore, the authors argue that the key to a long career in the mutual fund industry seems to be more related to avoiding underperformance than to achieve superior performance (Porter & Trifts, 2014).

Cremers and Petajisto (2009) find an insignificant relationship between manager tenure and fund performance. However, the authors also try to explain the degree of active management, measured by active share, by manager tenure and other fund characteristics and find a positive relationship between manager tenure and active share.

Ding and Wermers (2012) discover a difference between small and large mutual funds. For large funds, they find evidence of a positive relationship between manager tenure and fund performance in contrast to smaller funds, where manager tenure has a negative effect on performance. Ding and Wermers (2012) argue that their discoveries could be an indication of manager entrenchment in smaller funds compared to larger funds where governance is more effective and structured. The authors argue that for smaller funds, managers of poor current skills are retained and managers with decent current skills are likely to leave for a position with higher compensation.

3. Hypotheses

The main argument constantly made by active managers is that they possess enough stock-picking skills to beat the market (passive strategy). Jensen (1968) evaluates the performance of 115 mutual funds between 1955-1964 and finds that mutual funds on average are not able to generate superior risk-adjusted returns relative the market even before fees are considered. Fama (1970) extends the research by Jensen (1968) and develops the efficient markets model that help explain the findings of Jensen (1968). In his paper, Fama argues that investors are not able generate abnormal risk-adjusted returns because the stock prices already reflect all available information which limits any potential opportunities to exploit mispricing.

Sharpe (1991) argues that even though some active managers may be able to outperform the market, this could not be true for *all* active managers as they operate in a zero-sum game before costs. In other words, if an active manager generates positive gross alpha this is at the expense of other active managers. Regarding the *net* alpha received by investors, active investments must therefore be a *negative*-sum game. However, as mentioned, Pedersen (2018) argue that the capital market is not a zero-sum game but a positive-sum game and that active managers can be worth the fees charged (depending on the level of fees).

As a whole, previous research is relatively ambiguous regarding the relationship between active management and mutual fund performance.

However, the majority of the previous literature find that, on average, actively managed funds underperform passive alternatives when fees are taken into account. In Sweden, Flam and Vestman (2017) find that very few active funds provide positive net 1-factor alpha. Thus, we expect to see that actively managed funds do not add value after fees are taken into account.

H1a: In aggregate, actively managed funds underperform the passively managed portfolio alternative (benchmark index) after fees are taken into account.

Even if a group of managers have the sufficient skills to outperform passively managed funds net of fees, their performance is hidden by the majority of managers with insufficient skills.

Nevertheless, some funds are found to regularly beat the market. For an investor, the most obvious alternative of investing in an actively managed fund is to invest in a passive portfolio (e.g. an index fund). Actively managed funds are consequently compared to their respective benchmark index and the only way for an actively managed fund to outperform its benchmark is to deviate from it.

Wermers (2003) finds that active managers who take larger active bets are rewarded in line with the higher total risk, even after adjusting for market and different style loadings. Thus, he concludes that active managers who take larger active bets are better at picking stocks, even though the average active manager do not generate sufficient return to beat benchmarks.

Having the study of Cremers and Petajisto (2009) in mind, we examine if and how the *degree* of active management is related to mutual fund performance in the context of Swedish mutual funds. Similar to what is found by Cremers and Petajisto (2009), we expect to find a positive relationship between active share and future benchmark-adjusted fund performance. Furthermore, based on the findings presented by Wermers (2003) and Cremers and Petajisto (2009) we expect to find the most active funds to outperform the benchmark, on average, after fees are taken into account.

H1b: There is a positive relationship between active share and future benchmark-adjusted fund performance.

H1c: The most active funds outperform the passively managed portfolio alternative (benchmark index) after fees are taken into account.

Another way for actively managed funds to differentiate themselves from passively managed funds, could be to have a more experienced manager in charge of the fund. This is based on the underlying assumption that manager experience to some extent reflect the skill of the manager.

Although, as mentioned, research concerning the relationship between manager experience and fund performance shows ambiguous results. For example, Golec (1996) find evidence of manager tenure as the most significant factor to predict mutual fund performance. Also, Webster (2002) concludes a positive and significant relationship between manager tenure and fund performance. In contrast, Chevalier and Ellison (1999) find no robust results and Costa and Porter (2003) do not find funds managed by more experienced managers to perform better than funds managed by less experienced managers, which is also confirmed by Porter and Trifts (2014). Furthermore, Cremers and Petajisto (2009) find no significant relationship. The ambiguous results and the conventional wisdom that there is no real substitute for experience, makes it interesting to test for our next hypothesis.

H2: Actively managed funds that are managed by more experienced fund managers outperform actively managed funds that are managed by less experienced fund managers.

However, for manager experience to actually have an impact on how the fund performs, the fund needs to be actively managed. In turn, the manager's decisions and actions should have a greater significance for funds that are highly active than for less active funds.

In our next hypothesis, we test whether higher levels of active management in combination with more experienced managers is associated with greater performance and if this is even more pronounced for the most active funds.

H3a: There is a positive relationship between manager experience and fund performance for the most actively managed funds.

H3b: The positive relationship between manager experience and fund performance is stronger for the most actively managed funds than for the less actively managed funds.

If the assumption that manager experience to some extent reflects manager skills, it is reasonable to think that experience influence how inclined the fund manager is to take an active role in his or her management. However, regardless of if the assumption holds, experience could be related to investment confidence and thus impact how active the manager chooses to be. In their paper, Cremers and Petajisto (2009) find a positive relationship between manager tenure and active share. In our last hypothesis, we test whether experience induces active management.

H4: Actively managed funds managed by more experienced fund managers are more active than actively managed funds managed by less experienced fund managers.

4. Methodology

4.1 Active Management

4.1.1 Active Share

Active Share is a measure of active management that was introduced by Cremers and Petajisto (2009). Since its introduction, it has become an increasingly established measure of active management, both in the academic context and in the mutual fund industry. It has been used by the European Securities and Markets Authority (ESMA) to measure the degree of active management among mutual funds (Demartini & Mosson, 2018). In the academic context, active share has been used by, for example, Flam and Vestman (2017) to study actively managed funds in the context of the Swedish market.

Contrary to tracking error, it takes its emphasis on the holdings of a fund and measures the share (in percentage terms) of the portfolio holdings that differ from the benchmark index holdings. The more the portfolio holdings of the fund differs from the holdings of its benchmark index, the higher is the active share. Thus, an active share of 100% indicates that none of the holdings in the fund portfolio are represented in the benchmark index. An active share of 0% indicates that the fund holds the identical portfolio as the benchmark index both in terms of the stocks held in the portfolio and the composition of these holdings as well. The computation formula for active share is outlined below.

$$\text{Active Share} = \frac{1}{2}\sum_{i=1}^{N}[w_{fund,i} - w_{index,i}] \quad (1)$$

Where,

$w_{fund,i}$ = The portfolio weight of asset *i* in the fund

$w_{index,i}$ = The portfolio weight of asset *i* in the benchmark index

In our calculation of active share, we use the same benchmark index for all the funds in our sample, SIX Portfolio Return Index (SIXPRX). For motivation and more details on why this approach is used, see section 5.3.

4.1.2 Tracking Error

Tracking error, also known as "active risk", has historically been the traditional measure of active management (Cremers & Petajisto, 2009). Tracking error has been used in several papers as a measure of active management, among them are the papers by Wermers (2003), Berk and Green (2004) and Ding and Wermers (2012). It measures a fund's volatility that does not derive from fluctuations in the benchmark index. Thus, tracking error measures how much a fund deviates from the index in terms of returns. A fund that completely replicates the index has a tracking error of 0, as it fluctuates identically with the index. Tracking error is calculated as the standard deviation of the difference between the returns of a fund and its benchmark index. The formula for calculating tracking error is outlined below.

$$\text{Tracking Error} = \sqrt{\frac{\sum_{i=1}^{N}\left(R_{fund,t} - R_{index,t}\right)^2}{N-1}} \quad (2)$$

Where,

$R_{fund,t}$ = Fund return at time *t*

$R_{index,t}$ = Benchmark index's return at time *t*

N = Number of return periods

Monthly returns for fund *i* and SIXPRX are used in our calculation of tracking error. The tracking error at a given year *t* is based on the monthly returns within that given year, i.e. monthly returns within twelve months prior to the end of the year. This produces a year-end tracking error which is then annualized to match the yearly observations of active share and manager tenure.

4.2 Manager Experience

In this paper, we use manager tenure as a proxy for manager experience. When a fund is managed by a single manager, we use the same definition as Morningstar and calculate manager tenure as; *"the number of years that the current manager has been the portfolio manager of the fund"* (Morningstar Inc., n.d.-b). When a fund is managed by a team, i.e. by multiple managers, Morningstar defines manager tenure as the average tenure within the team. In contrast, we use the same approach as Ding and Wermers (2012) which means that we only consider the manager with the longest tenure. The underlying assumption following this approach is that the manager with the longest tenure, i.e. the longest experience, has the greatest influence on how the fund should be managed. By using manager tenure as proxy for manager experience, we do not take previous experience from managing another fund, or similar, into account. To calculate manager tenure, we collect data on manager history from Morningstar Direct[5] which includes the name of the current and historical fund manager and the period of time each of the

[5] Morningstar Direct is an investment analysis platform created by Morningstar, Inc. and is built for asset management and financial services professionals (Morningstar Inc., n.d-a).

managers managed the fund. With the help of this data, we are then able to manually calculate the year-end current level of manager tenure as of each specific year in our study period. For some funds, the data on manager history is not complete and it is usually the early managers of the funds that are missing. Unable to estimate the manager tenure for these fund-year observations, we instead report them as missing. There are 21 funds in our sample that encounter this problem resulting in missing values for manager tenure for some of the years for these funds.

4.3 Fund Performance

We use two metrics to evaluate fund performance: (1) benchmark-adjusted net returns and (2) four-factor alphas of benchmark-adjusted net returns. The first metric relates the returns of the fund to the returns of the benchmark index and represents therefore, in essence, the excess returns of the fund relative the benchmark. Thus, it measures the fund performance after the opportunity cost of investing in a passive portfolio (the fund's benchmark index) has been taken into account, in line with Berk and Green (2004) and Cremers and Petajisto (2009). The second metric is based on the first one but controls for well-known biases represented in the four-factor model (Fama & French, 1992, 1993; Carhart, 1997). We use the four-factor alphas to verify our results by controlling for exposures to the market, size, value and momentum.

4.3.1 Benchmark-Adjusted Returns

We use benchmark-adjusted net returns as the main measure of fund performance for two reasons. First, the most obvious alternative to investing in an actively managed fund is to invest in a passive portfolio, i.e. an index fund. Therefore, we have chosen to evaluate the return investor receives from investing in the actively managed fund compared to the alternative of investing in a passive portfolio. Second, this paper focuses on the perspective of investors. Therefore, we use *net* returns because this is the return investors ultimately receive. To calculate a fund's benchmark-adjusted net return, our starting point is the fund's monthly net return and then further subtract the

corresponding return of its benchmark index. Hereafter, we use the terms "benchmark-adjusted *net* returns" and "benchmark-adjusted returns" interchangeably. The formula illustrating how the benchmark-adjusted return is calculated it outlined below.

$$\text{Benchmark-adjusted return} = R_{i,t} - R_{benchmark,t} \quad (3)$$

Where,

$R_{i,t}$ = Return for fund *i* at time *t*

$R_{benchmark,t}$ = Return for benchmark index at time *t*

4.3.2. Four-Factor Alphas

Fama and French (1992) claim that CAPM is not sufficient to explain equity returns. In their study, they find two additional factors that may explain the outperformance of a certain portfolio or stock relative the market that that is not explained by CAPM. They find two classes of stocks that tend to perform better than the market; (1) small cap stocks and (2) stocks with a high book-to-market ratio of equity, also referred to as *value stocks*. The shares of small firms are generally less liquid than shares of large firms, and the higher returns of small firms could be seen as a risk premium for investing in an illiquid asset. Furthermore, value stocks have been shown to generate superior return compared to firms with a lower book-to-market ratio of equity, also referred to as *"growth stocks"*. Due to their observations, the authors expand CAPM by two factors, which they call SMB (Small Minus Big) and HML (High Minus Low). Fama and French (1992, 1993) show that this three-factor model has a significantly higher explanatory power than CAPM.

Later, Carhart (1997) extends the research of Fama and French (1992, 1993) and finds an additional factor that could add to the explanatory power of the model presented by Fama and French (1992, 1993); the momentum factor, capturing one-year anomaly. A stock is said to have momentum if the stock's average monthly return for the prior twelve months is positive. Momentum is described as the tendency of a stocks that perform well to

continue to perform well and stocks that perform poorly to continue to perform poorly (Carhart, 1997). The traditional four-factor model is outlined below.

$$R_{i,t} - rf_t = \alpha_{i,t} + \beta_{i,mkt}[R_{mkt,t} - rf_t] + \beta_{i,SMB}SMB_t + \beta_{i,HML}HML_t + \beta_{i,MOM}MOM_t + \varepsilon_{i,t} \quad (4)$$

Where,

$R_{i,t} - rf_t$ = The average actual return for portfolio *i* in excess of the risk-free rate at time *t*

$\alpha_{i,t}$ = The four-factor alpha, part of return that is not explained by the explanatory variables at time *t*

$[R_{mkt,t} - rf_t]$ = The actual market premium at time *t*

SMB_t = Fama and French's size factor at time *t*

HML_t = Fama and French's value factor at time *t*

MOM_t = Carhart's momentum factor at time *t*

$\varepsilon_{i,t}$ = Error term at time *t*

By controlling for these factors, we are able to better isolate the "true" value added that is attributable to the skills of fund managers and thus is not attributable to a tilt towards any of the four sources of systematic risk. Therefore, we complement the benchmark-adjusted returns with the four-factor alphas of benchmark-adjusted returns when measuring fund performance. Hereafter, we refer to the four-factor alphas of benchmark-adjusted *net* returns as four-factor alphas of benchmark-adjusted returns or just simply as four-factor alphas. Below, we outline the four-factor model applied to benchmark-adjusted returns.

$$R_{i,t} - R_{benchmark,t} = \alpha_{i,t} + \beta_{i,mkt}[R_{mkt,t} - rf_t] + \beta_{i,SMB}SMB_t + \beta_{i,HML}HML_t + \beta_{i,MOM}MOM_t + \varepsilon_{i,t} \quad (5)$$

Where,

$R_{i,t} - R_{benchmark,t}$ = The average actual return for fund *i* in excess of the benchmark index at time *t*

$\alpha_{i,t}$ = Four-factor alpha of benchmark-adjusted returns, part of return that is not explained by the explanatory variables at time *t*

$[R_{mkt,t} - rf_t]$ = The actual market premium at time *t*

SMB_t = Fama and French's size factor at time *t*

HML_t = Fama and French's value factor at time *t*

MOM_t = Carhart's momentum factor at time *t*

$\varepsilon_{i,t}$ = Error term at time *t*

4.4 Building Portfolios

In our empirical approach, we use portfolio sorts where we sort the funds in our sample into different portfolios based on relationships we want to test. One of the main advantages of using this approach in our study is that it allows us to identify and demonstrate trends in an illustrative manner. By sorting funds into different portfolios, we will be able to compare the different types of funds, based on the measures used to sort the funds, and analyze how they relate to another measure. Portfolio sorts are used extensively in the finance literature. Fama and French (1992), Pastor and Stambaugh (2003), Cremers and Petajisto (2009) and Ding and Wermers (2012) are among many to implement portfolio sorts in their research. In general, one of the advantages of creating portfolios is that it reduces the idiosyncratic volatility associated with individual stocks. Although, in our study we analyze mutual funds which implies that the idiosyncratic volatility related to stocks is already diversified away within each fund.

In our study, we will use different portfolio sorts to illustrate trends. First, we analyze the relationship between active management and fund performance by sorting funds into portfolios based on active share and tracking error and relate each portfolio to their respective equal-weighted average performance over the time period 2003-2016. Second, we analyze the

relationship between manager tenure and fund performance by sorting funds into portfolios based on manager tenure and relate each portfolio to their respective equal-weighted average performance over the same time period.

Lastly, we analyze the interaction between active share and manager tenure in relation to fund performance. We investigate if highly active funds managed by more experienced fund perform better relative the benchmark index than corresponding funds managed by less experienced manager. Furthermore, we analyze if the highly active funds managed by more experienced managers are able to outperform the benchmark index.

4.4.1 Active Management

As mentioned, actively managed funds are constantly compared against benchmark indices. Two intuitive ways to outperform a benchmark is through stock selection or factor timing. Stock selection means picking stocks that you think will beat holdings of the benchmark, with similar exposure to systematic risk. In contrast, factor timing means time-varying positioning in broader factor portfolios, based on beliefs about future performance of different factors (Cremers & Petajisto 2009).

A common measure of active management is tracking error. As mentioned, Cremers and Petajisto (2009) argue that tracking error is a reasonable proxy for factor timing, as it measures the volatility of a portfolio's return in relation to a benchmark and thus gives emphasis to correlated active bets (i.e. exposure to systematic risk factors). However, measuring active management by tracking error alone only covers one aspect of active management. For example, a fund manager that invests in multiple industries but carefully choses companies *within* an industry or sector will be considered less active than a fund manager who invests in fewer industries or sectors but hold a diversified portfolio within each industry or sector. Cremers and Petajisto (2009) instead argue that tracking error is better used in combination with active share. As discussed in section 4.1.1, active share measures to what extent a fund differs from its benchmark in regard to the holdings and thus

counts all factor bets with equal weights. Consequently, according to Cremers and Petajisto (2009) active share is a reasonable proxy for stock selection.

To cover different types and degrees of active management, we thus decide to use a combination of tracking error and active share, similar to Cremers and Petajisto (2009). Portfolios are constructed by sorting the funds in our sample sequentially into terciles, first by active share and then further by tracking error. This way, we evenly distribute the funds into six different portfolios based on the level of active share and tracking error (3x3 matrix). The main advantage of using terciles, instead of fixed cut-offs, is that the funds in our sample will be evenly distributed across the portfolios which will ensure that portfolios are designed to contain enough funds to make further analysis valid. Making sure that we have enough funds for further analysis is one of the reasons we decide to distribute our funds into portfolios based on terciles (3x3 matrix) and not based on quintiles in accordance with Cremers and Petajisto (2009). The obvious disadvantage of using terciles instead of quintiles, is that potential trends might be more difficult to identify.

4.4.2 Manager Experience

To examine manager experience in connection to fund performance, we construct portfolios by sorting the funds in our sample by manager tenure into manager tenure quartiles. This leaves us with four portfolios and an even distribution of funds across them.

4.4.3 Active Management and Manager Experience

To investigate the relationship between active management and manager experience and how the interaction between them two relates to fund performance, we construct portfolios in a similar manner as for active management alone. We decide to use active share as the main measure of active management since it is more directly related to the decisions of the fund manager compared to tracking error and should intuitively thus be more influenced by the actual stock-picking skills (and experience) of the fund manager. A fund manager can control the level of active share-through decisions on which stocks to hold and their weight levels-to a larger extent

compared to tracking error which is more indirectly under the control of the fund manager and more volatile. Thus, we argue that using active share better captures the relationship between active management and manager experience.

We use the same methodology in the construction of portfolios as previously. Portfolios are constructed by sorting the funds in our sample sequentially, first by active share into terciles and then further by manager tenure into medians. This way, we evenly distribute the funds into six different portfolios based on the level of active share and manager tenure (3x2 matrix).

4.5 Multivariate Regression Analysis

We perform multivariate regressions to complement the results from the nonparametric portfolio sorts where we control for different factors. In our multivariate regressions, two different baseline regression models are used. The first model aims to investigate whether the variation in active share can be explained by other fund and management characteristics, such as fund size and manager tenure. The second model aims to investigate whether fund performance can be predicted by active share and/or by other fund and management characteristics. The observations are at the fund-year level since active share, tracking error and manager tenure are computed and reported annually. The multivariate regression approach that we implement is mainly based on the one used by Cremers and Petajisto (2009). Although, in our regressions we do not control for turnover ratio and capital inflows due to lack of data. Nevertheless, these variables turn up insignificant in their regression results and Cremers and Petajisto (2009) further conclude turnover to play a minor role in their tests. Thus, we argue that the lack of these variables should not have a major impact on our results. A Pearson's pairwise correlation matrix of the variables used in our regressions can be found in Table 1.

The dataset used in our regression analysis has an unbalanced panel structure, meaning that we analyze numerous mutual funds over several years. This enables a more dynamic regression analysis. Given that we are working with panel data, there are three conventional regression approaches

to choose from: (1) a *random effects model*; (2) a *fixed effects model*; or (3) a *pooled OLS regression model*. To determine the appropriate approach, we will apply several specification tests for each of the regression models. For more details on these specification tests and their results, see section 11.2.

4.5.1 Explaining Active Share

To try to gain an understanding of active share and analyze if the level of active share can be explained by different fund and management characteristics, we run numerous regressions with several variables as predictors for active share. We apply a fixed effects model controlling for year fixed effects first and then further control for fund fixed effects as well (in combination with the year fixed effects).

A general cause of concern in regression analysis is the potential presence of endogeneity which causes biased estimators and unreliable regression results. Endogeneity occurs when the explanatory variable is correlated with the error term and may be the result of reverse causality or omitted variables. By applying a fixed effects model, we will be able to control for some endogeneity in the form of unobserved heterogeneity. Fixed effects at the fund-level will help control for unobserved heterogeneity that is related to time-invariant fund-specific characteristics that might have an impact on both active share and the explanatory variables such as manager tenure and tracking error. The culture or policies in a fund illustrates two examples of (relatively) time-invariant and fund-specific characteristics that might have this effect and cause biased estimators. Fixed effects at the year-level will enable us to control for time-varying factors that has an effect on the cross-section, e.g. a financial crisis. Several explanatory variables are used in our regressions to see to what extent different fund characteristics are related to active share. One of the explanatory variables, expense ratio, has a considerable number of missing observations. Therefore, we use mean imputation to address this in our main regressions and perform complementary regressions without the mean-imputed observations, that will function as robustness checks to test the validity of our results. These

complementary regressions are run for both our regression models with active share and fund performance as dependent variables respectively. We argue that this method to handle missing observations is plausible in the case of expense ratios since they are relatively fixed over time and do not change much within the funds. Furthermore, since both active share and some of the independent variables are persistent over time, we cluster the standard errors by fund. The baseline regression model is specified below.

$$AS_{i,t} = \alpha_{i,t} + TE_{i,t} + Tenure_{i,t} + Size_{i,t} + FundAge_{i,t} + Stocks_{i,t} + ER_{i,t} + BAR_{i,t-1} + BAR_{i,(t-3)-(t-1)} + d_i + d_t + u_{i,t} \quad (6)$$

Where,

$AS_{i,t}$	Active share for fund *i* at time *t*
$\alpha_{i,t}$	Alpha for fund *i* at time *t*
$TE_{i,t}$	Tracking error for fund *i* at time *t*
$Tenure_{i,t}$	Manager tenure, measured in years, for fund *i* at time *t*
$Size_{i,t}$	Natural logarithm of total net assets for fund *i* at time *t*
$FundAge_{i,t}$	The age, measured in years, of fund *i* at time *t*
$Stocks_{i,t}$	Number of stock holdings for fund *i* at time *t*
$ER_{i,t}$	The expense ratio for fund *i* at time *t*
$BAR_{i,t-1}$	The benchmark-adjusted return of fund *i* at time $t-1$
$BAR_{i,(t-3)-(t-1)}$	The benchmark-adjusted return of fund *i* between $t-3$ and $t-1$
d_i	Dummy variables to capture fund fixed effects
d_t	Dummy variables to capture year fixed effects
$u_{i,t}$	Error term for fund *i* at time *t*

4.5.2 Predicting Fund Performance

We also run regressions on fund performance with active share and manager tenure as predictors to examine their predictive power on fund performance. Two different performance metrics are used in separate regression models: (1) benchmark-adjusted returns and (2) four-factor alphas of benchmark-adjusted

returns. Both performance metrics are based on net returns. In this case, the most appropriate approach is to run pooled OLS regressions according to our model specification tests. Therefore, we run pooled OLS regressions of fund performance on active share and on the same set of explanatory variables used in the regressions of active share in section 4.5.1. Fund performance is measured over year t and represents cumulative returns while the explanatory variables are measured at the end of year t–1 to establish a predictive model on future returns. The standard errors are clustered at the fund-level. The baseline regression model is specified below.

$$\begin{aligned} \mathrm{Return}_{i,t} = {} & \alpha_{i,t} + \mathrm{AS}_{i,t-1} + \mathrm{TE}_{i,t-1} + \mathrm{Tenure}_{i,t-1} + \mathrm{Size}_{i,t-1} + \mathrm{FundAge}_{i,t-1} \\ & + \mathrm{Stocks}_{i,t-1} + \mathrm{ER}_{i,t-1} + \mathrm{BAR}_{i,t-1} + \mathrm{BAR}_{i,(t-3)-(t-1)} + u_{i,t} \end{aligned} \quad (7)$$

Where,

$\mathrm{Return}_{i,t}$	Benchmark-adjusted net returns or four-factor alphas of fund i at time t
$\alpha_{i,t}$	Alpha for fund i at time t
$\mathrm{AS}_{i,t-1}$	Active share for fund i at time $t-1$
$\mathrm{TE}_{i,t-1}$	Tracking error for fund i at time $t-1$
$\mathrm{Tenure}_{i,t-1}$	Manager tenure, measured in years, for fund i at time $t-1$
$\mathrm{Size}_{i,t-1}$	Natural logarithm of total net assets for fund i at time $t-1$
$\mathrm{FundAge}_{i,t-1}$	The age, measured in years, of fund i at time $t-1$
$\mathrm{Stocks}_{i,t-1}$	Number of stock holdings for fund i at time $t-1$
$\mathrm{ER}_{i,t-1}$	The expense ratio for fund i at time $t-1$
$\mathrm{BAR}_{i,t-1}$	The benchmark-adjusted return of fund i at time $t-1$
$\mathrm{BAR}_{i,(t-3)-(t-1)}$	The benchmark-adjusted return of fund i between $t-3$ and $t-1$
$u_{i,t}$	Error term for fund i at time t

5. Data

5.1 Data on Returns

Yearly and monthly returns for mutual funds are retrieved from Morningstar Direct. The calculation of the total return is determined by taking the change in net asset value (NAV) and reinvesting all income and capital gains during that month and dividing by the opening balance NAV for that period. Reinvestments are made using the actual reinvestment NAV and daily payoffs are reinvested monthly (Morningstar Inc., n.d.-c). As the purpose of our study is from an investors point of view, we use *net* returns accounting for the expense ratio which includes management, administrative, 12b-1 fees and other costs taken out of the funds' assets. However, the net returns do not account for sales charges such as front-end loads, deferred loads and redemption fees, as to give a clearer picture of the fund's performance (Morningstar Inc., n.d.-c). Yearly net returns are missing for some funds in certain years. For these observations, we use the monthly net returns to compute yearly net returns. The net returns include all income, such as interest, dividends, capital gains and distributions realized over the given period. The database include data on dead funds, including returns, which mitigates any potential survivorship bias.

For the benchmark index used in our study, SIX Portfolio Return Index (SIXPRX)[6], we receive monthly (month-end) net asset values (NAV) for the period 2002-2016 from SIX Group AG. NAV include reinvested dividends and capital gains and is used in the calculation of the monthly returns which in turn are used to calculate cumulative yearly returns for each year in our time period of 2003-2016 (see Table 2).

5.2 Data on Holdings

To compute active share, data on portfolio compositions for the mutual funds and the benchmark index are gathered. For the mutual funds, year-end holdings, for the period 2002-2015, are collected from Morningstar Direct. The

[6] For more detailed information about SIXPRX, see Appendix section 11.1.

holding weights of the mutual funds are adjusted to not include cash and bond holdings by rescaling the weights to be comparable to SIXPRX which only includes stock holdings. Although, since we only include equity funds in our sample bond holdings are rare and usually constitute a small share of the whole portfolio. For SIXPRX, quarter-end holdings are supplied by the index provider SIX Group AG for the period 2002-2015. The quarter-end holdings for the last quarter are used as the year-end holdings for SIXPRX.

5.3 Benchmark Index Selection

The choice of benchmark index is important as benchmark holdings and returns are central in the calculation of both active share and tracking error. A common approach is to use the prospectus benchmark for each fund. The prospectus benchmark is the index that the fund has committed to outperform and is therefore crucial in the evaluation of the fund's performance. Holdings data for benchmark indices are unfortunately not easily accessed which makes it difficult to use the prospectus benchmark for each fund. We were able to gain access to the holdings data for the benchmark index SIXPRX which is a widely used benchmark index for Swedish mutual funds in general and the most common prospectus benchmark among the funds in our sample. SIXPRX shows the development for all companies listed on the Stockholm Stock Exchange, however, no company may account for more than ten percent of the total value of the index portfolio.

We use SIXPRX as the benchmark index for all the funds in our sample and argue that using the same benchmark index could be a favorable approach. A drawback of using the prospectus benchmark is that a fund's management methodically can tilt away from their benchmark index in order to outperform it, even though the fund may be more similar to another index which it might underperform. For example, Agarwal and Naik (2004) find that, in general, hedge fund managers systematically use investment styles that are non-linear to their respective benchmark indices. This implicates that fund managers could choose benchmark indices based on the expected probability of outperformance and not on fit. Thus, the advantage of using the

same index for all the funds is that it is less likely that our results would be the target of this kind of management manipulation.

5.4 Control Variables

Yearly data for the control variables used in our multivariate regressions are retrieved from Morningstar Direct. Some of the control variables are reported on a quarter-end or month-end basis. In this case, the last observation each year (either last quarter or last month) is used as the year-end observation. Fund size is defined as total net assets and is reported on a month-end basis. Unfortunately, data on fund size is missing before 2005 which limits our regressions to the period of 2006-2016. Number of stock holdings calculates the numbers of stocks that the fund is invested in and only takes long positions into account. The expense ratio used is the net expense ratio reported on the annual report. The net expense ratio is collected after fees waived/recovered/expense reimbursement, or recoupment by advisor and includes the following types of fees: interest and dividends on borrowed securities, accounting, administrator, advisor, audit, board of directors, custodial, distribution (12b-1), legal, organizational, professional, registration, shareholder reporting, subadvisor, and transfer agency (Morningstar Inc., n.d.-d).

Similar to manager tenure, fund age is calculated manually. The fund age is based on the fund's performance start date which is the first date with reported returns. Each year-end, the number of days that the fund has operated since the performance start date is calculated and divided by 365 to get the fund age at a given year.

5.5 Sample Selection

To focus on all-equity funds, the dataset only includes funds from the Morningstar Category "Sweden Equity"[7]. The category Sweden Equity consists of Swedish Equity funds that mainly invest in the equities of

[7] The Morningstar category Swedish Equity consists of mutual funds that invest at least 75% of total assets in equities and at least 75% of equity assets in Swedish equities (Morningstar Inc., 2018).

companies based in Sweden. Only the primary share class of the fund is considered. The original dataset consists of 209 Swedish funds between 2003-2016. Funds with no reported return or no reported holdings are excluded. A few funds are left out due to inaccurate holdings data[8]. Funds with large stakes in bonds[9] are excluded to make the comparison with SIXPRX more accurate. Moreover, pure index funds are left out. Our final sample consists of 134 Swedish funds. Undeniable, our tests have a selection bias but is, to the best of our knowledge, free of a survivorship bias.

5.6 Dataset Formation

5.6.1 Active Share

To compute active share, holdings of mutual funds are compared to holdings of SIXPRX. Holdings are primarily matched through ISIN codes. However, a recurrent problem for the mutual fund holdings is that ISIN codes are missing for some of the stock holdings. There are different alternatives on how to approach this problem. One option is to disregard holdings without ISIN codes and exclude them from the matching process. This method will produce a large estimation error and is therefore the most unfavorable approach. Another option is to include these holdings but not try to match them with the holdings of the benchmark. The resulting underlying assumption is that these holdings are "active positions" that are not held by the benchmark. This approach risk to overestimate the active share. Our final approach involves using ticker symbols to find ISIN codes for the missing observations. This method produces the lowest estimation error and is therefore chosen. Through Netfonds Bank's webpage (Netfonds Bank, 2019), we are able to match ticker symbols with ISIN codes. For some of the stocks, an exact match between the ticker symbols in our data and the ticker symbols in Netfonds Bank's database could not be found. This is most probably due to ticker symbols not always being consistent across different databases. When we searched for a certain stock using the ticker symbol in our data, the database sometimes returned a ticker symbol

[8] When the reported sum of the holdings does not correspond to the total sum of the individual holdings.
[9] Funds with times-series average of equity holdings <80 %.

that was very similar but not identical (e.g. the only difference could be that the database used "-" to separate the share class from the name abbreviation while our data used a space instead). In these cases, we use additional information—such as market listing and last trading day (corresponding to the day of delisting for some stocks)—to make sure that the match is correct. Through this method, we are able to cover a majority of the holdings with missing ISIN codes and match them with the holdings of the benchmark. For the rest of the holdings that are not matched with ISIN codes, often constituting as small share of the total holdings of the funds, we assume them to be active positions which to some extent will generate an overestimation of active share. To mitigate this issue, we use the criteria that at least 80% of the fund holdings have to be matched with ISIN codes at a given year. Otherwise the fund-year observation is treated as missing.

Another issue that we encounter is that the reported weights of the individual stock holdings does not sum up to a 100% for some funds in certain years. This means that some of the individual holdings are not reported for that specific year. In this case, we treat the observation as missing.

5.6.2 Multivariate Regressions - Panel Dataset

The dataset used in our regressions is prepared using the data on benchmark-adjusted returns, four-factor alphas of benchmark-adjusted returns, active share, tracking error and manager tenure used in our nonparametric portfolio sorts and data on our control variables as well. The data from our nonparametric portfolio sorts is already prepared and is therefore easily matched by fund name and year and merged with the data on our control variables.

Initially, we have 134 funds in our sample. A few funds are excluded from our sample mainly due to having single-year observations for our main variables which shrinks the sample used in the multivariate regressions to 119 funds. Our final dataset is an unbalanced panel with 1042 fund-year observations.

6. Results and Analysis

6.1 Descriptive Statistics

Table 3 shows descriptive statistics for nine different portfolios sorted by active share and tracking error. Each year, we sort funds into terciles, first by active share and then further by tracking error. For each portfolio and year, we calculate equal-weighted mean values for different variables and then calculate time-series averages over the period 2006-2016.

The average fund has assets under management of 3087.09 MSEK. Within the top tercile of active share (which includes portfolio 3/1, 3/2 and 3/3), funds on average appear to be smaller than the average fund. In the bottom tercile of active share (which includes portfolio 1/1, 1/2 and 1/3), the opposite seems to apply, i.e. funds are larger on average. Cremers and Petajisto (2009) find the same result for their sample. Also, the number of stocks that a fund invests in seems to be negatively correlated with the level of active share. This relationship is reasonable, as active share measures the difference in holdings between a portfolio and a benchmark and thus a plausible proxy for stock selection, as discussed by Cremers and Petajisto (2009). No clear relationship appears to exist between tracking error and size or number of stocks. Furthermore, manager tenure seems to increase with higher levels of active share. Examining expense ratio, the average fund charges 1.27% of assets invested. The bottom tercile of active share is, not surprisingly, associated with lower fees. A possible explanation could be that the typical passive fund trades less than an actively managed fund. Furthermore, the fees charged should to some extent reflect the value added by the fund manager to investors. The less a fund deviates from the benchmark, the less value does it add relative a passive strategy which should be reflected in lower fees. More interestingly, the funds within the middle tercile of active share (which includes portfolio 2/1, 2/2 and 2/3) seems to charge higher fees, on average, than the most active funds. The highest expense ratio (1.54%) is found for portfolio 2/2.

Table 4 shows descriptive statistics for six different portfolios sorted by active share and manager tenure. Each year, we sort funds first by active

share into terciles and then further by manager tenure into medians. For each portfolio and year, we calculate equal-weighted mean values for different variables and then calculate time-series averages over the period 2006-2016.

Similar patterns for the relationship between active share and expense ratio, size and number of stocks respectively, are found with the portfolio sorting based on active share and manager tenure. This is reasonable as the portfolio construction is still conditional on active share. For each level of active share, we see that manager tenure increases independent of whether we look at high tenure portfolios or low tenure portfolios. To be more precise, when we compare the equal-weighted time-series average of manager tenure for portfolio 1/1, 2/1 and 3/1 we see that the tenure increases from 1.45 to 1.71. The same goes for portfolio 1/2, 2/2 and 3/2 where the equal-weighted time-series average of manager tenure for these portfolios increase from 6.27 to 8.77. Thus, portfolios with higher active share appear to have higher manager tenure on average. On the other hand, given each level of active share, we find no indication that funds managed by more experienced fund managers are more active than their less experienced counterparts (comparing the average active share of portfolio 1/1 [35.22%] with the average active share of portfolio 1/2 [34.75%] and so on). Surprisingly, we also find expense ratio to be lower for the funds with high tenure (for each level of active share). For example, we find portfolio 1/2 to have a lower expense ratio than portfolio 1/1 (0.94% compared to 1.15%). Intuitively, we would expect experience, i.e. manager tenure, to be positively related to fees since manager experience to some extent should reflect manager skill and thus the ability to add value to investors.

6.2 Active Management

In this section, we present results for portfolios where we sort the funds in our sample based on two measures of active management—active share and tracking error. In section 6.2.1, we present time-series averages of benchmark-adjusted returns and four-factor alphas of benchmark-adjusted returns for each portfolio over our sample period 2003-2016, to see if we find any trends on returns between different levels of active share and tracking error. This

section will help us determine whether more active funds on average perform better than less active funds and if they on average perform better than the benchmark index. In section 6.2.2, we present time-series averages of manager tenures for each portfolio over the same period to identify potential trends between manager experience and the two measures of active management. This section will help us determine if more active funds have more experienced managers.

6.2.1 Fund Performance

Table 5 illustrates the benchmark-adjusted returns and the four-factor alphas of benchmark-adjusted returns for nine different portfolios sorted by active share and tracking error. Each year, we sort funds into terciles, first by active share and then further by tracking error. For each portfolio and month, we calculate an equal-weighted benchmark-adjusted return and then calculate time-series averages over the sample period 2003-2016. These benchmark-adjusted returns are then annualized and illustrated in Panel A. The monthly equal-weighted benchmark-adjusted returns are also regressed on Carhart's four-factor model to generate alphas that are controlled for exposure to the market, size, value and momentum. The four-factor alphas are then annualized and illustrated in Panel B.

In Panel A, we see that most of the portfolios generate negative benchmark-adjusted returns that are statistically significant, implying that active funds do not add enough value to motivate their fees. On the aggregate level, we see a weak negative relationship between tracking error and benchmark-adjusted returns. However, this relationship is so weak that we can deem it as neutral. Within the high active share tercile, the relationship is more distinct and instead positive implying that "the more actively managed" the fund is in terms of both active share and tracking error, the higher is the benchmark-adjusted returns. Although, the return is still negative for the most active portfolio at -0.03% (t = -0.03) which in turn is not significantly different from zero. Within the middle and low terciles of active share, the relationship between tracking error and benchmark-adjusted returns is negative.

Table 5: Net equal-weighted benchmark-adjusted returns and four-factor alphas for all-equity funds in Sweden between 2003-2016. The funds in our sample are sorted by the two dimensions of active management. The funds are sorted sequentially, first into active share terciles and then further into tracking error terciles. Active share is defined as the percentage of a fund's portfolio holdings that differ from the fund's benchmark index (SIXPR) and is measured at the end of year $t-1$. Tracking error is defined as the standard deviation of the difference between the returns of a fund and its benchmark index (SIXPRX) and is measured at the end of year $t-1$ based on the monthly returns during that year. Net fund returns are the returns to a fund investor after fees (expense ratio) and represent annualized returns over year *t*. Index funds are excluded from the sample. The table shows annualized returns, followed by t-statistics (in parentheses) based on White's (robust) standard errors.

Panel A: Benchmark-adjusted returns (%)					
Active Share Tercile	Tracking Error Tercile				
	Low (1)	(2)	High (3)	All	High-Low
High (3)	-1.49	0.04	-0.03	-0.49	1.45
	(-2.29)	(0.05)	(-0.03)	(-0.67)	(1.20)
(2)	-1.47	-2.09	-2.60	-2.05	-1.13
	(-2.61)	(-3.18)	(-3.79)	(-3.49)	(-1.28)
Low (1)	-1.15	-1.16	-1.85	-1.39	-0.70
	(-2.58)	(-2.04)	(-2.91)	(-2.71)	(-0.91)
All	-1.37	-1.07	-1.49	-1.31	-0.13
	(-2.79)	(-1.76)	(-2.23)	(-2.34)	(-0.16)
High-Low	-0.34	1.20	1.82	0.89	
	(-0.43)	(1.17)	(1.51)	(0.99)	
Panel B: Four-factor alpha of benchmark-adjusted returns (%)					
Active Share Tercile	Tracking Error Tercile				
	Low (1)	(2)	High (3)	All	High-Low
High (3)	-1.44	0.07	0.69	-0.23	2.15
	(-2.27)	(0.09)	(0.68)	(-0.32)	(2.66)
(2)	-1.43	-2.15	-2.62	-2.07	-1.20
	(-2.64)	(-3.50)	(-4.09)	(-3.79)	(-2.65)
Low (1)	-1.28	-1.30	-1.83	-1.47	-0.56
	(-2.98)	(-2.39)	(-2.93)	(-2.98)	(-1.29)
All	-1.38	-1.13	-1.26	-1.26	0.12
	(-2.93)	(-2.00)	(-1.98)	(-2.39)	(0.31)
High-Low	-0.16	1.39	2.56	1.26	
	(-0.30)	(1.83)	(2.82)	(2.16)	

Similar trends are observed in Panel B where four-factor alphas of benchmark-adjusted returns are shown. Although, the positive relationship within the high active share tercile is more pronounced and the difference in four-factor alphas between the high tracking error tercile and the low tracking error tercile is positive and both statistically and economically significant at 2.15% (t = 2.66). On the aggregate level, different levels of tracking error do not show any significant relationship with four-factor alphas.

In conclusion, the two most active portfolios, in terms of both active share and tracking error, generate the highest yearly benchmark-adjusted returns and four-factor alphas which in turn are not significantly different from zero. These results fit within the framework of Berk and Green (2004) who conclude that actively managed funds should generate alpha close to zero net of fees.

An interesting aspect is that the middle tercile of active share is associated with the lowest (most negative) returns both in Panel A and in Panel B, where we also find that the returns are a decreasing function of tracking error. This may to some extent be explained by the higher expense ratios that these portfolios are associated with according to Table 6. There, we can see that the time-series average of the equal-weighted expense ratios over the sample period 2003-2016 for these portfolios are the highest. The two portfolios within the middle tercile of active share with the higher level of tracking errors have on average a yearly expense ratio of 1.47% and 1.51% respectively. These portfolios generate on average yearly benchmark-adjusted returns of -2.09% (t = -3.18) and -2.60% (t = -3.79) respectively in Panel A and four-factor alphas of -2.15% (t = -3.50) and -2.62% (t = -4.09) respectively in Panel B.

Shifting our focus to active share, we see a relationship of the opposite kind at the aggregate level. Instead, we observe a weak positive relationship between active share and benchmark-adjusted returns as the benchmark-adjusted returns increase from -1.39% (t = -2.71) for the lowest active share tercile to -0.49% (t = -0.67) for the highest active share tercile. Within each tracking error tercile, this positive relationship becomes stronger for each increasing level of tracking error as the differences in benchmark-adjusted returns between high active share and low active share (High-Low) increase

from -0.34% (t = -0.43) to 1.82% (t = 1.51). This trend is even more pronounced for the four-factor alphas where the differences in four-factor alphas between high active share and low active share (High-Low) increase from -0.16% (t = -0.30) to 2.56% (t = 2.82).

Overall, we see that the two most active portfolios are the only ones generating yearly benchmark-adjusted returns and four-factor alphas that are not statistically significantly different from zero. The rest of the portfolios all generate corresponding returns that are negative and both statistically and economically significant, consistent with previous findings within the context of the Swedish market by Flam and Vestman (2014, 2017). This indicates that even though the "more active" funds may not add value, they add more value relative their fees than the "less active" funds.

To try to understand our results, we turn to Cremers et al. (2016) who find Sweden to be among the countries with the highest proportion of closet indexers[10]. They also find Sweden to have a proportion of explicitly indexed funds (index funds and ETF's) below the worldwide average. According to the authors, the lack of competition from explicitly indexed funds enables closet indexers to charge excessive fees in relation to the level of their active management. This could explain the relatively high level of fees, especially among the funds within the middle active share tercile. Interestingly, looking at Table 3 we observe that the average active share for funds within this tercile over the time period of 2006-2016 ranges between 47.90-50.04%. In Table 7, Panel A, we further see that the funds within this tercile almost exclusively contain funds with active shares below 60% (for the year 2016) deeming them as closet indexers. According to Table 7, the majority of the funds in our sample (approx. 60% of the funds) appear to be closet indexers which is in line with the findings of Cremers et al. (2016) for Sweden. In their paper, they also find that the average alpha generated by active management is lower in countries with more closet indexing (e.g. Sweden) and higher in countries with more explicit indexing. This could explain why even the most active funds in our

[10] In their paper, the authors define closet indexers as funds with an active share below 60%.

sample do not generate positive benchmark-adjusted returns and four-factor alphas of benchmark-adjusted returns which is in conflict with the finding of Cremers and Petajisto (2009). Thus, it may be due to the funds in our sample not being active enough while charging excessive fees.

Moreover, in Table 8 we find low coefficient values when benchmark-adjusted returns are regressed on Carhart's four-factor model. This verifies that the results related to the benchmark-adjusted returns are not due to exposure to any of the sources of systematic risk.

6.2.2 Manager Tenure

Table 9 illustrates the average manager tenure for nine different portfolios sorted by active share and tracking error. Each year, we sort funds into terciles, first by active share and then further by tracking error. For each portfolio and year, we calculate an equal-weighted manager tenure and then calculate time-series averages for each portfolio over the sample period 2003-2016.

In Table 9, we observe a distinct positive relationship between active share and manager tenure which is in line with our expectations. Manager tenure appears to increase with active share both on an aggregate level and within each tracking error tercile. This indicates that fund managers with longer tenure tend to be more active in their investment approach, in line with the findings of Cremers and Petajisto (2009). Directing our focus to tracking error, we see no clear relationship with manager tenure.

The finding that active share is positively related to manager tenure can be interpreted in different ways. One way to interpret it is to see it as managers with longer tenure—i.e. are more experienced—may feel more comfortable in deviating from the benchmark since they have held their position for a longer time period and feel more secure. Another way to see it is that fund managers with longer tenure may feel more confident in their stock-picking skills and ability to generate excess returns and therefore increase their deviation from the benchmark since this is the only way to outperform it.

Table 9: Equal-weighted manager tenures for all-equity funds in Sweden between 2003-2016. The funds in our sample are sorted by the two dimensions of active management. The funds are sorted sequentially, first into active share terciles and then further into tracking error terciles. Active share is defined as the percentage of a fund's portfolio holdings that differ from the fund's benchmark index (SIXPRX) and is measured at the end of year $t-1$. Tracking error is defined as the standard deviation of the difference between the returns of a fund and its benchmark index (SIXPR) and is measured at the end of year $t-1$. Manager tenure is defined as the number of years that the current manager has been the portfolio manager of the fund and is measured at the end of year $t-1$. When a fund is managed by a team, we only consider the manager with the longest tenure in the calculation of manager tenure. Index funds are excluded from the sample. The table shows equal-weighted manager tenures measured in years, followed by t-statistics (in parentheses) based on White's (robust) standard errors.

Manager Tenure (Years)					
Active Share Tercile	Tracking Error Tercile				
	Low (1)	(2)	High (3)	All	High-Low
High (3)	5.00	5.38	5.18	5.19	0.18
					(0.30)
(2)	4.64	3.85	4.48	4.32	-0.16
					(-0.23)
Low (1)	4.32	3.72	4.09	4.04	-0.23
					(-0.33)
All	4.65	4.32	4.58	4.52	-0.07
					(-0.18)
High-Low	0.68	1.66	1.09	1.15	
	(1.03)	(2.73)	(1.72)	(3.17)	

6.3 Manager Experience

In this section, we present results for portfolios where we sort the funds in our sample based on manager tenure. In section 6.3.1, we present time-series averages of benchmark-adjusted returns and four-factor alphas of benchmark-adjusted returns for each portfolio over our sample period 2003-2016 to see if we find any trends on returns between different levels of manager tenure. This section will help us determine whether funds with more experienced managers on average perform better than funds with less experienced managers and if they on average perform better than their benchmark indices. In section 6.3.2, we present time-series averages of active shares for each portfolio over the

same period to identify potential trends between manager experience and active management (measured by active share). This section will help us determine if funds with more experienced managers are more active.

6.3.1 Fund Performance

Table 10 illustrates the benchmark-adjusted returns and the four-factor alphas of benchmark-adjusted returns for four different portfolios sorted by manager tenure. Each year, se sort funds into quartiles by manager tenure. For each portfolio and month, we calculate an equal-weighted benchmark-adjusted return and then calculate time-series averages over the sample period 2003-2016. These benchmark-adjusted returns are then annualized and illustrated in Panel A. The monthly equal-weighted benchmark-adjusted returns are also regressed on Carhart's four factor model to generate alphas that are controlled for exposure to the market, size, value and momentum. The four-factor alphas are then annualized and illustrated in Panel B.

In aggregate, the annualized benchmark-adjusted return is -1.31% (t = -2.27) and statistically significant. The low quartile shows the highest, but still negative, benchmark-adjusted return of -1.27% (t = -1.93) followed by the high quartile with benchmark-adjusted net return of -1.29% (t = -1.94). However, the difference in benchmark-adjusted returns between the high and low (High-Low) quartile is not statistically significant. Examining the quartiles in the middle, i.e. the second and the third, benchmark-adjusted returns further decrease to -1.30% (t = -2.28) and -1.38% (t = -2.25) respectively. These results are in line with evidence of Chevalier and Ellison (1999) who find no robust results and Cremers and Petajisto (2009) who find no significant results, for manager tenure in relation to fund performance. Although, it contradicts the finding of Golec (1996) who concludes manager tenure as the most significant factor to predict mutual fund performance and Webster (2002) who find a positive and statistically significant relationship between manager tenure and fund performance.

Table 10: Net equal-weighted benchmark-adjusted returns and four-factor alphas for all-equity funds in Sweden between 2003-2016. The funds in our sample are sorted into manager tenure quartiles. Manager tenure is defined as the number of years that the current manager has been the portfolio manager of the fund. When a fund is managed by a team, we only consider the manager with the longest tenure in the calculation of manager tenure. Net fund returns are the returns to a fund investor after fees (expense ratio). Index funds are excluded from the sample. The table shows annualized returns, followed by t-statistics (in parentheses) based on White's (robust) standard errors.

Panel A: Benchmark-adjusted returns (%)					
Manager Tenure Quartile					
Low (1)	(2)	(3)	High (4)	All	High-Low
-1.27	-1.30	-1.38	-1.29	-1.31	-0.01
(-1.93)	(-2.28)	(-2.25)	(-1.94)	(-2.27)	(-0.02)
Panel B: Four-factor alpha of benchmark-adjusted returns (%)					
Manager Tenure Quartile					
Low (1)	(2)	(3)	High (4)	All	High-Low
-1.07	-1.12	-1.31	-1.43	-1.23	-0.35
(-1.66)	(-2.08)	(-2.36)	(-2.25)	(-2.27)	(-0.83)

In Panel B, we find that four-factor alphas appear to negatively correlate with manager tenure. Our results are similar to the findings of Porter and Trifts (2014) who find an inverse relationship between manager tenure and fund performance. However, in their study they only include mutual funds with fund managers that have at least a tenure of ten years within the fund. Consistent with our results in Panel A, the difference between the high and low (High-Low) quartile is not statistically significant.

Overall, we see that neither the average fund nor any of the quartiles generate positive benchmark-adjusted return. The same holds for four-factor alphas. Consequently, it seems like fund managers, on average, do not generate sufficient value to outweigh the costs for an investor, regardless of level of manager tenure. Moreover, as mentioned, we find no relationship between manager tenure and fund performance. One way to interpret this result is that the advantage of having a relatively experienced manager in charge of a fund does not seem to have a crucial role in how the fund performs, in line with what is suggested by Costa and Porter (2003).

Although, intuitively, our results could simply be explained by differences in fees among the groups. However, examining the expense ratios in Table 11, the two top quartiles are associated with lower fees, on average, than the two bottom quartiles. Thus, differences in fees do not change our conclusion that longer experience among fund managers does not seem to be associated with better performance.

6.3.2 Active Share

Table 12 illustrates the active share for four different portfolios sorted by manager tenure. Each year, we sort funds into quartiles by manager tenure. For each portfolio and year, we calculate an equal-weighted active share and then calculate time-series averages for each portfolio over the sample period 2003-2016.

Table 12: Equal-weighted Active Shares for all-equity funds in Sweden between 2003-2016. The funds in our sample are sorted into manager tenure quartiles. Manager tenure is defined as the number of years that the current manager has been the portfolio manager of the fund. When a fund is managed by a team, we only consider the manager with the longest tenure in the calculation of manager tenure. Active share is defined as the percentage of a fund's portfolio holdings that differ from the fund's benchmark index (SIXPRX) and is measured at the end of year $t-1$. Index funds are excluded from the sample. The table shows equal-weighted Active Shares measured in percentage terms, followed by t-statistics (in parentheses) based on White's (robust) standard errors.

Active Share (%)					
Manager Tenure Quartile					
Low (1)	(2)	(3)	High (4)	All	High-Low
48.79	50.21	50.03	52.47	50.37	3.67
					(2.58)

Examining the quartiles in the middle, i.e. the second and the third, active share is 50.21% and 50.03% respectively, which is not far from the average fund (50.37%). The high quartile has the highest value of active share (52.47%) and the bottom quartile is the portfolio with the lowest active share (48.79%). The difference in active share between the high and low (High-Low) quartile is statistically significant. Overall, it seems like active share is positively correlated with manager tenure, which is consistent with our findings in

section 6.2.2 and in line with Cremers and Petajisto (2009). Cremers and Petajisto (2009) argue that active share can be used as a proxy for stock selection. Thus, one possible way to interpret this result is that manager tenure, i.e. experience, is connected to engagement in stock-picking. Following the same reasoning as in section 6.2.2, it could be that more experienced managers are more confident in their stock-picking skills and more comfortable in deviating from the benchmark, i.e. taking active bets in stocks they believe in. However, as discussed in section 6.3.1, it does not seem to translate into higher returns as higher quartiles of manager tenure are not associated with better performance.

6.4 Active Management and Manager Experience

In this section, we investigate the interaction between active share, manager tenure and fund performance. In section 6.4.1, we present results for portfolios where we sort the funds in our sample based on active share and manager tenure. This section shows time-series averages of benchmark-adjusted returns and four-factor alphas of benchmark-adjusted returns for each portfolio over our sample period 2003-2016 to see if we find any trends on returns between different levels of active share and manager tenure. This section will help us determine whether highly active funds with more experienced managers on average perform better than other funds and if they on average perform better than their benchmark index. Thus, we will be able to identify whether experience among managers in more active funds is associated with higher returns.

In section 6.4.2, we present results for portfolios where we sort the funds in our sample based on manager tenure and benchmark-adjusted returns. This section shows time-series averages of active shares for each portfolio over our sample period 2003-2016 to identify potential trends between manager experience, fund performance and active management. This section will help us determine if funds with more experienced managers that perform the best, in terms of benchmark-adjusted returns, are more active.

In section 6.4.3, we present results for portfolios where we sort the funds in our sample based on active share and benchmark-adjusted returns. This section shows time-series averages of manager tenures for each portfolio over our sample period 2003-2016 to identify potential trends between manager experience, fund performance and active management (measured by active share). This section will help us determine if funds that are more active and that perform the best, in terms of benchmark-adjusted returns, have more experienced managers.

6.4.1 Fund Performance

Table 13 illustrates the benchmark-adjusted returns and the four-factor alphas of benchmark-adjusted returns for six different portfolios sorted by active share and manager tenure. Each year, we sort funds sequentially, first by active share into terciles and then further by manager tenure into medians. For each portfolio and month, we calculate an equal-weighted benchmark-adjusted return and then calculate time-series averages over the sample period 2003-2016. These benchmark-adjusted returns are then annualized and illustrated in Panel A. The monthly equal-weighted benchmark-adjusted returns are also regressed on Carhart's four factor model to generate alphas that are controlled for exposure to the market, size, value and momentum. The four-factor alphas are then annualized and illustrated in Panel B.

In aggregate, the average fund generates yearly benchmark-adjusted return of -1.27% (t = -4.56) and four-factor alpha of -1.18% (t = -2.18). As can be seen in Table 14, the average fund charges 1.27% in fees, which is identical with what the average fund underperforms relative to the benchmark. Thus, in line with evidence of Fama and French (2010), we find that actively managed funds, in aggregate, perform in line with the market before fees and underperform, corresponding to the fees charged, after fees are taken into account.

In Panel A we see that among the different terciles of active share, the high tercile of active share appears to be associated with the highest benchmark-adjusted return of -0.33% (t = -0.43), which is not statistically significantly

different from zero. In contrast, the middle tercile of active share appears to be the worst performing group among the active share terciles, with benchmark-adjusted return of -1.95% (t = -3.25). As can be seen in Table 14, this is also the group associated with the highest fees, on average. Consequently, it seems that funds within the middle tercile of active share charge excessive fees in relation to how actively they are managed (measured in active share) and how well they perform. This finding is related to our previous discussion in section 6.2.1, that a lack of competition from low-cost explicitly indexed funds enables closet indexers to charge excessive fees in line with arguments stated by Cremers et al. (2016).

Furthermore, in Panel A we see that regardless of which tercile of active share we examine, the difference in benchmark-adjusted returns between the high and low (High-Low) manager tenure median is close to zero and statistically insignificant. On an aggregated level, the difference between the high and low (High-Low) manager tenure median is likewise close to zero and insignificant (0.01% (t = 0.02)). A similar trend can be seen in Panel B for the four-factor alphas. Although, in panel B we observe a weak negative relationship between manager tenure and benchmark-adjusted returns on an aggregate level and further within the two upper active share terciles, however statistically insignificant.

Focusing on the manager tenure medians, in Panel A we see that within the low median of manager tenure the difference in benchmark-adjusted returns between the high and low (High-Low) active share tercile is 1.40% (t = 1.44) yearly and statistically significant. Within the high median of manager tenure, the difference in benchmark-adjusted returns between the high and low (High-Low) active share tercile is 1.02% (t = 1.00) yearly, however not statistically significant. On an aggregated level, the difference in benchmark-adjusted return between the high and low (High-Low) active share tercile is 1.20% (t = 1.30) and statistically significant. Similar results are found in Panel B where we observe four-factor alphas.

Table 13: Net equal-weighted benchmark-adjusted returns and four-factor alphas for all-equity funds in Sweden between 2003-2016. The funds in our sample are sorted by active share and manager tenure. The funds are sorted sequentially, first into active share terciles and then further into manager tenure medians. Active share is defined as the percentage of a fund's portfolio holdings that differ from the fund's benchmark index (SIXPRX) and is measured at the end of year $t-1$. Manager tenure is defined as the number of years that the current manager has been the portfolio manager of the fund and is measured at the end of year $t-1$. When a fund is managed by a team, we only consider the manager with the longest tenure in the calculation of manager tenure. Net fund returns are the returns to a fund investor after fees (expense ratio) and represent annualized returns over year *t*. Index funds are excluded from the sample. The table shows annualized returns in percentage terms, followed by t-statistics (in parentheses) based on White's (robust) standard errors.

Panel A: Benchmark-adjusted returns (%)				
Active Share Tercile	Manager Tenure Median			
	Low (1)	High (2)	All	High-Low
High (3)	-0.29	-0.37	-0.33	-0.08
	(-0.36)	(-0.44)	(-0.43)	(-0.07)
(2)	-1.85	-2.06	-1.95	-0.21
	(-2.85)	(-3.17)	(-3.25)	(-0.23)
Low (1)	-1.69	-1.37	-1.53	0.32
	(-3.08)	(-2.46)	(-2.89)	(0.41)
All	-1.28	-1.27	-1.27	0.01
	(-3.27)	(-3.18)	(-4.56)	(0.02)
High-Low	1.40	1.02	1.20	
	(1.44)	(1.00)	(1.30)	
Panel B: Four-factor alpha of benchmark-adjusted returns (%)				
Active Share Tercile	Manager Tenure Median			
	Low (1)	High (2)	All	High-Low
High (3)	0.25	-0.22	0.02	-0.47
	(0.31)	(-0.27)	(0.02)	(-0.80)
(2)	-1.56	-2.26	-1.91	-0.71
	(-2.54)	(-3.66)	(-3.41)	(-1.39)
Low (1)	-1.72	-1.54	-1.63	0.18
	(-3.09)	(-2.94)	(-3.16)	(0.56)
All	-1.01	-1.34	-1.18	-0.33
	(-1.82)	(-2.40)	(-2.18)	(-1.15)
High-Low	2.00	1.34	1.67	
	(2.64)	(2.02)	(2.63)	

Moreover, in Table 15 we find low coefficient values when benchmark-adjusted returns are regressed on Carhart's four-factor model. This verifies that the results related to the benchmark-adjusted returns are not due to exposure to any of the sources of systematic risk.

Table 16 shows results in the same way as Table 13, but with reversed sorting where we sort sequentially, first by manager tenure into medians and then further by active share into terciles. As can be seen in Table 16, our results are robust to the reversed order of sorting.

Consistent to what is found in section 6.3.1, a relationship does not seem to exist between fund performance and manager tenure, neither for the more active funds or for the less active funds. This result is not what we expected and indicates that manager tenure is not a predictor of fund performance, regardless of how actively managed the fund is. This result contradicts the findings of Golec (1996) who concludes manager tenure to be the most significant predictor of fund performance but consistent with Costa and Porter (2003) who disregard manager tenure as a predictor of fund performance.

6.4.2 Active Share

Table 17 illustrates active share for six different portfolios sorted by manager tenure and benchmark-adjusted returns. Each year, we sort funds sequentially first by manager tenure into medians and then further by yearly benchmark-adjusted returns into terciles. For each portfolio, we then calculate time-series averages of active share over the sample period 2003-2016.

The average fund has an active share of 50.07%. Given funds within the high manager tenure median, the group that performs the best, i.e. the high tercile of benchmark-adjusted returns are associated with the highest level of active share at 55.40%. Within the high median of manager tenure, the difference in active share between the high and low (High-Low) tercile of benchmark-adjusted returns is 4.63% (t = 2.73) and statistically significant. This is an interesting finding as this indicates that within the group of funds that are managed by more experienced managers, the best performing funds are also the most active funds. Within the low median of manager tenure, no

significant difference in active share is found between the high and low (High-Low) tercile of benchmark-adjusted returns.

Reviewing terciles of benchmark-adjusted return alone (i.e. regardless of manager tenure), the top tercile shows the highest active share of 54.14% followed by the bottom tercile with an active share of 51.19%. Also, the difference in active share between the top and bottom tercile is statistically significant. The middle tercile of benchmark-adjusted return shows an active share of 45.01%. With the reversed order of sorting in Table 18 we find the same patterns which concludes that our results are robust to the reversed sorting.

Within the top tercile of benchmark-adjusted return, the group with high manager tenure also has the higher active share, compared to the group associated with relatively low manager tenure. Although, this difference is not statistically significant. The same pattern is shown for the middle tercile of benchmark-adjusted return, however this time with statistical significance. In contrast, the bottom tercile of benchmark-adjusted return shows the opposite but with no significance.

However, on an aggregated level, it seems like manager tenure has a weak positive and statistically significant relationship with active share. This result is weak but somewhat in line with Cremers and Petajisto (2009) who find manager tenure to be positively correlated with active share. In accordance, we find a positive relationship with the reversed order of sorting in Table 18, although with no statistical significance.

In conclusion, we find that given relatively high manager tenure, the managers who perform the best seem to be the most active. One possible way to interpret this is that more experienced managers are more confident and comfortable in taking on a more active role in their management.

Furthermore, we find that the best performing funds, i.e. the high tercile of benchmark-adjusted return, are associated with the highest level of active share. Although, the worst performing funds are interestingly not the least active. Intuitively, this would indicate that the most active funds do either fit

in the top or bottom tercile of benchmark-adjusted returns, i.e. are the best or the worst performing funds.

In 6.4.1, we found the middle tercile of active share to be associated with the highest level of fees, among the different terciles of active share. In this section, it seems like the funds within the bottom tercile of benchmark-adjusted returns are not the most active nor the least active, on average. Which, in line with the discussion in 6.4.1, at least to some extent could be explained by higher fees on average among the funds within the bottom tercile of benchmark-adjusted returns.

6.4.3 Manager Tenure

Table 19 illustrates manager tenure for six different portfolios sorted by active share and benchmark-adjusted returns. Each year, we sort funds sequentially into terciles, first by active share and then further by yearly benchmark-adjusted returns. For each portfolio, we then calculate time-series averages of manager tenure over the sample period 2003-2016.

The average fund has a manager tenure of 4.56 years. The highest manager tenure is found for the portfolio within the high active share tercile and benchmark-adjusted return and amounts to 5.85 years. Regardless of the level benchmark-adjusted return, active share seems to positively correlate with manager tenure. The difference in manager tenure between the high and low (High-Low) active share tercile is 1.33 years (t = 3.84) and statistically significant.

Within the high active share tercile, manager tenure tends to increase with benchmark-adjusted returns. The difference between the high and the low (High-Low) benchmark-adjusted return tercile is 0.81 years (t = 1.15). Thus, we observe a positive, although weak, relationship between manager tenure and benchmark-adjusted returns for the most active funds. More specifically, the most active funds that perform the best tend to be managed by the most experienced managers which is consistent with and further highlights the finding in section 6.4.2 where we find that the funds that are managed by the most experienced managers and that perform the best appears to be the most

active. Important to point out, however, is that the relationship is quite weak and statistically insignificant. We therefore choose not to put too much emphasis on this result.

Moving forward to the middle tercile of active share, we observe that manager tenure seems to negatively correlate with benchmark-adjusted return and the difference between the high and low (High-Low) tercile is -1.00 year (t = -2.21), similar to what is found by Porter and Trifts (2014) who find manager tenure to be negatively correlated with fund performance. However, in their study, they only examine funds with managers that have at least ten years of experience.

For the low active share tercile, no pattern is found between benchmark-adjusted return and manager tenure. Investigating the relationship between benchmark-adjusted returns and manager tenure regardless of level of active share, the difference in manager tenure between the high and low (High-Low) benchmark-adjusted return tercile is small, at -0.11 years (t = -0.35), and statistically insignificant.

To summarize, our results indicate that there is no distinct relationship between manager tenure and fund performance irrespective of level of active management. This is consistent with the findings of Cremers and Petajisto (2009) who find manager tenure to be an insignificant predictor of performance. Even though manager tenure tends to increase with benchmark-adjusted returns for the most active funds, this trend is rather weak.

Furthermore, similar to what is found in section 6.4.2, manager tenure appears to be somewhat positively correlated to active share.

6.5 Multivariate Regressions

In this section, we present regression results for the two baseline regression models that were introduced in section 4.5. The multivariate regressions serve as complementary tests to our nonparametric portfolio sorts in section 6.2-6.4.

In section 6.5.1, we present regression results for our first baseline regression model introduced in section 4.5.1 where we regress active share on a set of explanatory variables that represent different fund and management

characteristics, such as manager tenure and fund size. Thus, this section investigates whether the variation in active share can be explained by other fund and management characteristics. This will help us determine if manager tenure can help explain the level of active share controlling for other factors.

In section 6.5.2, we present regression results for our second baseline regression model introduced in section 4.5.2 where we regress future fund performance—measured by benchmark-adjusted returns and four-factor alphas respectively—on active share and the same set of explanatory variables used in the regression model in section 6.5.1. Thus, this section investigates the predictive power of active share and manager tenure on future fund performance. This will help us gain an understanding on the relationship between active share, manager tenure and future fund performance and further if higher levels of active share and manager tenure are associated with superior future fund performance. We also dig deeper into the interaction between active share, manager tenure and fund performance by adding two interaction variables for active share and manager tenure separately to the regression model and present the results further down in this section.

6.5.1 Explaining Active Share

Table 20 presents four different regressions where we examine the link between active share and a number of variables that measure different types of fund and manager characteristics. Regression (1) and (2) include year fixed effects where manager tenure is added as an explanatory variable in regression (2). The same structure is used in regression (3) and (4) where manager tenure is added to the model specification in regression (4). In addition to the year fixed effects, we add fund fixed effects in regression (3) and (4) to control for time-invariant unobserved heterogeneity at the fund-level.

Table 20: Determinants of Active Share for all-equity funds in Sweden between 2006-2016 with mean-imputed values replacing missing expense ratios. The dependent variable is Active Share for each fund-year observation and is measured on a scale 0-100 (%). Active share is defined as the percentage of a fund's portfolio holdings that differ from the fund's benchmark index (SIXPRX) and is measured at the end of year *t.* Tracking error measures the standard deviation of the difference between the monthly net returns of fund *i* and its benchmark (SIXPRX) over time $t-1$ and takes on an annualized value. Fund age and manager tenure are measured in years. Expense ratio is the net expense ratio reported on the annual report at $t-1$ and is reported in percentage points. Mean imputation has been applied to replace missing expense ratios by taking the time-series average of the expense ratio for each fund respectively. Return over Index is the cumulative benchmark-adjusted return over calendar year $t-1$ and over calendar years $t-3$ to $t-1$ respectively. Index funds are excluded from the sample. Due to missing observations for fund size (TNA) before 2005, we limit our time period to 2006-2016 for our multivariate regressions. Robust t-statistics (based on standard errors clustered at the fund-level) are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	Active Share			
Regression model	(1)	(2)	(3)	(4)
Tracking Error	4.2915***	4.1790***	1.5149***	1.4219***
	(11.60)	(10.93)	(6.05)	(6.22)
Manager Tenure		0.2581		-0.4319*
		(1.44)		(-1.89)
Ln(TNA)	0.4870	0.4779	-1.1331	-1.0265
	(1.03)	(0.94)	(-1.29)	(-1.19)
Number of Stock Holdings	-0.0492	-0.0515*	-0.0775***	-0.0719***
	(-1.62)	(-1.69)	(-4.39)	(-4.00)
Fund Age	-0.1187	-0.0779	0.6422***	0.7836***
	(-1.25)	(-0.77)	(4.00)	(3.36)
Expense Ratio	5.2027***	5.1923**	-1.2955	-1.8108
	(2.74)	(2.61)	(-0.65)	(-0.91)
Return over Index, t−1 to t	0.0754	0.0635	-0.0154	-0.0334
	(0.70)	(0.59)	(-0.24)	(-0.55)
Return over Index, t−3 to t−1	0.0541	0.0161	-0.0214	-0.0699
	(0.66)	(0.18)	(-0.37)	(-1.43)
Constant	20.5656*	19.7381*	64.7504***	63.9006***
	(1.88)	(1.70)	(3.48)	(3.47)
Year FE	Yes	Yes	Yes	Yes
Fund FE	No	No	Yes	Yes
Observations	684	627	684	627
R^2	0.575	0.568	0.318	0.329

Unsurprisingly, tracking error comes up as a statistically significant predictor for all regressions and is the most significant predictor of active share in all our regressions. This is in line with the findings of Cremers and Petajisto (2009) who also find tracking error to be the most significant predictor of active share in their multivariate regressions. Its coefficient decreases from 4.179 (regression 2) to 1.422 (regression 4) as we include fund fixed effects indicating that unobserved time-invariant confounders are present in our sample which may explain some of the variation in active share across funds. Economically, the coefficient of 1.422 (regression 4) means that for each percentage point increase in tracking error, the active share increases with 1.422 percentage points which we deem as economically insignificant.

Manager tenure shows up as a statistically significant predictor in regression (4) with a negative coefficient (-0.432) which is a bit surprising considering that a strong positive relationship has been found in our nonparametric portfolio sorts. Although, by including fund fixed effects we investigate the relationship within each fund across time. This means that within the funds, the active share tends to decrease as the manager tenure increases. This implies that the longer a fund manager holds his/her position, the less he/she holds "active positions". This can be interpreted as fund managers becoming more cautious with time. This interpretation is related to the argument made by Porter and Trifts (2014) that the key to a long career in the mutual fund industry seems to be related more to avoid underperformance than to achieve superior performance. Another way to see it is that newly appointed fund managers want to make an early impact on the fund and its returns. This may especially be the case in situations where the change of fund manager(s) is due to poor performance by the previous fund manager(s). Thus, the new fund manager may want to deviate from the benchmark index by increasing the fund's active positions in order to generate excess returns relative the benchmark. Important to point out, however, is that the small size on the coefficient limits our economic interpretation.

For the rest of our variables in regression (4), we see that an increasing number of stock holdings is associated with a lower active share—which is in

line with our previous findings in Table 3 and 4—while older funds appears to have a higher active share. These findings are quite reasonable. First, considering that benchmark indices naturally hold a large number of stocks implying that funds that aim to replicate the benchmark (lower active share) will need to increase the number of stock holdings in their portfolio which is not necessarily the case for more active funds. Further, since active share could be considered a reasonable proxy for stock selection this would also be reflected in this relationship. Second, the positive relationship between fund age and active share may indicate that funds with a longer track record may be more comfortable in taking active positions in their investments. In regression (1) and (2), expense ratio appears as a statistically significant positive predictor of active share. This is to be expected since the level of fees should intuitively be related to the level of added value by the fund manager and the only way for a fund manager to add value to an investor is to deviate from the benchmark implying a higher active share. Furthermore, Due to expense ratio being relatively time-invariant at the fund-level, the coefficient turns insignificant when we add fund fixed effects (regression 3 and 4).

In Table 21, we present regression results for the same regression model as in Table 20 with the difference that we exclude observations with missing expense ratios instead of using mean-imputed values. Observing the regression results, we find that the results are in principal identical to the results presented in Table 20. Thus, we conclude that our results are robust to the exclusion of mean-imputed expense ratios.

6.5.2 Predicting Fund Performance

Table 22 includes six different regressions where we investigate the predictive power of active share, manager tenure and some other variables on future fund performance. In regression (1), (2) and (3) we use benchmark-adjusted returns as a measure of fund performance. In regression (4), (5) and (6) we use four-factor alphas of benchmark-adjusted returns as a measure of fund performance.

Table 22: Predictive regression of fund performance for all-equity funds in Sweden between 2006-2016 with mean imputed values replacing missing expense ratios. The dependent variables in columns 1-6 are based on the cumulative net return (%) over calendar year *t*, while the independent variables are measured at the end of year $t-1$. Alphas are based on benchmark-adjusted returns and computed with respect to the four-factor model by Carhart. Active share is defined as the percentage of a fund's portfolio holdings that differ from the fund's benchmark index (SIXPRX) and is measured at the end of year *t*. Tracking error measures the standard deviation of the difference between the monthly net returns of fund *i* and its benchmark (SIXPRX) over time $t-1$ and takes on an annualized value. Fund age and manager tenure are measured in years. Expense ratio is the net expense ratio reported on the annual report at $t-1$ and is reported in percentage points. Mean imputation has been applied to replace missing expense ratios by taking the time-series average of the expense ratios for each fund respectively. Return over Index is the cumulative benchmark-adjusted return over calendar year $t-1$ and over calendar years $t-3$ to $t-1$ respectively. Index funds are excluded from the sample. Due to missing observations for fund size (TNA) before 2005, we limit our time period to 2006-2016 for our multivariate regressions. Robust t-statistics (based on standard errors clustered at the fund-level) are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	Benchmark-Adjusted Returns			Four-Factor Alphas		
	(1)	(2)	(3)	(4)	(5)	(6)
Active Share	0.0513***	0.0502**	0.0472**	0.0476**	0.1107***	0.1079***
	(2.89)	(2.49)	(2.28)	(2.48)	(5.76)	(5.42)
Tracking Error		0.0118	0.0254		-0.6864***	-0.6565***
		(0.07)	(0.15)		(-4.74)	(-4.56)
Manager Tenure			0.0817*			0.0504
			(1.94)			(1.02)
ln(TNA)	0.1067	0.1086	0.0836	0.0727	-0.0393	-0.0948
	(1.10)	(1.01)	(0.78)	(0.62)	(-0.33)	(-0.76)
Number of Stock Holdings	-0.0027	-0.0027	-0.0024	-0.0034	-0.0018	-0.0016
	(-0.67)	(-0.67)	(-0.67)	(-1.15)	(-0.66)	(-0.67)
Fund Age	-0.0444**	-0.0445**	-0.0520**	0.0186	0.0243	0.0273
	(-2.18)	(-2.15)	(-2.27)	(0.69)	(0.83)	(0.91)
Expense Ratio	-1.3877***	-1.3884***	-1.3983**	-1.8201***	-1.7800***	-1.6755***
	(-2.82)	(-2.81)	(-2.63)	(-3.26)	(-3.18)	(-2.92)
Return over Index, t−1 to t	-0.0440	-0.0448	-0.0549	-0.2458***	-0.2041***	-0.2353***
	(-1.61)	(-1.48)	(-1.63)	(-3.71)	(-3.72)	(-4.21)
Return over Index, t−3 to t−1	-0.0578**	-0.0585**	-0.0589**	-0.0340	0.0080	0.0477
	(-2.10)	(-2.13)	(-2.48)	(-0.66)	(0.15)	(1.34)
Constant	-3.5246	-3.5563	-3.273	-3.1114	-1.2744	-0.3294
	(-1.44)	(-1.37)	(2.539)	(-1.22)	(-0.50)	(-0.13)
N	684	684	627	684	684	627
R^2	0.045	0.045	0.054	0.060	0.099	0.112

Active share appears as a statistically significant predictor for all our regressions with a positive coefficient which implies that a higher active share is associated with higher benchmark-adjusted returns. However, in regression (6), with the four-factor alphas as measure of fund performance, the coefficient more than doubles compared to the corresponding regression (3). In regression (6), an increase in active share with 10 percentage points is associated with an increase in benchmark-adjusted return of 1.08 percentage points, controlled for the four-factor model, over the following year which is to be considered economically significant. Our regression results indicate that active share is a predictor of future fund performance relative its benchmark. However, it is important to point out that contrary to the previous regressions, where we investigate the link between active share and several fund characteristics, we have not implemented a fixed effects model in this regression specification which limits our ability to control for unobserved heterogeneity.

Tracking error on the other hand comes up as a negative predictor in regression (5) and (6) implying that a higher tracking error is associated with lower four-factor alphas. This indicates that fund managers that take a higher active risk in order to beat their benchmark, implying higher tracking error, usually perform worse than funds where the fund manager(s) limit the exposure to active risk. The coefficient of -0.656 means that an increase of tracking error with 5 percentage points is associated with a decrease in four-factor alphas with 3.28 percentage points on a yearly basis which is economically significant. This finding is in line with the results in Cremers and Petajisto (2009) who find tracking error to be a statistically significant negative predictor of four-factor alphas of benchmark-adjusted returns in their multivariate regressions.

Manager tenure is a statistically significant predictor in regression (3) where we regress the benchmark-adjusted returns but later turns insignificant when we regress the four-factor alphas (regression 6). The positive coefficient of 0.0817 in regression (3) can be interpreted as that for each additional year of experience (manager tenure), the yearly benchmark-adjusted returns the following year increase with 0.0817 percentage points

which is quite small and not economically insignificant. Relating this finding to the literature, the statistically insignificant positive coefficient in regression (6) is in line with the multivariate regression results in Cremer and Petajisto (2009) where they perform a predictive regression on the four-factor alphas. Although, they do not perform any predictive regressions on the benchmark-adjusted returns.

Shifting our focus to the rest of the variables, we observe that expense ratio is a statistically significant negative predictor in all our regressions. This is to be expected since a higher expense ratio directly affects the net returns of a fund negatively. However, an interesting aspect is the level of the coefficient in our regressions. The coefficient ranges between -1.820 and -1.388 which indicates that for each percentage increase in expense ratio, fund performance decreases with more than the actual percentage increase in expense ratio. Interestingly, the same finding is made by Carhart (1997) who observes that expense ratios reduce performance a little more than one-for-one. Thus, higher expense ratios appear to be associated with additional costs that are not reflected in the expense ratio itself but that nevertheless affect the returns of the fund.

We check the robustness of our results by performing identical regressions with the difference that we that we exclude observations with missing expense ratios instead of using mean-imputed values. The results of these regressions are presented in Table 23. Observing the regression results, we find them to be in principal identical to the results presented in Table 22. Thus, we conclude that our results are robust to the exclusion of mean-imputed expense ratios.

Table 24: Predictive regression of fund performance for all-equity funds in Sweden between 2006-2016 with mean imputed values replacing missing expense ratios. The dependent variables in columns 1-6 are based on the cumulative net return (%) over calendar year *t*, while the independent variables are measured at the end of year $t-1$. Alphas are based on benchmark-adjusted returns and computed with respect to the four-factor model by Carhart. In these regressions, we include two interaction variables. High MT x AS is an interaction between a dummy variable—taking on the value 1 if the fund has a manager tenure above the median across funds within a given year *t*—and active share. High AS x MT is an interaction between a dummy variable—taking on the value 1 if the fund has an active share above the median across funds within a given year *t*—and manager tenure. Active share is defined as the percentage of a fund's portfolio holdings that differ from the fund's benchmark index (SIXPRX) and is measured at the end of year *t*. Tracking error measures the standard deviation of the difference between the monthly net returns of fund *i* and its benchmark (SIXPRX) over time $t-1$ and takes on an annualized value. Fund age and manager tenure are measured in years. Expense ratio is the net expense ratio reported on the annual report at $t-1$ and is reported in percentage points. Mean imputation has been applied to replace missing expense ratios by taking the time-series average of the expense ratios for each fund respectively. Return over Index is the cumulative benchmark-adjusted return over calendar year $t-1$ and over calendar years $t-3$ to $t-1$ respectively. Index funds are excluded from the sample. Due to missing observations for fund size (TNA) before 2005, we limit our time period to 2006-2016 for our multivariate regressions. Robust t-statistics (based on standard errors clustered at the fund-level) are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	Benchmark-Adjusted Returns		Four-Factor Alphas	
	(1)	(2)	(3)	(4)
Active Share	0.0461**	0.0425*	0.1110***	0.0946***
	(2.20)	(1.73)	(5.07)	(3.75)
Tracking Error	0.0239	0.0263	-0.6521***	-0.6542***
	(0.14)	(0.16)	(-4.48)	(-4.52)
Manager Tenure	0.0710	0.0611	0.0796	-0.0076
	(1.13)	(1.59)	(1.14)	(-0.17)
High MT x AS	0.0025		-0.0067	
	(0.24)		(-0.45)	
High AS x MT		0.0352		0.0990
		(0.57)		(1.31)
ln(TNA)	0.0848	0.0871	-0.0981	-0.0850
	(0.80)	(0.81)	(-0.78)	(-0.67)
Number of Stock Holdings	-0.0024	-0.0024	-0.0017	-0.0016
	(-0.66)	(-0.66)	(-0.69)	(-0.66)
Fund Age	-0.0515**	-0.0525**	0.0257	0.0258
	(-2.22)	(-2.32)	(0.86)	(0.86)
Expense Ratio	-1.4002***	-1.4086***	-1.6702***	-1.7045***
	(-2.63)	(-2.67)	(-2.90)	(-3.03)
Return over Index, t−1 to t	-0.0547	-0.0559	-0.2359***	-0.2380***
	(-1.62)	(-1.64)	(-4.28)	(-4.27)
Return over Index, t−3 to t−1	-0.0592**	-0.0599**	0.0486	0.0449
	(-2.52)	(-2.54)	(1.37)	(1.29)
Constant	-3.2587	-3.0906	-0.3672	0.1825
	(-1.27)	(-1.24)	(-0.14)	(0.07)
N	627	627	627	627
R^2	0.054	0.054	0.113	0.114

In Table 24, we perform additional regressions where we add two interaction variables to our model. We let the level of manager tenure interact with the level of active share in two different ways. In the first interaction, we create dummy variables where we each year identify funds that are managed by a fund manager with a longer manager tenure—which is defined as a manager tenure above the median within each specific year. We then let this dummy variable interact with the level of active share. Through this, we aim to investigate if funds managed by more experienced fund managers (i.e. that have a longer manager tenure) perform better with a higher level of active share. In the second interaction, we use a different perspective. Here, we create dummy variables that identify funds with a higher level of active share—defined as above median active share within each specific year. The dummy variable is then allowed to interact with manager tenure. This allows us to investigate if funds with a higher active share perform better if they are managed by more experienced fund managers (i.e. that have a longer manager tenure). These interaction variables allow us to dig deeper into the relationship between active share, manager tenure and fund performance and see how they interact with each other.

The regression results do not add anything of significant value to our previous regressions. In regression (1) and (2) we observe positive coefficients for both interaction variables which implies that funds that are more actively managed perform better with more experienced fund managers and that funds with more experienced fund managers perform better the more actively managed they are. However, since these findings are statistically insignificant the effects of the categorizations are non-existent in our tests. In regression (3) and (4), the coefficient of the interaction variable "High AS x MT" turns negative but nevertheless remains statistically insignificant.

Comparing to the previous regressions in Table 22, we see no major differences for the majority of the variables. However, the statistically significant positive coefficient of manager tenure in regression (3) in Table 22 turns insignificant when we add the interaction variables.

As in our previous regressions, we check the robustness of the results presented in Table 24 by performing identical regressions with the difference that we exclude observations with missing expense ratios instead of using mean-imputed values. The results of these regressions are presented in Table 25. Observing the regression results, we find that the results are in principal identical to the results presented in Table 24. Thus, we conclude that our results are robust to the exclusion of mean-imputed expense ratios.

7. Discussion

Fama and French (2010) find that actively managed funds, on average, perform in line with the market before fees and worse than market net of fees. In this paper, we find that in aggregate, the average actively managed fund generates yearly benchmark-adjusted net returns of -1.31%, which is very close to what the average fund charges in fees (1.27%)[11]. Thus, similar to Fama and French (2010), we find that the average actively managed fund performs in line with the market before fees and worse than the market after fees are taken into account.

Investigating different degrees of active management, we find a positive relationship between active share and fund performance. Cremers and Petajisto (2009) find similar results in the context of US mutual funds. They find that the most active funds are able to *add value*, both in terms of benchmark-adjusted net returns and the four-factor alphas, even when fees are taken into consideration. In our study, the most active funds perform better than the less active funds and generate yearly benchmark-adjusted net returns and four-factor alphas that are positive on average. However, the returns are not statistically significantly different from zero. Thus, our results are not in line with the findings of Cremers and Petajisto (2009) in this regard. As we discussed earlier, this may be due to the actively managed funds in Sweden not being active enough in combination with charging excessive fees. Instead, this result fits better with the findings of Berk and Green (2004), who

[11] Flam and Vestman (2017) find an average annual fee of 1.3% for actively managed Swedish mutual equity funds during 2002-2013.

state that actively managed funds should generate alphas close to zero when fees are taken into consideration.

For the less active funds, the findings of Berk and Green (2004) does not seem to fit well as they generate negative benchmark-adjusted returns and four-factors alphas net of fees. One possible explanation could be that the less active funds charge excessive fees in relation to the value they add, which in our paper appears to be the case. Cremers et al. (2016) argue that this may be due to competitive pressure from low-cost explicitly indexed funds not being high enough, which enables these funds to take excessive fees.

Our complementary multivariate regressions find a positive relationship between active share and future fund performance which supports the results from our nonparametric portfolio sorts and are in line with the results from the multivariate regressions presented by Cremers and Petajisto (2009). In conclusion, we find that our results support hypotheses 1a[12], 1b[13] and 1c[14].

Regarding the relationship between manager tenure and benchmark-adjusted returns, i.e. manager experience and fund performance, we find it to be neutral in our nonparametric portfolio sorts. This result is in line with evidence presented by Chevalier and Ellison (1999) who find no robust results and Cremers and Petajisto (2009) who find no significant results, for manager tenure in relation to fund performance. However, shifting our focus to four-factor alphas we even find manager tenure to be rather negatively related to performance. Although, the relationship is quite weak, and we therefore conclude that a distinct relationship between manager tenure and fund performance cannot be established based on our results.

Furthermore, none of the portfolios, sorted by manager tenure, generate positive benchmark-adjusted net returns or four-factor alphas. Thus, active managers, on average, do not generate sufficient value relative the benchmark

[12] H1a: In aggregate, actively managed funds underperform the passively managed portfolio alternative (benchmark index) after fees are taken into account.

[13] H1b: There is a positive relationship between active share and future benchmark-adjusted fund performance.

[14] H1c: The most active funds outperform the passively managed portfolio alternative (benchmark index) after fees are taken into account.

index when fees are considered—regardless of longevity of tenure. In our multivariate regressions, we find manager tenure to be a statistically significant positive predictor of future benchmark-adjusted returns. However, the small size of the coefficient limits the economic interpretation leading us to deem it as economically insignificant. Consequently, our results do not support hypothesis 2[15].

Consequently, we find evidence which could be interpreted to support the argument of Costa and Porter (2003), who argue that manager tenure should not be considered an important factor for investors when selecting mutual funds. There is, at least, two ways to interpret these results. Either our initial assumption that manager experience at least to some extent should reflect manager skill is not correct, i.e. manager experience does not indicate skill, or manager tenure is not a solid proxy for manager experience. Also, our definition of manager tenure could possibly have an impact on our results. Morningstar defines manager tenure as the average tenure within a team in the case of multiple managers. In contrast, we only consider the manager with the longest tenure, in line with Ding and Wermers (2012). The underlying assumption following this approach is that the manager with the longest tenure has the greatest influence over the management of the fund. However, if this assumption does not hold for our sample of funds, some of the funds that are considered to be managed by highly experienced managers should in fact be considered to be managed by less experienced managers when the average tenure of the whole team is considered.

Considering the relationship between manager tenure and active share in relation to fund performance, we find slightly ambiguous results. Given the most active funds, longer manager tenure does not seem to improve fund performance. This result is robust to the reversed order of sorting. Furthermore, we find that funds that are managed by the most experienced managers that perform the best in terms of benchmark-adjusted returns have the highest active shares. We also find that the most active funds that perform

[15] H2: Actively managed funds that are managed by more experienced fund managers outperform actively managed funds that are managed by less experienced fund managers.

the best are managed by more experienced managers. Thus, the results suggest that there might be a positive relationship between active share, manager tenure and fund performance. However, we deem the relationship as too weak to be able to draw any conclusions in support for hypothesis 3a[16] and hypothesis 3b[17]. In our multivariate regression analysis where we let active share and manager tenure interact with each other in two different ways through interaction variables ("high active share x manager tenure" and "high manager tenure x active share"), we find positive coefficients for both interaction variables, although both being statistically insignificant. In conclusion, we find weak support for hypotheses 3a and 3b in some of our nonparametric portfolio sorts, but the overall results do not support our hypothesis.

Lastly, we find a positive relationship between manager tenure and active share in several of our nonparametric portfolio sorts, regardless of order of sorting, which is in line with Cremers and Petajisto (2009). Thus, we conclude that our results support hypothesis 4[18].

8. Conclusion

In this paper we investigate the relationship between active management, manager experience and fund performance among Swedish all-equity mutual funds during the period 2003-2016. In line with Cremers and Petajisto (2009), we combine tracking error (a proxy for factor timing) and active share (a proxy for stock selection) to measure different degrees of active management. We find no evidence that the average actively managed fund, on average, outperforms the benchmark index SIXPRX over the time period of 2003-2016. Instead, we find the average actively managed fund to generate negative benchmark-adjusted return of -1.31% per year, on average. Examining

[16] H3a: There is a positive relationship between manager experience and fund performance for the most actively managed funds.

[17] H3b: The positive relationship between manager experience and fund performance is stronger for the most actively managed funds than for the less actively managed funds.

[18] H4: Actively managed funds managed by more experienced fund managers are more active than actively managed funds managed by less experienced fund managers.

different degrees of active management, we find no clear relationship for tracking error but find active share to be positively related to fund performance. We find that the less actively managed funds on average generate negative benchmark-adjusted returns that are statistically significantly different from zero. On the contrary, we find the most active funds to generate positive benchmark-adjusted returns, on average, although not statistically significantly different from zero.

In contrast, no distinct relationship is found between manager tenure, i.e. manager experience, and fund performance. On average, active managers do not add sufficient value to outperform the benchmark index net of fees, regardless of longevity of tenure. Given that we have used manager tenure as a proxy for manager experience, our paper suggests that manager experience per se is not a predictor of fund performance. The implication of this result is that manager experience by itself should not be considered an important factor for an investor in the screening and selection process of mutual funds.

Even though manager experience does not appear to be a predictor of fund performance by itself, we further investigate if it might be a predictor of fund performance for the more actively managed funds. We do not find fund performance for the most actively managed funds to increase with manager experience. Regardless of how actively managed the fund is, manager tenure does not show up as a predictor of fund performance which is in line with our previous finding for manager tenure in relation to fund performance. However, we complement with additional tests to further investigate the relationship between active management, manager experience and fund performance. Interestingly, we find funds that are managed by the most experienced managers and that perform the best to also be the most active. Furthermore, we find that the most active funds that perform the best are also managed by the most experienced managers. These two findings highlight that further research in this topic might be motivated and could help unravel any uncertainties related to the slightly ambiguous results in this paper.

Lastly, we find a positive relationship between manager tenure and active share. Regardless, it seems like active share is positively related to

performance, but it is hard to conclude whether the higher level of active management is really derived from having a more experienced manager or if the most actively managed funds just happen to be managed by more experienced managers.

9. Limitations and Future Research

We have a few suggestions that may be considered for future research that may contribute to further illuminate the relationship between active management, manager experience and fund performance.

First, we argue that other methodologies related to how to measure experience should be considered. Even though manager tenure is a widely used proxy for manager experience, it should be questioned and challenged. There are other factors that may affect manager tenure, which could make it difficult to isolate the relationship between manager experience, active management and fund performance, and cause biased results. For example, Kostovetsky (2007) argue that if young mutual fund managers that perform well leave the mutual fund to go work for a hedge fund while only the mediocre fund managers stay, it may make it difficult to estimate the true incremental value of experience in terms of fund performance based on manager tenure since it may be a biased proxy. Furthermore, the shorter tenured managers may be less safe in their position and be subject to greater risk of being fired for underperformance compared to longer tenured managers because they may not have a proven track record of success to rely on as a safety net. Thus, factors that affect the level of manager tenure that should not affect the level of experience for a fund manager may be present and cause biased results. Instead, an alternative way to measure experience would be to measure the total amount of years that the fund manager has managed funds and not only a specific fund (which manager tenure captures). It may be cumbersome to measure, however, but we consider that this may be information that could be of interest to investors and thus should be made available to them by the mutual funds.

Second, we argue that it would be of value to extend this study by increasing the sample both through the cross-section and the time-series, by looking at a broader sample of mutual funds over a longer time-horizon. This could be done by, for example, creating a sample of mutual funds in the Nordic countries since the Nordic countries share several similar characteristics in terms of e.g. culture, politics and economic policies.

Third, it may take time for actions to translate into outcomes. In this study, we limit ourselves to analyzing how the fund performance of the upcoming year is affected by a certain year's (end of year) level of active management and manager experience. In future research, it may be interesting to consider a wider time-span and instead look at cumulative returns over a longer time period, e.g. five-year spans, to capture the long-term effects of the level of active management and manager experience on fund performance.

Fourth, we do not adjust our results on performance for fund-specific risk. Thus, we do not relate active fund managers to risk-taking in that sense. Although it would be interesting to study whether different degrees of active management and manager tenure is related to differences in manager risk-taking.

Fifth, the same benchmark, SIXPRX, is used for all the funds in our sample to evaluate their performance relative a passive strategy. However, in practice, the funds mainly commit to outperform their respective prospectus benchmark index. For this reason, it may be interesting to complement our findings with an evaluation of funds in relation to their respective prospectus benchmark index in future research.

Lastly, the methodology related to how the portfolios in our nonparametric portfolio sorts are constructed may not be optimal in terms of capturing the relationship between active management, manager experience and fund performance. We apply the same methodology as Cremers and Petajisto (2009) and divide our funds into different portfolios based on, among others, active share and manager tenure in a way to guarantee an even distribution across the different portfolios. Thus, we mainly look at the levels of active share and manager tenure in relative terms (relative other funds) and not in absolute

terms when assigning the funds to a certain portfolio. However, if the interaction between active share and manager tenure has an effect on fund performance above a certain level for active share (e.g. active share above 60% could be used as a threshold to identify highly active funds) and manager tenure (e.g. manager tenure above 10 years could be used as a threshold to identify funds with highly experienced managers) our methodology may not be able to capture this relationship well enough. Therefore, it could be interesting to apply a different approach in the methodology related to how the funds are sorted into different portfolios in future research.

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11. Appendix

11.1 Description of Benchmark Index - SIXPRX

SIX Portfolio Return Index (SIXPRX) is constructed to reflect the market progress of companies listed on the Stockholm Stock Exchange and aims to reflect the value progress from a fund management perspective. SIXPRX is subject to the restriction that no company may compose >10 % in the index, in accordance with the EU UCITS Directive. SIXPRX is a value-weighted index and dividends are received. (SIX Group AG, n.d.)

11.2 Model Specification Tests

We apply the Breusch-Pagan Lagrange multiplier to choose between a pooled OLS regression and a random effects model. For model (1) and (2) with fund performance as dependent variable we fail to reject the null hypothesis concluding that the random effects model is not favorable to the pooled OLS regression model. We therefore apply the pooled regression model for baseline model (1) and (2) with benchmark-adjusted returns and the four-factor alphas as dependent variables respectively. We apply the same test for baseline model (3) and can reject the null hypothesis at a high significance level (0.1 %) concluding that the random effects model is favorable to the pooled OLS regression model. To decide between a random effects model and a fixed effects model for model (3), we apply a robust version of the Hausman test. We reject the null hypothesis at a high significance level (0.1 %) in favor of a fixed effects model.

In conclusion, we will apply a pooled OLS regression model for the baseline models with fund performance as dependent variable and a fixed effects model for the baseline model where we are regressing the determinants of active share.

To test for autocorrelation, we apply Wooldridge's test for autocorrelation (serial correlation). We reject the null hypothesis of no first-order autocorrelation at a high significance level for all our models. In addition, with the help of the Wald test we detect a presence of heteroskedasticity in our

sample. Therefore, we use heteroskedasticity robust standard errors clustered at the fund-level to mitigate the effects that the presence of heteroskedasticity and autocorrelation might have on our regressions.

11.3 Tables

Table 1: Pearson's pairwise correlation analysis. This table depicts the Pearson's pairwise correlation coefficients between the main variables used in the regressions. A listwise deletion of missing observations has been done. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	Four-factor alphas	Benchmark-adjusted returns	Active Share	Tracking Error	Manager Tenure	Fund Age	Number of Stock Holdings	Ln(TNA)	Expense Ratio	Return over Index, t−1 to t	Return over Index, t−3 to t−1
Four-factor alphas	1										
Benchmark-adjusted returns	0.4736***	1									
Active Share	0.0635	0.1236**	1								
Tracking Error	-0.1305**	0.0678	0.6320***	1							
Manager Tenure	0.0535	0.0857*	0.1899***	0.1246**	1						
Fund Age	0.0102	-0.1120**	-0.0964*	-0.0850*	-0.0717	1					
Number of Stock Holdings	-0.0398	-0.0800	-0.3889***	-0.2337***	-0.0770	0.1887**	1				
Ln(TNA)	0.0359	-0.0008	-0.0659	-0.1338**	0.1361***	0.3728***	0.1046*	1			
Expense Ratio	-0.0782	-0.0716	0.2690***	0.1830***	-0.0424	0.0927*	-0.0956*	-0.2721***	1		
Return over Index, t−1 to t	-0.2228***	-0.0246	0.1480***	0.2202***	0.0442	-0.0956*	-0.0993*	0.0487	-0.0405	1	
Return over Index, t−3 to t−1	0.0696	-0.0143	0.1377***	0.2378***	0.1905***	-0.1180**	-0.1517***	0.1159**	-0.1136**	-0.0153	1
N	586										

Table 2: Returns for the Benchmark Index SIXPRX between 2002-2016. SIX Portfolio Return Index (SIXPRX) shows the average development including dividends on the Stockholm Stock Exchange adjusted for the investment restrictions that apply to equity funds. The table shows both monthly and yearly returns for the time period 2002-2016. Returns are presented in percentage terms (%).

Month/Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
January	-5.06	-3.67	5.89	0.82	1.48	3.28	-12.27	-5.96	0.77	-1.15	5.89	5.50	-1.64	7.12	-7.14
February	0.90	-1.59	3.31	4.85	3.73	-2.19	3.43	2.63	-0.52	-1.62	6.30	3.58	6.10	8.09	2.04
March	2.95	-2.18	-1.03	0.38	6.87	5.57	-1.65	2.15	8.78	2.26	-1.06	0.91	0.69	0.06	1.92
April	-7.20	14.92	1.46	-1.15	1.15	6.75	4.91	21.95	4.25	4.01	-0.14	2.06	1.89	0.24	0.91
May	-5.99	-0.18	-1.24	5.40	-7.89	1.95	2.86	2.86	-6.92	-0.52	-6.62	2.14	3.75	1.22	2.50
June	-7.50	4.21	3.27	4.05	0.92	-2.23	-13.98	0.80	1.51	-3.52	2.92	-5.04	-1.35	-6.38	-3.57
July	-10.95	7.01	-1.53	4.97	-1.28	-1.49	-0.69	10.34	4.60	-4.72	4.25	7.17	-0.73	5.01	5.54
August	-2.67	3.62	-0.45	-1.11	4.41	-2.65	1.26	3.69	-3.24	-10.50	-2.17	-1.04	0.62	-5.93	2.47
September	-15.03	-3.20	2.96	5.58	5.22	-0.40	-12.33	0.65	8.48	-5.95	3.21	4.07	-0.17	-4.42	1.78
October	12.89	8.92	0.42	-1.72	4.51	-1.93	-17.77	4.76	0.08	8.90	-1.44	1.73	1.58	6.92	-0.95
November	12.83	0.42	5.87	4.09	-0.91	-6.49	-2.23	-0.02	1.44	-1.42	3.14	2.31	3.32	3.64	1.44
December	-12.51	3.10	0.88	6.01	8.34	-2.00	3.72	1.97	5.99	1.08	2.03	2.05	1.05	-4.03	2.92
Yearly	-34.68	34.17	21.27	36.73	28.71	-2.58	-39.10	53.31	26.90	-13.60	16.68	27.97	15.90	10.50	9.65

Table 3: Descriptive statistics for portfolios sorted by Active Share and Tracking Error. The table presents time-series averages of equal-weighted mean values of number of funds, fund size (Assets), active share, tracking error, manager tenure, expense ratio and number of stocks for each portfolio sorted by active share and tracking error between 2006-2016. The funds are sorted sequentially, first into active share terciles and then further into tracking error terciles. We choose to limit the time period to 2006-2016 due to fund size (Assets) being missing before 2006.

		Mean values					
Portfolio (AS/TE)	**Number of funds**	**Assets (MSEK)**	**Active Share**	**Tracking Error**	**Manager Tenure**	**Expense Ratio**	**Number of Stocks**
3/3	8	2391.78	72.44	8.33	5.50	1.33	28.01
3/2	9	2890.76	65.93	5.33	5.39	1.37	36.23
3/1	8	2383.30	62.02	3.55	5.28	1.32	48.96
2/3	8	2408.74	50.04	4.97	4.43	1.49	50.73
2/2	9	1629.20	47.90	3.45	4.01	1.54	37.76
2/1	8	4058.57	47.97	2.59	4.72	1.31	47.23
1/3	8	3184.63	36.26	3.35	4.05	1.07	61.36
1/2	8	5951.53	35.77	2.51	3.46	0.91	64.98
1/1	8	3002.58	31.85	1.73	4.56	1.05	95.69
All	75	3087.09	50.18	4.01	4.63	1.27	51.77

Table 4: Descriptive statistics for portfolios sorted by Active Share and Manager Tenure. The table presents time-series averages of equal-weighted mean values of number of funds, fund size (Assets), active share, tracking error, manager tenure, expense ratio and number of stocks for each portfolio sorted by active share and manager tenure between 2006-2016. The funds are sorted sequentially, first into active share terciles and then further into manager tenure medians. We choose to limit the time period to 2006-2016 due to fund size (Assets) being missing before 2006.

		Mean values					
Portfolio (AS/MT)	**Number of funds**	**Assets (MSEK)**	**Active Share**	**Tracking Error**	**Manager Tenure**	**Expense Ratio**	**Number of Stocks**
3/2	12	2778.22	67.47	5.85	8.77	1.34	37.27
3/1	11	2238.92	69.26	5.90	1.71	1.35	32.41
2/2	12	2761.32	50.20	3.87	6.78	1.37	45.90
2/1	11	2602.28	49.58	3.74	1.64	1.45	48.58
1/2	12	4582.62	34.75	2.52	6.27	0.94	78.71
1/1	11	3348.05	35.22	2.68	1.45	1.15	68.00
All	70	3073.84	51.16	4.09	4.55	1.26	51.94

Table 6: Equal-weighted expense ratios for all-equity funds in Sweden between 2003-2016. The funds in our sample are sorted by the two dimensions of active management. The funds are sorted sequentially, first into active share terciles and then further into tracking error terciles. Active share is defined as the percentage of a fund's portfolio holdings that differ from the fund's benchmark index (SIXPRX) and is measured at the end of year $t-1$. Tracking error is defined as the standard deviation of the difference between the returns of a fund and its benchmark index and is measured at the end of year $t-1$. Expense ratio is measured as the net expense ratio reported on the annual report at $t-1$. Index funds are excluded from the sample. The table shows equal-weighted annualized expense ratios in percentage terms.

Expense Ratios (%)					
Active Share Tercile	Tracking Error Tercile				
	Low (1)	(2)	High (3)	All	High-Low
High (3)	1.31	1.37	1.35	1,34	0.04
(2)	1.30	1.47	1.51	1.43	0.21
Low (1)	0.89	0.95	1.15	1.00	0.26
All	1.17	1.26	1.34	1.27	0.17
High-Low	0.42	0.42	0.20	0.34	

Table 7: All-equity mutual funds in Sweden in 2016. Panel A shows the number of mutual funds, sorted by active share and tracking error while Panel B shows the number of funds, sorted by active share and manager tenure.

Panel A: Number of Mutual Funds (Active Share and Tracking Error)								
	Tracking Error (%)							
Active Share (%)	0-2	2-4	4-6	6-8	8-10	10-12	>12	All
90-100		1						1
80-90				1				1
70-80			3	3	1			7
60-70		5	13	1	1			20
50-60		14	6					20
40-50		6	1					7
30-40	1	10						11
20-30	1	2						3
10-20	1							1
0-10								0
All	3	38	23	5	2	0	0	71

Panel B: Number of Mutual Funds (Active Share and Manager Tenure)								
	Manager Tenure (Years)							
Active Share (%)	0-2	2-4	4-6	6-8	8-10	10-12	>12	All
90-100			1					1
80-90							1	1
70-80	3	3					1	7
60-70	3	4	1	4	5	1	2	20
50-60	7	4		4	2		3	20
40-50	2	1		2		1	1	7
30-40	6	1	1	1	2			11
20-30	2			1				3
10-20			1					1
0-10								0
All	23	13	4	12	9	2	8	71

Table 8: Regression of equally-weighted portfolios', sorted by active share and tracking error, benchmark-adjusted returns on Carhart's four-factor model. Each year between 2003-2016, the mutual funds in our sample are sorted sequentially into terciles, first by active share and then further by tracking error. Funds with the lowest levels of active share and tracking error respectively constitute portfolio 1/1. The beta values show exposure to Fama and French's (1993) and Carhart's (1997) factor-mimicking portfolios MKT, SMB, HML and MOM. The table shows the result after regressing the portfolios' benchmark-adjusted returns (BAR). Alpha is the part of the portfolio's benchmark-adjusted return that is not explained by the explanatory variables in Carhart's four-factor model. Robust p-values are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Portfolio AS/TE	1/1	1/2	1/3	2/1	2/2	2/3	3/1	3/2	3/3
Dependent variable	BAR	BAR	BAR	BAR	BAR	BAR	BAR	BAR	BAR
Alpha	-0.0011***	-0.0011**	-0.0015***	-0.0012***	-0.0018***	-0.0022***	-0.0012**	0.0001	0.0006
	(0.0004)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0007)	(0.0008)
β_{MKT}	0.0118	0.0145	0.0044	0.0025	0.0066	-0.0004	-0.0049	0.0028	-0.0568**
	(0.0096)	(0.0104)	(0.0124)	(0.0094)	(0.0112)	(0.0110)	(0.0115)	(0.0160)	(0.0230)
β_{SMB}	-0.0122**	-0.0229***	-0.0224***	-0.0202***	-0.0252**	-0.0272***	-0.0096	-0.0383***	-0.0466**
	(0.0049)	(0.0073)	(0.0066)	(0.0061)	(0.0105)	(0.0084)	(0.0089)	(0.0120)	(0.0194)
β_{HML}	-0.0015	-0.0090	-0.0185	-0.0158	-0.0079	0.00178	0.0028	-0.0166	-0.0025
	(0.0146)	(0.0178)	(0.0172)	(0.0154)	(0.0195)	(0.0179)	(0.0172)	(0.0214)	(0.0261)
β_{MOM}	-0.0187	-0.0180	-0.0177	-0.0169	-0.0219	-0.0091	-0.0098	-0.0371*	-0.0472*
	(0.0126)	(0.0142)	(0.0151)	(0.0129)	(0.0167)	(0.0142)	(0.0169)	(0.0205)	(0.0276)
Obs.	168	168	168	168	168	168	168	168	168
R^2	0.061	0.065	0.035	0.036	0.046	0.040	0.008	0.059	0.096

Table 11: Equal-weighted expense ratios for all-equity funds in Sweden between 2003-2016. The funds in our sample are sorted by the two dimensions of active management. The funds are sorted sequentially, first into active share terciles and then further into tracking error terciles. Active share is defined as the percentage of a fund's portfolio holdings that differ from the fund's benchmark index (SIXPRX) and is measured at the end of year $t-1$. Tracking error is defined as the standard deviation of the difference between the returns of a fund and its benchmark index and is measured at the end of year $t-1$. Expense ratio is measured as the net expense ratio reported on the annual report at $t-1$. Index funds are excluded from the sample. The table shows equal-weighted annualized expense ratios in percentage terms.

Expense Ratios (%)					
Manager Tenure Quartile					
Low (1)	(2)	(3)	High (4)	All	High-Low
1.34	1.31	1.22	1.26	1.27	-0.08

Table 14: Equal-weighted expense ratios for all-equity funds in Sweden between 2003-2016. The funds in our sample are sorted by active share and manager tenure. The funds are sorted sequentially, first into active share terciles and then further into manager tenure medians. Active share is defined as the percentage of a fund's portfolio holdings that differ from the fund's benchmark index (SIXPRX) and is measured at the end of year $t-1$. Manager tenure is defined as the number of years that the current manager has been the portfolio manager of the fund and is measured at the end of year $t-1$. When a fund is managed by a team we only consider the manager with the longest tenure in the calculation of manager tenure. Expense ratio is measured as the net expense ratio reported on the annual report at $t-1$. Index funds are excluded from the sample. The table shows equal-weighted annualized expense ratios in percentage terms.

Expense Ratios (%)				
Active Share Tercile	Manager Tenure Median			
	Low (1)	High (2)	All	High-Low
High (3)	1.36	1.34	1.35	-0.02
(2)	1.41	1.37	1.39	-0.04
Low (1)	1.22	0.99	1.11	-0.23
All	1.33	1.23	1.27	0.06
High-Low	0.14	0.35	0.24	

Table 15: Regression of equally-weighted portfolios', sorted by active share and manager tenure, benchmark-adjusted returns on Carhart's four-factor model. Each year between 2003-2016, the mutual funds in our sample are sorted sequentially, first by active share into terciles and then further by manager tenure into medians. Funds with the lowest levels of active share and manager tenure respectively constitute portfolio 1/1. The beta values show exposure to Fama and French's (1993) and Carhart's (1997) factor-mimicking portfolios MKT, SMB, HML and MOM. The table shows the result after regressing the portfolios' benchmark-adjusted returns (BAR). Alpha is the part of the portfolio's return that is not explained by the explanatory variables in Carhart's four-factor model. Robust p-values are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Portfolio AS/MT	1/1	1/2	2/1	2/2	3/1	3/2
Dependent variable	BAR	BAR	BAR	BAR	BAR	BAR
Alpha	-0.0014***	-0.0013***	-0.0013**	-0.0019***	0.0002	-0.0002
	(0.0005)	(0.0004)	(0.0005)	(0.0005)	(0.0007)	(0.0007)
β_{MKT}	0.0016	0.01760*	-0.0181	0.0167	-0.0442***	-0.0060
	(0.0107)	(0.0105)	(0.0117)	(0.0112)	(0.0153)	(0.0170)
β_{SMB}	-0.0158***	-0.0198***	-0.0291***	-0.0211**	-0.0298***	-0.0321**
	(0.0058)	(0.0069)	(0.0076)	(0.0100)	(0.0091)	(0.0160)
β_{HML}	-0.0002	-0.0108	-0.0202	-0.0023	-0.0009	-0.0160
	(0.0158)	(0.0177)	(0.0200)	(0.0179)	(0.0189)	(0.0225)
β_{MOM}	-0.0135	-0.0245*	-0.0129	-0.0207	-0.0185	-0.0370
	(0.0122)	(0.0144)	(0.0124)	(0.0174)	(0.0182)	(0.0243)
Obs.	168	168	168	168	168	168
R^2	0.025	0.076	0.055	0.055	0.076	0.046

Table 16: Net equal-weighted benchmark-adjusted returns and four-factor alphas for all-equity funds in Sweden between 2003-2016. The funds in our sample are sorted by manager tenure and active share. The funds are sorted sequentially, first into manager tenure medians and then further into active share terciles. Active share is defined as the percentage of a fund's portfolio holdings that differ from the fund's benchmark index (SIXPRX) and is measured at the end of year $t-1$. Manager tenure is defined as the number of years that the current manager has been the portfolio manager of the fund and is measured at the end of year $t-1$. When a fund is managed by a team we only consider the manager with the longest tenure in the calculation of manager tenure. Net fund returns are the returns to a fund investor after fees (expense ratio) and represent annualized returns over year *t*. Index funds are excluded from the sample. The table shows annualized returns, followed by t-statistics (in parentheses) based on White's (robust) standard errors.

Panel A: Benchmark-adjusted returns (%)					
Manager Tenure Median	Active Share Tercile				
	Low (1)	(2)	High (3)	All	High-Low
High (2)	-1.39	-2.16	-0.36	-1.30	1.03
	(-2.55)	(-3.30)	(-0.41)	(-2.17)	(1.01)
Low (1)	-1.56	-2.10	-0.04	-1.24	1.52
	(-2.92)	(-3.33)	(-0.06)	(-2.14)	(1.57)
All	-1.47	-2.13	-0.20	-1.27	1.27
	(-3.87)	(-4.70)	(-0.26)	(-4.55)	(1.36)
High-Low	0.18	-0.05	-0.31	-0.06	
	(0.23)	(-0.06)	(-0.27)	(-0.11)	
Panel B: Four-factor alpha of benchmark-adjusted returns (%)					
Manager Tenure Median	Active Share Tercile				
	Low (1)	(2)	High (3)	All	High-Low
High (2)	-1.47	-2.25	-0.26	-1.33	1.23
	(-2.86)	(-3.64)	(-0.31)	(-2.39)	(1.68)
Low (1)	-1.66	-1.81	0.39	-1.03	2.07
	(-3.12)	(-3.05)	(0.49)	(-1.86)	(3.02)
All	-1.56	-2.03	0.06	-1.18	1.65
	(-3.11)	(-3.61)	(0.08)	(-2.19)	(2.59)
High-Low	0.18	-0.45	-0.64	-0.30	
	(0.63)	(-0.99)	(-1.07)	(-1.09)	

Table 17: Equal-weighted Active Shares for all-equity funds in Sweden between 2003-2016. The funds in our sample are sorted by manager tenure and benchmark-adjusted returns. The funds are sorted sequentially, first into manager tenure medians and then further into benchmark-adjusted return terciles. Manager tenure is defined as the number of years that the current manager has been the portfolio manager of the fund and is measured at the end of year $t-1$. When a fund is managed by a team we only consider the manager with the longest tenure in the calculation of manager tenure. Benchmark-adjusted returns are measured as the annualized excess return that a fund generates relative its benchmark index and is measured over year t and represents cumulative returns. In our study, we use SIX Portfolio Index (SIXPRX) as the benchmark index for all the funds. Active share is defined as the percentage of a fund's portfolio holdings that differ from the fund's benchmark index (SIXPRX) and is measured at the end of year $t-1$. Index funds are excluded from the sample. The table shows equal-weighted active shares measured in percentage terms, followed by t-statistics (in parentheses) based on White's (robust) standard errors.

Active Share (%)					
Manager Tenure Median	Benchmark-Adjusted Return Tercile				
	Low (1)	(2)	High (3)	All	High - Low
High (2)	50.78	46.71	55.40	50.94	4.63
					(2.73)
Low (1)	51.62	43.23	52.83	49.15	1.22
					(0.66)
All	51.19	45.01	54.14	50.07	2.96
					(2.37)
High-Low	-0.84	3.49	2.57	1.79	
	(-0.50)	(2.52)	(1.40)	(1.82)	

Table 18: Equal-weighted Active Shares for all-equity funds in Sweden between 2003-2016. The funds in our sample are sorted by benchmark-adjusted returns and manager tenure. The funds are sorted sequentially, first into benchmark-adjusted return terciles and then further into manager tenure medians. Benchmark-adjusted returns are measured as the annualized excess return that a fund generates relative its benchmark index and is measured over year t and represents cumulative returns. In our study, we use SIX Portfolio Index (SIXPRX) as the benchmark index for all the funds. Manager tenure is defined as the number of years that the current manager has been the portfolio manager of the fund and is measured at the end of year $t-1$. When a fund is managed by a team we only consider the manager with the longest tenure in the calculation of manager tenure. Active share is defined as the percentage of a fund's portfolio holdings that differ from the fund's benchmark index (SIXPRX) and is measured at the end of year $t-1$. Index funds are excluded from the sample. The table shows equal-weighted active shares measured in percentage terms, followed by t-statistics (in parentheses) based on White's (robust) standard errors.

Active Share (%)				
Benchmark-Adjusted Return Tercile	Manager Tenure Median			
	Low (1)	High (2)	All	High-Low
High (3)	53.94	55.43	54.70	1.49
				(0.81)
(2)	42.77	45.15	44.05	2.38
				(1.77)
Low (1)	52.48	50.76	51.56	-1.72
				(-1.03)
All	49.77	50.33	50.07	0.56
				(0.53)
High-Low	1.46	4.66	3.13	
	(0.80)	(2.78)	(2.12)	

Table 19: Equal-weighted manager tenures for all-equity funds in Sweden between 2003-2016. The funds in our sample are sorted by active share and benchmark-adjusted returns. The funds are sorted sequentially, first into active share terciles and then further into benchmark-adjusted return terciles. Active share is defined as the percentage of a fund's portfolio holdings that differ from the fund's benchmark index (SIXPRX) and is measured at the end of year *t*. Benchmark-adjusted returns are measured as the annualized excess return that a fund generates relative its benchmark index and is measured over year *t* and represents cumulative returns. In our study, we use SIX Portfolio Index (SIXPRX) as the benchmark index for all the funds. Manager tenure is defined as the number of years that the current manager has been the portfolio manager of the fund and is measured at the end of year *t*. When a fund is managed by a team we only consider the manager with the longest tenure in the calculation of manager tenure. Index funds are excluded from the sample. The table shows equal-weighted manager tenures measured in years, followed by t-statistics (in parentheses) based on White's (robust) standard errors.

Manager Tenure (Years)					
Active Share Tercile	Benchmark-Adjusted Return Tercile				
	Low (1)	(2)	High (3)	All	High-Low
High (3)	5.04	5.23	5.85	5.38	0.81
					(1.15)
(2)	4.64	4.44	3.64	4.24	-1.00
					(-2.21)
Low (1)	4.24	3.85	4.08	4.05	-0.15
					(-0.28)
All	4.64	4.51	4.53	4.56	-0.11
					(-0.35)
High-Low	0.81	1.38	1.77	1.33	
	(1.30)	(2.63)	(2.72)	(3.84)	

Table 21: Robustness check: Determinants of Active Share for all-equity funds in Sweden between 2006-2016 without mean-imputed expense ratios. The dependent variable in columns 1-4 is active share for each fund-year observation and is measured on a scale 0-100 (%). Active share is defined as the percentage of a fund's portfolio holdings that differ from the fund's benchmark index (SIXPRX) and is measured at the end of year *t*. Tracking error measures the standard deviation of the difference between the monthly net returns of fund *i* and its benchmark (SIXPRX) over time $t-1$ and takes on an annualized value. Fund age and manager tenure are measured in years. Expense ratio is the net expense ratio reported on the annual report at $t-1$ and is reported in percentage points. Return over Index is the cumulative benchmark-adjusted return over calendar year $t-1$ and over calendar years $t-3$ to $t-1$ respectively. Index funds are excluded from the sample. Due to missing observations for fund size (TNA) before 2005, we limit our time period to 2006-2016 for our multivariate regressions. Robust t-statistics (based on standard errors clustered at the fund-level) are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	Active Share			
Regression model	(1)	(2)	(3)	(4)
Tracking Error	4.2826***	4.1858***	1.5441***	1.4493***
	(11.58)	(10.97)	(6.06)	(6.27)
Manager Tenure		0.2140		-0.4431*
		(1.16)		(-1.90)
Ln(TNA)	0.4346	0.4139	-1.0169	-0.7836
	(0.85)	(0.74)	(-0.84)	(-0.66)
Number of Stock Holdings	-0.0470	-0.0497*	-0.0746***	-0.0689***
	(-1.59)	(-1.68)	(-4.67)	(-4.25)
Fund Age	-0.1670*	-0.1218	0.6382***	0.7804***
	(-1.69)	(-1.17)	(3.59)	(3.05)
Expense Ratio	5.6947***	5.7151**	-1.4035	-2.0056
	(2.65)	(2.49)	(-0.71)	(-1.01)
Return over Index, t−1 to t	0.0259	0.0113	-0.0314	-0.0519
	(0.24)	(0.11)	(-0.47)	(-0.83)
Return over Index, t−3 to t−1	0.0333	0.0007	-0.0344	-0.0864*
	(0.39)	(0.01)	(-0.57)	(-1.68)
Constant	21.8677*	21.3726*	62.5432**	59.2007**
	(1.83)	(1.67)	(2.47)	(2.36)
Year FE	Yes	Yes	Yes	Yes
Fund FE	No	No	Yes	Yes
Observations	641	586	641	586
R^2	0.578	0.572	0.332	0.348

Table 23: Robustness check: Predictive regression of fund performance for all-equity funds in Sweden between 2006-2016 without mean-imputed expense ratios. The dependent variables in columns 1-6 are based on the cumulative net return (%) over calendar year *t*, while the independent variables are measured at the end of year $t-1$. Alphas are based on benchmark-adjusted returns and computed with respect to the four-factor model by Carhart. Active share is defined as the percentage of a fund's portfolio holdings that differ from the fund's benchmark index (SIXPRX) and is measured at the end of year t. Tracking error measures the standard deviation of the difference between the monthly net returns of fund i and its benchmark (SIXPRX) over time $t-1$ and takes on an annualized value. Fund age and manager tenure are measured in years. Expense ratio is the net expense ratio reported on the annual report at $t-1$ and is reported in percentage points. Return over Index is the cumulative benchmark-adjusted return over calendar year $t-1$ and over calendar years $t-3$ to $t-1$ respectively. Index funds are excluded from the sample. Due to missing observations for fund size (TNA) before 2005, we limit our time period to 2006-2016 for our multivariate regressions. Robust t-statistics (based on standard errors clustered at the fund-level) are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	Benchmark-Adjusted Returns			Four-Factor Alphas		
	(1)	(2)	(3)	(4)	(5)	(6)
Active Share	0.0455**	0.0429**	0.0407*	0.0434**	0.1063***	0.1041***
	(2.58)	(2.14)	(1.97)	(2.20)	(5.42)	(5.16)
Tracking Error		0.0284	0.0434		-0.6779***	-0.6475***
		(0.17)	(0.25)		(-4.58)	(-4.38)
Manager Tenure			0.0650			0.0388
			(1.48)			(0.76)
ln(TNA)	0.0921	0.0974	0.0825	0.1027	-0.0215	-0.0766
	(0.85)	(0.82)	(0.68)	(0.80)	(-0.17)	(-0.57)
Number of Stock Holdings	-0.0031	-0.0031	-0.0029	-0.0035	-0.0021	-0.0018
	(-0.79)	(-0.80)	(-0.79)	(-1.17)	(-0.75)	(-0.73)
Fund Age	-0.0588***	-0.0591***	-0.0664***	0.0095	0.0181	0.0208
	(-2.93)	(-2.89)	(-2.84)	(0.35)	(0.59)	(0.67)
Expense Ratio	-1.0738**	-1.0758**	-1.0725**	-1.5748***	-1.5285**	-1.3902**
	(-2.25)	(-2.24)	(-2.04)	(-2.65)	(-2.54)	(-2.27)
Return over Index, t−1 to t	-0.0553**	-0.0572*	-0.0682**	-0.2562***	-0.2113***	-0.2438***
	(-2.07)	(-1.90)	(-2.01)	(-3.84)	(-3.80)	(-4.31)
Return over Index, t−3 to t−1	-0.0552*	-0.0570*	-0.0553**	-0.0245	0.0188	0.0629*
	(-1.89)	(-1.96)	(-2.24)	(-0.45)	(0.34)	(1.71)
Constant	-3.0253	-3.1107	-3.0086	-3.6905	-1.6574	-0.7266
	(-1.11)	(-1.08)	(-1.05)	(-1.32)	(-0.59)	(-0.25)
N	641	641	586	641	641	586
R^2	0.040	0.040	0.047	0.059	0.097	0.113

Table 25: Robustness check: Predictive regression of fund performance for all-equity funds in Sweden between 2006-2016 without mean-imputed expense ratios. The dependent variables in columns 1-6 are based on the cumulative net return (%) over calendar year *t*, while the independent variables are measured at the end of year $t-1$. Alphas are based on benchmark-adjusted returns and computed with respect to the four-factor model by Carhart. In these regressions, we include two interaction variables. "High MT x AS" is an interaction between a dummy variable—taking on the value 1 if the fund has a manager tenure above the median across funds within a given year *t*—and active share. High AS x MT is an interaction between a dummy variable—taking on the value 1 if the fund has an active share above the median across funds within a given year *t*—and manager tenure. Active share is defined as the percentage of a fund's portfolio holdings that differ from the fund's benchmark index (SIXPRX) and is measured at the end of year *t*. Tracking error measures the standard deviation of the difference between the monthly net returns of fund *i* and its benchmark (SIXPRX) over time $t-1$ and takes on an annualized value. Fund age and manager tenure are measured in years. Expense ratio is the net expense ratio reported on the annual report at $t-1$ and is reported in percentage points. Return over Index is the cumulative benchmark-adjusted return over calendar year $t-1$ and over calendar years $t-3$ to $t-1$ respectively. Index funds are excluded from the sample. Due to missing observations for fund size (TNA) before 2005, we limit our time period to 2006-2016 for our multivariate regressions. Robust t-statistics (based on standard errors clustered at the fund-level) are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	Benchmark-Adjusted Returns		Four-Factor Alphas	
	(1)	(2)	(3)	(4)
Active Share	0.0424**	0.0365	0.1099***	0.0927***
	(2.01)	(1.49)	(4.95)	(3.61)
Tracking Error	0.0457	0.0443	-0.6395***	-0.6450***
	(0.26)	(0.25)	(-4.27)	(-4.35)
Manager Tenure	0.0812	0.0469	0.0946	-0.0097
	(1.24)	(1.20)	(1.34)	(-0.21)
High MT x AS	-0.0038		-0.0131	
	(-0.35)		(-0.84)	
High AS x MT		0.0308		0.0825
		(0.49)		(1.07)
ln(TNA)	0.0802	0.0842	-0.0842	-0.0719
	(0.67)	(0.70)	(-0.62)	(-0.53)
Number of Stock Holdings	-0.0029	-0.0029	-0.0019	-0.0018
	(-0.80)	(-0.78)	(-0.78)	(-0.73)
Fund Age	-0.0674***	-0.0669***	0.0171	0.0193
	(-2.85)	(-2.91)	(0.55)	(0.62)
Expense Ratio	-1.0657**	-1.0837**	-1.3667**	-1.4201**
	(-2.02)	(-2.09)	(-2.23)	(-2.36)
Return over	-0.0686**	-0.0691**	-0.2454***	-0.2464***
Index, t−1 to t	(-2.02)	(-2.01)	(-4.45)	(-4.35)
Return over	-0.0548**	-0.0563**	0.0647*	0.0601*
Index, t−3 to t−1	(-2.25)	(-2.30)	(1.77)	(1.67)
Constant	-3.0178	-2.8117	-0.7582	-0.1984
	(-1.05)	(-1.00)	(-0.26)	(-0.07)
N	586	586	586	586
R^2	0.047	0.047	0.114	0.114