Active Share and the Three Pillars of Active Management:

Skill, Conviction and Opportunity

*Martijn Cremers**

University of Notre Dame

Financial Analyst Journal, Forthcoming

December 2016

Abstract

We introduce a new formula for Active Share that emphasizes that a fund's Active Share is only reduced through overlapping holdings with its benchmark. Next, we relate Active Share to the fund manager's individual stock picking skill, conviction and opportunity. We show why and how to adjust the expense ratio for the level of Active Share and the cost of investing in the benchmark. We conclude that Active Share matters for actively managed funds: investors should not pay (too) much for low Active Share funds which generally underperform, there is no evidence that high Active Share funds as a group have underperformed, while patient managers with high Active Share have been quite successful.

* Contact information: Martijn Cremers, 264 Mendoza College of Business, University of Notre Dame, Notre Dame, IN 46556. Email: mcremers@nd.edu. Website: http://mcremers.nd.edu. The Online Appendix is available here: https://ssrn.com/abstract=2891047. I would like to thank Stephen Brown, Luis Garcia-Feijóo, Barbara Petitt, Larry Swedroe, as well as two anonymous reviewers for very helpful comments. All errors are our own. The Active Share and Fund Holding Duration data used in this study is made available on http://activeshare.nd.edu for academic purposes. Active Share and Active Fee information (as well as other related holdings-based information) for U.S. equity funds is made available on http://activeshare.info. The author has consulting relationships with investment firms that offer high Active Share investments.

Introduced in Cremers and Petajisto (2009), Active Share has emerged as a standard tool to analyze investment portfolios. Active Share is equal to the proportion (i.e., *share*) of assets that is invested differently (i.e., *active*) from the benchmark. In this paper, we discuss how Active Share can help to understand a portfolio manager's approach by relating Active Share to the three pillars of active management – skill, conviction and opportunity – and present empirical evidence on the usefulness of Active Share for long-only retail U.S. equity mutual funds for the period 1990 – 2015.

The three pillars of skill, conviction and opportunity is an application of the philosophical idea that practical wisdom involves the full triad of right knowledge, good judgment and effective practical application, rather than only a subset of these three components.[1] In other words, to be successful in the long-term one must have a good understanding, make the right choices and have the practical ability to do so effectively. It is insufficient to have good understanding but not enough willpower, or to have both of these but face practical obstacles preventing effective implementation. Worst perhaps is having strong willpower and great opportunity but lacking understanding. Applying this triad of requirements to investment management, this means that successful managers need to have (i) the skill to identify good investment opportunities appropriate for their clients, (ii) the right judgment or willingness to choose among the identified opportunities in a prudent way, and finally (iii) sufficient opportunity or lack of practical obstacles to do so persistently.

Basic economic intuition relates Active Share to each of these three pillars and thereby to fund performance: managerial skill, conviction and opportunity are more likely to contribute to outperformance for investors in actively managed funds, if access to such skill is not too expensive, if convictions are more subject to limited arbitrage, and for investment mandates providing more investment opportunities. We document evidence consistent with these conjectures, combining Active Share with expense ratios (see Cremers and Curtis, 2016), fund holding duration (where patient strategies require stronger convictions because they are riskier for the manager to pursue, see Cremers and Pareek, 2016) and investment style (with small cap stocks as generally allowing more stock picking opportunities than large cap stocks).

We start by introducing a new, simpler formula for Active Share that expresses Active Share as 100% minus the sum of the overlapping weights between the portfolio and its benchmark. Under the simplifying assumption that one is solely interested in the relative performance to the benchmark (or assuming that both fund and benchmark have similar risk), overlapping positions will not contribute to the relative performance. For example, if both the fund and its benchmark

[1] This is based on a line of philosophical thought that can be traced back to Plato and Aristotle, is ubiquitous in Thomas Aquinas and more recently has been explored by, e.g., Nozick (1989) and Kekes (1983), see Ryan (2014) for a quick overview. For example, Kekes (1983) argues that "The possession of wisdom shows itself in reliable, sound, reasonable, in a word, good judgment. In good judgment, a person brings his knowledge to bear on his actions. To understand wisdom, we have to understand its connection with knowledge, action, and judgment" (1983, 277), emphasizing the necessity of the full triad of knowledge, judgment and effective action.

have an identical weight of 5% in Apple stock, then the actual performance of Apple stock is irrelevant for the relative performance of the fund, as Apple's stock return will affect the fund and its benchmark identically.[2]

Considering each of the three pillars of active management in turn, the first pillar is skill, or the ability to identify good investment opportunities. Active Share does not directly measure stock picking skill. All you need for a high Active Share is construct a portfolio that is very different than the benchmark portfolio, which requires conviction and opportunity but can be done without skill. Further, Active Share is a security-level measure that ignores cross-correlations between the securities, not capturing various other trading and risk management skills. It is only for managers with strong individual stock picking skills that a high Active Share may be beneficial.[3]

The lower the Active Share, the higher the hurdle that the active manager must overcome in her portfolio's Active Share to achieve relative outperformance. As example of an actively managed fund with a relatively low Active Share, the AQR Large Cap Momentum Fund as of 2015:Q1 (henceforth 'AQR Momentum') has a 49% Active Share with respect to the S&P 500 Growth benchmark, and a gross expense ratio of 0.84% per year for its N retail share class. Therefore, its positions need to outperform its benchmark – available at an annual retail cost of about 0.15% per year – on average by 0.84% - 0.15% = 0.69% per year, in order to outperform the benchmark (ignoring risk). Its low Active Share of 49% indicates that only about half of the portfolio can contribute to any outperformance, such that the Active Share of the portfolio should outperform by at least 0.69%/0.49 = 1.41% per year (i.e., its hurdle rate).

This basic economic intuition is the motivation behind the Active Fee, introduced by Cremers and Curtis (2016), which measures the fee charged for the actual level of active management by adjusting the expense ratio for the Active Share and the cost of investing in the benchmark. In the previous example, the Active Fee would be (0.84% - 51%*0.15%)/49% = 1.56% per year. The difference between the Active Fee and the cost of investing in the benchmark is the hurdle rate for the active holdings in the fund, i.e., 1.56% - 0.15% = 1.41%, which is decreasing in Active Share.

We empirically document that, on average, higher fees are particularly detrimental to future performance for funds with low Active Shares, for which there is a strongly negative association between future performance and expense ratios. Therefore, low Active Share funds should be inexpensive. There is no negative association between future performance and expense ratios

[2] Of course, which particular positions are overlapping matters. Our point relates to the proportion of the fund that is different from the benchmark, not the skill with which the difference is chosen.

[3] For managers whose active strategy pertains to choosing exposure to broader factors (or betas/characteristics) – i.e., for factor investing or strategic beta funds – one would naturally expect lower Active Share. However, this does not mean that Active Share is irrelevant for factor investing funds, as the following example aims to illustrate.

for high Active Share funds, and we find no evidence that high Active Share funds on average underperform, regardless of their expense ratios.

The second pillar of active investment management is conviction, or the willingness to translate the identified investment opportunities into a portfolio that is sufficiently different to outperform in the long-term. In order to bring long-term economic rewards to the investors, the convictions should not easily be followed by others. Otherwise, i.e., without any exposure to economic risks or limits to arbitrage, any active strategy is easily replicated. An example of strategies subject to limited arbitrage are those trading on long-term underpricing, which Shleifer and Vishny (1990, 1997) argued are riskier for the manager, requiring stronger convictions and investor trust. The increased risk for the manager is caused by the possibility that a long-term profitable strategy may underperform in the short-term, where short-term underperformance may jeopardize the manager's ability to retain the assets and continue the long-term investment strategy (especially in case of impatient investors).

Following Cremers and Pareek (2016), we document that among high Active Share funds, only those with long holding durations outperform on average, while frequently trading funds on average underperform. This provides empirical support for Shleifer and Vishny's argument that long-term mispricing is more subject to limited arbitrage than short-term mispricing, resulting in greater profitability for those managers able and willing to invest in patient active strategies. It further underscores that high Active Share by itself is not strongly associated with outperformance, but only when coming from convictions that are subject to limited arbitrage.

The third pillar of active management is opportunity. Active managers may be subject to a variety of constraints limiting the manager's ability to implement high Active Share investment strategies in practice. A high Active Share indicates a relative lack of constraints. If small caps generally have greater information uncertainty or less efficient pricing than large cap stocks, this would predict that high Active Share funds perform better among small cap funds than among large cap funds. We find some but more limited evidence for this. On the one hand, large cap funds with low Active Share strongly underperform, while we find no evidence for underperformance among small cap funds, even those with low Active Share. On the other hand, funds that combine patient with high Active Share strategies outperformed on average both among large cap and small cap funds.

Our paper contributes to the recent debate on the usefulness of Active Share as a new measure of the amount of individual stock picking in investment funds, see Schlanger, Philips and Peterson LaBarge (2012), Cohen, Leite, Nelson and Browder (2014), Frazzini, Friedman and Pomorski (2016, henceforth FFP) and Petajisto (2016). As FFP make the strongest claims, we discuss their conclusions in light of our results. We explain how several claims in FFP warrant significant qualification, and conclude that Active Share is quite useful to analyze investment funds and predicting performance of fund portfolios over longer periods of time, consistent with

existing literature such as Kacperczyk, Sialm, and Zheng (2005), Jiang, Verbeek and Wang (2014), Doshi, Elkamhi and Simutin (2015), Cremers, Ferreira, Matos and Starks (2016), and Cremers and Pareek (2016) – all predating but not cited in FFP.

1. Data and Methodology

1.1 A new, alternative formula for Active Share

The formula for Active Share introduced in Cremers and Petajisto (2009) is as follows:

$$\textbf{Active Share} = \frac{1}{2}\sum_{i=1}^{M}\left|w_{fund,i} - w_{benchmark,i}\right| \qquad (1)$$

where *M* is the total number of stocks that is included in either the fund or the benchmark, $w_{fund,i}$ is the weight in the fund in stock *i* and $w_{benchmark,i}$ is the weight in the benchmark in stock *i*. For example, the fund may include 100 stocks (out of which 80 are included in the benchmark and 20 are not), and, say, the benchmark may include 500 stocks (out of which 420 are not included in the fund). In this example, the *M* in (1) equals 520, namely the number of stocks included in the benchmark (i.e., 500) plus the number of stocks included in the fund that are not included in the benchmark (20). When applying the formula in (1) it is easy to forget about the 420 stocks that are included in the benchmark but not in the fund, in which the fund has an active underweight. Forgetting these positions results in an Active Share that is too low.

Formula (1) emphasizes that any difference in portfolio weights contributes to Active Share – either by overweighting or underweighting. However, it does not clearly show that fund positions in the benchmark are treated differently from fund positions not included in the benchmark. Specifically, any position in a stock outside the benchmark contributes positively to Active Share. As a result, the only positions that decrease Active Share are positions that overlap, i.e., where the fund buys a security that is also included in the benchmark, which is better expressed by the following, new alternative formula for Active Share:

$$\textbf{Active Share} = 100\% - \sum_{i=1}^{N} \textbf{Min}\left(w_{fund,i}, w_{benchmark,i}\right) x\, \boldsymbol{d}[\,w_{fund,i} > 0] \qquad (2)$$

where *N* is the total number of stocks that is included in the fund, and $d[w_{fund,i}>0]$ is an indicator variable equal to 1 for all positions where the fund is positive (i.e., not short) and is zero otherwise, where we also assume that all benchmark weights are non-negative. As long as all weights are positive, the minimum of each stock's weight in the fund ($w_{fund,i}$) and in the benchmark ($w_{benchmark,i}$) is the overlapping weight for the stock. The simpler Active Share formula in (2) expresses Active Share as equal to 100% minus the sum of the overlapping weights between the portfolio and its benchmark, and thus emphasizes that Active Share is only lowered by overlapping positions that are in both the fund and the benchmark. In the previous example, the

number of stocks included in the fund, *N,* equals 100. In addition, we assumed that the fund invests in 80 stocks that are included in the benchmark and in 20 stocks that are not included in the benchmark. This means that any overlapping weights can only come from the 80 positions in stocks that are included in both the fund and the benchmark.

The alternative formula in (2) gives identical results to the formula in (1) for portfolios that do not short securities or lever up, but more clearly indicates that only overlapping positions lower Active Share. In addition, the computational demands for the new formula (2) are lower than for the original formula (1), as the Active Share calculation using (2) only involves the weights for the subset of stocks that are both in the fund and in the benchmark (rather than the weights of all of the stocks included in either the fund or the benchmark).

1.2 Data

The data used for all results in this paper are from the sample of actively managed equity U.S. retail mutual funds from the CRSP survivorship-bias-free mutual fund database as used in Cremers and Pareek (2016) but extended to 1990 – 2015, including 'dead', merged and delisted funds. Our final sample comprises about 3,100 actively managed funds. We use the net fund returns (after fees, trading costs, other expenses including brokerage commissions, but ignoring any rear or front-end loads), total net assets (TNA) under management across all share classes, and the annual expense ratio (weighted across share classes by the value of the assets).

We aim to only select actively managed funds investing almost exclusively in U.S. equities and that are not small through the following sample selection criteria (see Cremers and Pareek, 2016, for further details). First, we require the objective codes available in CRSP to indicate that the fund is pursuing an active U.S. equity strategy that is not focused on particular sectors. Second, we exclude index funds and ETFs and require an Active Share of at least 20%. Third, we require the percentage of assets in U.S. stocks in the portfolio to be at least 80%. Fourth, we require at least $10 million under management, which also mitigates any incubation bias. These latter two requirements decrease the number of funds in our sample substantially, but ensure that our Active Share numbers pertain to almost all of the portfolio and that our results are not driven by small funds, and further increases the comparability of funds across our sample. We merge the remaining funds in CRSP with the mutual fund holdings database maintained by Thomson Financial as available through WRDS using the 'mflinks' linking files on WRDS.

When available, we use the self-declared benchmarks from Morningstar Direct. If this is not available, we assign a benchmark ourselves based on the benchmark that has the lowest Active Share across all benchmarks considered, i.e., where the fund's holdings resemble that benchmark's holdings more closely than the holdings of any other benchmark. Assigning the 'wrong' benchmark to a fund is a concern – particularly assigning a high Active Share to a fund based on its self-declared benchmark, where the fund has substantial overlap in holdings with another benchmark – for example through possible benchmark manipulation by funds (see

Sensoy, 2009). We verify that our results are robust to ignoring self-selected benchmarks and solely relying on using the minimum Active Share across of all benchmarks. The number of funds in our main sample equals 164 at the beginning of 1990, grows to over 1,100 in 2000, to around 1,500 in 2009 and is close to 1,000 at the end of the sample. Conditioning on Fund Duration reduces the sample of funds by, on average, 25% due to more stringent data requirements, as explained below in Section 2.2.

The set of benchmarks includes all self-declared benchmarks chosen by funds in our sample as available in our Morningstar Direct data, including these benchmark families: Calvert Social (1), Dow Jones (6), FTSE (4), Mergent (1), MSCI (15), NASDAQ (2), Russell (13), Standard & Poors (14), and Schwab (2), for a total of 58 benchmarks. For the benchmark holdings for the Russell and S&P benchmarks, we have the official benchmark constituent weights for all but the most recent period. For all other benchmarks and for the most recent period for the Russell and S&P benchmarks, we approximate the benchmark constituent weights by following the methodology in Cremers, Ferreira, Matos, and Starks (2016), i.e., using the weights in passive ETFs and passive mutual funds with the same benchmarks. Benchmark returns are from Bloomberg and four-factor returns are from Ken French's website.

1.3 Performance evaluation of net mutual fund returns

To evaluate the net returns of mutual funds, we employ different factor models to adjust the mutual fund performance for time-invariant exposure to well-known factors. The first model is the standard choice in academic papers, namely the four-factor Fama-French-Carhart model, consisting of a market factor in excess of the risk-free rate, a size factor (SMB, small-minus-big market capitalization stocks), a value factor (HML, high-minus-low book-to-market stocks) and a momentum factor (UMD, up-minus-down recent stock momentum). The second model is the index-based seven-factor model proposed by Cremers, Petajisto, and Zitzewitz (2013), which uses tradable benchmark indices for the market, size and value factors: the (i) market factor is the excess return on the S&P 500; two size factors, namely (ii) small cap factor (equal to the difference between the return of the Russell 2000 and the Russell Midcap) and (iii) mid-cap factor (equal to the difference between the return of the Russell Midcap and the S&P 500), three separate value factors for large, midcap and small cap stocks: (iv) large cap value factor (the difference between the return of the S&P 500 value and growth indices), (v) mid cap value factor (the difference between the return of the Russell Midcap value and growth indices), and (vi) small cap value factor (the difference between the return of the Russell 2000 value and growth indices), and finally (vii) momentum factor (UMD).[4] For robustness, we also consider a one-factor model consisting only of the return on the S&P 500.

[4] Including the momentum factor UMD in the seven-factor index-based performance evaluation model is more based on convention than on consistency with the arguments that follow. On the one hand, including UMD renders the results more comparable to those of the four-factor Fama-French-Carhart model and to the previous literature. On

Our preferred performance evaluation model is the index-based seven-factor model. As explained by Cremers, Petajisto, and Zitzewitz (2013, henceforth CPZ), it has three interrelated advantages relative to the four-factor model. First, the market, size and value factors in the seven-factor model are tradable factors that are all easily investable at low cost. As a result (and apart from momentum exposure), the alphas from the seven-factor model are straightforward to interpret, namely as the estimated outperformance relative to investing in cost-free indexes. In contrast, the market, size and value factors in the Fama-French-Carhart model are not tradable, where SMB and HML heavily weight small value stocks that are generally illiquid and not found in mutual fund portfolios. Second, CPZ show that employing two size factors and three value factors is useful, as size and book-to-market have different relationships with stock performance depending on whether one considers all stocks, only large cap, only mid cap or only small cap stocks.

Third and most importantly, the four-factor alphas are hard to interpret for funds that have significant size or value/growth tilts, as the four-factor model allows economically large non-zero alphas even for passive portfolios like the benchmarks themselves. As documented by CPZ, small cap benchmarks like the Russell 2000 and the S&P 600 have large negative alphas according to the four-factor model, while large cap benchmarks like the S&P 500 and the Russell 1000 have large positive alphas according to the four-factor model, which CPZ show can be explained by the particular construction of SMB and HML.[5, 6] Large four-factor alphas for *passive* benchmarks mean not only that actively managed small (large) cap funds tend to have negative (positive) four-factor alphas, as documented in CPZ, but also that such non-zero alphas cannot be taken at face value and e.g. be interpreted as evidence for or against active management. This is particularly important for evaluating how Active Share relates to performance, as small cap funds tend to have higher Active Shares than large cap funds, which will be further discussed in sections 3.3 and 3.4 below.

2. Active Share and Mutual Fund Performance

the other hand, UMD is not directly investable either (like SMB and HML), and ignores, for example, transaction and shorting costs. As there is no tradable, low-cost momentum factor available for a sufficiently long period of time to use instead of UMD, we verified that the main results in our paper are robust to removing UMD.

[5] For example, CPZ (page 2) show that "regressing the excess returns of the S&P 500 index (including dividends) on the Carhart four-factor model yields an annual alpha of 0.82% (t = 2.78) over our sample period from 1980 to 2005. … The Russell 2000 annual alpha is −2.41% (t = −3.21). A portfolio that is long the S&P 500 Growth index and short the Russell 2000 Growth index has an impressive annual alpha of 5.23% (t = 4.23)."

[6] CPZ explain how these alphas are caused by the equal weights on the portfolios used to construct HML and SMB, namely the six portfolios resulting from the two-by-three sort of stocks on size and book-to-market. The portfolio with small size and high book-to-market stocks represents about 2% of the market capitalization across all stocks, though represents a third of the long side of SMB and half the long size of HML. The historically high returns of small value stocks makes SMB and HML benchmarks that are difficult to beat for mutual funds, explaining the negative (positive) four-factor alphas for small (large) cap funds whose positive (negative) loadings on SMB and/or HML) means that their benchmark implicitly shorts (buys) these small value stocks. This renders SMB and HML inappropriate benchmarks for mutual funds.

2.1 Active Share and Costs: How Much Are You Paying For Stock-Picking Skills?

Active Share is not a measure of skill. As indicated by either (1) or (2), Active Share measures the proportion of holdings of the fund that is different from the holdings of the benchmark. A high Active Share (and assuming it's calculated with respect to the 'right' benchmark) only indicates a high *amount* of individual stock picking but not the skill thereof. As formula (2) makes more explicit, Active Share is the proportion of the fund that is non-overlapping with the benchmark holdings, such that all a manager would need to do to construct a high Active Share portfolio is to buy different securities than are included in the benchmark.

Therefore, Active Share can be interpreted as the share of the portfolio that the manager's individual stock-picking skill is applied to, whatever those skills are. As such, it is only for managers that actually have stock picking skills that a high Active Share would be beneficial. For managers whose expertise pertains to constructing portfolios based on favorable exposure to broader economic factors (or betas/characteristics), one would naturally expect their funds to have a lower Active Share. Further, high Active Share fund managers need more than stock picking skills to be successful, but also need trading and risk management skills, which may be largely unrelated to Active Share.

A separate question is how much investors should be willing to pay, on average, for individual stock-picking. As broad sector exposure has become cheaply accessible through index mutual funds and ETFs, it directly follows that, *ceteris paribus*, low Active Share funds should on average be relatively inexpensive. Funds with low Active Share have a higher hurdle to overcome to achieve relative outperformance, given the inexpensive access to beta, as the overlapping positions won't contribute to outperformance.

Therefore, basic economic intuition implies that the cost of any actively managed fund should be roughly proportional to Active Share (where such costs can be adjusted for the cost of the exposure to beta or the benchmark, though ignoring other costs such as loads). This motivates the introduction of the *Active Fee* measure in Cremers and Curtis (2016), which is defined as

$$\boldsymbol{Active\ Fee} = \frac{\boldsymbol{Expense\ Ratio} - (\mathbf{100\%} - \boldsymbol{Active\ Share}) * \boldsymbol{Index\ Fund\ Fee}}{\boldsymbol{Active\ Share}} \qquad \mathbf{(3)}$$

The main intuition behind the Active Fee definition in (3) is that investors in actively managed funds can pay the (low) index fund fee for the part of the fund that overlaps with the benchmark, where the non-overlapping holdings have to outperform by at least the Active Fee minus the index fund fee before the investors achieve a higher net return from investing in the actively managed fund. In our previous illustration of AQR Momentum in the introduction with an Active Share of 49%, if its expense ratio equals 0.84% and for its benchmark equals 0.15%, then its Active Fee would be (0.84% - 51%*0.15%)/49% = 1.56% per year. The difference between the Active Fee of 1.56% and the 0.15% cost for the benchmark equals 1.41%, the hurdle rate for the

manager. In contrast, for very high Active Share funds, the Active Fee would be basically identical to the expense ratio. As the quintile of highest Active Share funds has a median expense ratio of 1.35% per year in our sample, this means that AQR Momentum charges relatively high fees for active management compared to high Active Share funds.

The main empirical prediction that follows is that expense ratios should be more negatively associated with fund performance for low Active Share funds as compared to high Active Share funds, which is confirmed in Cremers and Curtis (2016). We replicate their main results below, using a different model to evaluate performance and updating their results until the end of 2015. We form mutual fund portfolios based on past information, and then evaluate their subsequent performance 'out of sample' in a sample without significant sample selection or survivorship bias. For example, we first sort mutual funds into portfolios at the end of 1989 to evaluate their performance over calendar year 1990, then re-sort all mutual funds in our sample at the end of 1990 for evaluation over 1991, and so forth.

Figure 1 displays the percentage of fund assets by Active Share group, indicating that funds with less than 60% Active Share had few assets before 1997 but became very prominent in the early 2000s. In recent years, the percentage of assets in funds with less than 60% Active Share has steadily declined to about 12% at the end of 2015. This decline in very low Active Share funds did not reverse the broader trend towards lower Active Share in the overall sample. In particular, the percentage of assets in funds with Active Share above 80% and 90% has been fairly stable since 2006 (around 30% and 10%, respectively). Online Appendix Figure A.1, focusing on the percentage of funds rather than fund assets, shows similar trends. Comparing both figures shows that low Active Share funds tend to be larger, while high Active Share funds tend to be smaller. For example, at the end of 2015, about 24% of funds in the sample have an Active Share above 90%, but this group of funds contains only about 10% of the overall assets in the sample.

In our empirical analysis, we focus on quintile sorts based on the data at the end of each calendar year. Pooled over the full period, the median Active Shares in the five quintiles equal 56%, 71%, 82%, 90% and 97% (with the 25th percentiles of Active Share in the five quintile groups based on Active Share equal 49%, 67%, 79%, 88% and 95%, while the 75th percentiles are, respectively, 62%, 76%, 85%, 92% and 98%). As a result, comparing high and low Active Share funds using these quintile sorts generally means comparing funds with an Active Share above 95% to funds with an Active Share of below 60%.

Sorting funds into expense ratio quintiles (winsorized at 1%), the average (median) expense ratio equals 0.71% (0.76%) per year in the first quintile, and 1.79% (1.76%) in the fifth quintile. Active Share is positively correlated with the fund's expense ratio. In the full sample, the rank correlation equals 30%. Forming independently-sorted quintile portfolios at the end of each calendar year based on Active Share alone, the quintile with the lowest (highest) Active Share has a median expense ratio of 1.00% (1.35%) per year, and the quintile with the lowest (highest)

expense ratio has a median Active Share of 71% (88%). Due to this positive correlation, the number of funds in an independent double sort is low in portfolios of funds with low (high) Active Share and high (low) expense ratios. We conduct both independent and dependent double sorts to ensure that our results are not driven by differences in the number of funds across portfolios.

Table 1 presents the seven-factor alphas of net mutual fund returns for the resulting 25 equally-weighted portfolios from the independent double sort on the lagged expense ratio and lagged Active Share, as well as of the quintile portfolios of a single sort on lagged Active Share and of a single sort on the lagged expense ratio. The single sort of funds on Active Share, in the top row of Table 1, shows that low Active Share funds (i.e., bottom quintile) substantially underperformed over this period, on average by 1.37% per year, which is strongly statistically significant with a t-statistic of 7.06. High Active Share funds (i.e., in the top quintile) outperform, on average by 0.71% per year, but this result is statistically insignificant with a t-statistic of 1.37. The difference in the performance between high and low Active Share funds equals 2.08% per year, which is again strongly statistically significant with a t-statistic of 4.19. These results are quite similar to the results in Cremers and Petajisto (2009). Overall, avoiding actively managed funds with low Active Share appears to have been useful for avoiding average underperformance, while we find no evidence that high Active Share funds have underperformed.[7]

Figure 2 presents the cumulative abnormal net performance of the five Active Share quintile portfolios, applying their abnormal net returns to a fictitious $1 investment at the start of 1990, estimated ex-post over the full period.[8] Most of the outperformance of the high Active Share funds occurred in the 2000-2001 period, coinciding with the Nasdaq crash, with little evidence of outperformance outside of that period. Moreover, in the period after 2001, the quintile portfolio of high Active Share funds shows fairly persistent underperformance. The low Active Share quintile portfolio exhibits consistent underperformance over the whole time period, such that the high Active Share funds still do not underperform low Active Share funds after 2001. Nonetheless, this pattern in the predictability of Active Share suggests that the outperformance of high Active Share funds relative to low Active Share funds in our sample has been mostly due to a particular period in which technology stocks crashed.

Single sorts on expense ratios, in the first column of Table 1, show little evidence that more expensive funds perform worse. The best performance is achieved by quintiles 1 and 4, and the worst performance by quintiles 3 and 5, while the difference between the performance of funds with high and low expense ratios is statistically insignificant with a t-statistic of 1.25, and economically minor with a difference of 0.32% per year. The lack of predictability using the

[7] For comparison, the aggregate equal-weighted portfolio of all actively managed funds in the sample has an annualized 7-factor alpha of -1.19% (t-statistic of 4.48), and the aggregate value-weighted portfolio (weighted by the total net assets across all share classes of the fund) has an alpha of -0.64% per year (t-statistic of 2.26).

[8] For comparison, Online Appendix Figure A.2 shows the cumulative abnormal net performance of the aggregated equal-weighted and value-weighted portfolios of all mutual funds in the sample, indicating that, on average, mutual funds consistently underperformed over the period, similar to the lowest Active Share quintile groups.

expense ratio by itself seems consistent with fairly informationally-efficient markets (see Grossman and Stiglitz, 1990), where funds with higher gross returns are generally able to charge higher fees, resulting in similar net returns on average after such fees are taken out.

The independent double sorts show that the relevance of expense ratios depends on Active Share, consistent with our intuition provided above. Expense ratios only seem predictive of future performance among low Active Share funds – as expensive funds significantly underperform inexpensive funds for the subsample of funds with low Active Share – while high Active Share funds tend to outperform low Active Share funds irrespective of the expense ratio. For low Active Share funds (bottom quintile), the difference in the performance between the top and bottom quintile of the expense ratio equals -1.54% per year with a t-statistic of 4.36.[9, 10]

We speculate that these results are broadly consistent with a bifurcation across mutual funds based on Active Share, perhaps driven by differences in clienteles. For low Active Share funds, the mutual fund market may be less competitive, allowing some low Active Share funds to overcharge (where investors in expensive and low Active Share funds may be unaware that they are investing in low Active Share funds). This is consistent with the apparent bifurcation across mutual fund markets internationally, as documented in Cremers, Ferreira, Matos and Starks (2016). Using the prevalence and costs of index and ETF investing as proxies for the level of competition in the country's mutual fund market, they document that more (less) competitive markets – i.e., with more or cheaper passive investing – exhibit higher (lower) average Active Share, lower (higher) average costs for active investing and better (worse) average mutual fund performance for funds with high Active Share.

These results further imply significant qualifications for the claim in Frazzini, Friedman and Pomorski (2016, henceforth FFP) that "there is no reliable statistical evidence that high active-share and low-active-share funds have returns that are different from each other." The first qualification is that this claim depends on the factor model used to evaluate fund performance,

[9] For robustness, we report dependent sorts in Online Appendix Table A.1 showing results from a dependent double sort where we first sort on the expense ratio and then on Active Share. Online Appendix Table A.2 shows results from a dependent double sort where we first sort on Active Share and then on the expense ratio, allowing an analysis of the relevance of the expense ratio controlling for Active Share. Finally, in Online Appendix Table A.3, we use a one-factor model consisting only of the return on the S&P 500 and an independent double sort on Active Share and expense ratios. All of these robustness checks show similar results to Table 1.

[10] Online Appendix Table A.4 shows the results for the independent double sort but now using the Fama-French-Carhart four-factor model to evaluate performance. Several notable differences with the seven-factor results are worth noting. First, the difference between high and low Active Share funds is no longer statistically significant due to the biases inherent in the four-factor model, which assigns positive (negative) alphas to even passive portfolios that invest primarily in large (small) cap stocks, as is the case for low (high) Active Share actively managed funds. Second, the difference between high and low expense ratio quintile groups becomes statistically significant, which is also consistent with this bias, as more (less) expensive funds tend to be small (large) cap funds. Third, the main results in the double sort are robust, namely that high Active Share funds tend to outperform low Active Share funds irrespective of the expense ratio, while expensive funds substantially underperform inexpensive funds only for low Active Share funds.

where the results in FFP are only achieved when using an inappropriate performance evaluation model that contains strong biases against small cap funds, and accordingly generates a strong bias against high Active Share funds.[11] However, the performance differences are strongly statistically significant using more appropriate methods such as benchmark-adjusted net returns as in Cremers and Petajisto (2009) and Petajisto (2013), or when using the 7-factor benchmark as documented in this paper.

The second qualification needed is that the statistical evidence that high Active Share funds outperform low Active Share funds is considerably stronger for specific subsets of funds, such as amongst funds with low expense ratios (as shown here and in Cremers and Curtis, 2016) and amongst funds with long Fund Holding Duration (see section 3.2 below and Cremers and Pareek, 2016). Moreover, we will show that both of these results remain robust even when using the four-factor Fama-French-Carhart model.[12, 13] The third qualification is that the result that low Active Share funds (either in an absolute sense or relative to their benchmark group) substantially underperform on average remains robust across all performance evaluation models, including in all of the tests reported in FFP.[14]

2.2 Active Share and Fund Holding Duration: How Long Do the Manager's Convictions Last?

The second pillar that active managers need is conviction, i.e., the willingness to use the identified investment opportunities and create a portfolio that is substantially different from the benchmark. A manager with strong individual stock picking skills but weak convictions may be overly concerned about short-term volatility or tracking error (as opposed to actual downside

[11] Cremers, Petajisto and Zitzewitz (2013) document that seemingly minor choices in the factor construction of SMB and HML cause economically and statistically large non-zero alphas for passive benchmarks, with small (large) benchmarks having large negative (positive) alphas, especially when these benchmarks also have value (growth) exposure. These large nonzero alphas for passive benchmarks render the SMB and HML factors inappropriate choices for performance evaluation. Further downsides of SMB and HML are that these factors are not tradable and are dominated by stocks that are generally outside of the investment universe of most active fund managers.

[12] Small cap funds are relatively less important in these specific subsets of funds, such that the biases from using SMB and HML matter less.

[13] FFP have two more main claims. This footnote discusses the second, while the third main claim in FFP will be discussed below in Section 3.3. The second main result that FFP claim is that "[f]or a given benchmark, there is no reliable statistical evidence that high-active-share funds outperform low-active-share funds." They base this claim upon sorting funds into Active Share quintiles separately within 17 groups of funds based on their benchmark. This changes the definition of high Active Share to a relative-to-the-benchmark-group standard, introducing noise as many benchmark groups contain few funds, see Petajisto (2016). About 38% of the funds that FFP label as high Active Share are not in the top Active Share quintile for the full sample. Having few funds and less Active Share spread explains why FFP find weaker statistical significance. As shown in section 3.3, combining all funds with a large cap benchmark into one subsample (rather than into 9 subsamples as FFP do), we find a large and significant performance difference between high and low Active Share in the subsample of large cap funds.

[14] For example, FFP report that closet indexers (separately ranking funds within each benchmark, see their Table 3) have an alpha of -0.71% per year (t-statistic of 2.53) when benchmark-adjusting and of -0.88% per year (t-statistic of 3.76) when also using the four-factor Fama-French-Carhart model to estimate the alpha. FFP exclusively focus on the performance difference between high and low Active Share funds, side-stepping the persistent, strong and robust underperformance of low Active Share funds.

risk) and thus end up with a portfolio that only partly reflects her stock picking skills, i.e., with low Active Share. The primary usefulness of Active Share is in distinguishing between active managers who actually implement their strong convictions about individual stocks and managers who only portray themselves as having such strong convictions but whose portfolios do not really reflect these.

Different types of convictions could potentially be associated with outperformance. Here, we consider the length of time that the manager's convictions last. Shleifer and Vishny (1990, 1997) argue that convictions related to long-term mispricing are more subject to limited arbitrage, because trading on long-term mispricing is more expensive and difficult than trading on short-term mispricing. In particular, a manager trading on long-term mispricing faces the possibility that such mispricing may become aggravated in the short term (i.e., that undervalued stocks become even more undervalued), and thus risks being fired or losing assets in the short-term before ex-post successful long-term bets would pay off. Such risks are particularly strong for fund managers with relatively impatient investors. As result, Shleifer and Vishny (1990, 1997) argue that in equilibrium, the more limited arbitrage capital pursuing longer-term mispricing would be expected to be relatively more profitable.

Cremers and Pareek (2016) test this hypothesis using double sorts of mutual funds on Active Share and different proxies for the investment horizon of the manager. Their main proxy is Fund Holding Duration, which measures the length of time that the fund manager has held the stocks in her portfolio over past five years, weighted by assets, based on quarter-end holdings reports.[15] A limitation of Fund Holding Duration is that it misses any roundtrip trades within the quarter, which is picked up by fund turnover, an alternative proxy measuring total trading activity. The main advantage of the Fund Duration over fund turnover is that the latter is not weighted by the actual assets in the portfolio that is turned over. For example, a fund could hold most of its assets for the long-term, but trade relatively frequently with a smaller part of its assets. Such a fund would have a long Fund Holding Duration – which weights the length of time a stock has been in the portfolio by the portfolio weight of the assets invested in the stock – but not low turnover. Cremers and Pareek (2016) show robustness results using fund turnover.

Figure 3 (Online Appendix Figure A.3) shows the percentage of assets (funds) across different Fund Holding Duration groups over time. Fund Holding Durations generally decreased from 1990 to 2000, and then increased. Using fund turnover would generate a similar pattern. This indicates that the substantial increase in stock trading activity over this period has not been due to the mutual funds in our sample (but rather to high frequency traders). On average over our sample, funds in the short (first) Fund Holding Duration quintile have stocks that have on average been

[15] To compute Fund Holding Duration, we only include funds that have at least 2 years of quarterly holdings available, for which we only consider stocks that have at least 2 years of return data available, see Cremers and Pareek (2016).

included in the portfolio for less than 8 months, while funds in the long (fifth) Fund Holding Duration quintile have generally held stocks for at least 2 years.

The correlation between Active Share and Fund Holding Duration equals -16%, such that patient funds tend to have lower Active Share. Averaged across the sample, about 20% of total fund assets are in patient (top quintile of Fund Holding Duration) funds, but only 1.6% of total fund assets are in patient funds that also have a high Active Share. On the other hand, as about 4.9% of assets are in high (i.e., fifth quintile) Active Share funds, about a third of high Active Share fund assets (1.6%/4.9%) are also in patient funds.

Table 2 shows the performance based on the 7-factor model for both an independent double sort of all funds on lagged Active Share and lagged Fund Holding Duration, as well as for the sorts on lagged Fund Holding Duration by itself and lagged Active Share by itself.[16] The single sort on Fund Holding Duration shows that there is only weak evidence that more patient funds perform better than impatient funds, as the difference in abnormal performance of the fifth and first Fund Holding Duration quintile portfolios equals 0.63% per year, with a t-statistic of 1.50.

The independent double sort shows the importance of combining Active Share with Fund Holding Duration. Amongst the patient funds, only those that also have high Active Share outperformed, while the patient funds with low Active Share substantially underperformed. Amongst high Active Share funds, only those funds that also pursued patient strategies outperformed. Out of the 25 portfolios in the double sort, the only portfolio with statistically significant outperformance is the portfolio with high Active Share and long Fund Holding Duration, with an annualized 7-factor alpha of 1.88% with a t-statistic of 2.35.[17] These results underline that among high Active Share managers, strategies based on long-term convictions have been on average the most successful in our sample. This seems broadly consistent with the prediction in Shleifer and Vishny (1990, 1995) that strategies chasing long-term underpricing are relatively more difficult such that they receive relatively little capital which allows them to be more profitable.

Figure 4 shows the cumulative abnormal performance for five out of the 25 portfolios from the double sort, all of them with high Active Share but different Fund Holding Duration quintiles. The outperformance of the high Active Share funds following patient strategies was against strongest in 2000-2001, but also includes two further periods with persistent outperformance, namely 1990-2000 and 2007-2013, together with two periods of underperformance, namely 2002-2006 and 2014-2015. Therefore, the outperformance of the patient high Active Share funds is not mostly due to 2000-2001.

[16] To save space, we only report results for the first and fifth quintiles, with full results in Online Appendix Table A.5.
[17] Online Appendix Table A.6 presents similar results using the four-factor Fama-French-Carhart model, and Online Appendix Table A.7 using the one-factor model using the return on the S&P 500 as the only factor. Results are robust to focusing on large funds only, e.g. through using value-weighted portfolios, see Cremers and Pareek (2016).

2.3 Active Share and Stock Picking Opportunities: Small Caps Versus Large Caps

If Active Share measures the amount of individual stock picking done by the fund manager, we would expect a higher Active Share for managers with better stock picking opportunities. These include managers whose universe consists of stocks with greater information uncertainty or less efficient pricing, or which is simply larger. A basic example of managers with better stock opportunities would be small cap managers as compared to large cap managers. Next, if small cap stocks allow better stock picking opportunities, then we would expect a stronger predictive relationship between Active Share and performance for small cap managers.

Consistent with this, Cohen, Leite, Nelson and Browder (2014) document that small cap funds tend to have considerably higher Active Shares. In contrast, our focus in Cremers and Petajisto (2009) was on fund size rather than fund style, such that our previous article underappreciated the importance of the investment universe. As a simple example, say one randomly chooses 100 small cap stocks from the Russell 2000 and, separately, from 100 large cap stocks from the S&P 500 benchmarks, and overweights all of the chosen stocks relative to the benchmark. In that case, the 100 randomly chosen small cap stocks can be expected to constitute approximately 100/2000 = 5% of the Russell 2000 weights, resulting in about 5% overlap in weights and thus an Active Share of about 95%. For the large cap stocks, the overlap with the benchmark weights would be expected to be about 100/500 = 20%, resulting in an Active Share of about 80%.[18]

We construct a subsample of small cap funds as those with a small cap benchmark such as S&P 600 or Russell 2000. Likewise, we construct a subsample of large cap funds as those with a large cap benchmark such as the S&P 500 and Russell 1000. About 23% of funds are classified as small cap funds and 59% as large cap funds, with the remaining funds typically consisting of mid cap funds or those with a particular industry focus. Over time, small cap funds have become more prevalent, constituting 12% of the funds in our sample in 1990 but 24% in 2000, after which the percentage of small cap funds remains fairly stable around 24%. As small cap funds tend to be smaller in size, the assets across all small cap funds constitute 4% of the total assets in our sample in 1990, 8% in 2000 and 12% in 2015.

This also means that the second of the three main claims in Frazzini, Friedman and Pomorski (2016, henceforth FFP) that "[s]orting funds on active share is equivalent to sorting on benchmark type (page 15)" seems an exaggeration. Even if small cap funds on average have a higher Active Share, this is not universally so, and these funds are also less prevalent and generally have smaller size. For example, the fraction of funds with a small (large) cap benchmark amongst the set of funds with an Active Share above 90% in our dataset equals 24% (49%) of funds in 1990, 54%

[18] This example makes various simplifying assumptions. The universe of large cap managers may include all stocks in the Russell 1000, though as market capitalizations tend to be right-skewed, large cap benchmarks are more concentrated than small cap benchmarks, reducing the effective number of stocks in large cap benchmarks as compared to small cap benchmarks. Further, the liquidity of the stocks in the universe may matter.

(25%) of funds in 2000 and 55% (24%) in 2015. This shows that a considerable proportion of high Active Share funds are not small cap funds and that large cap funds make up a considerable fraction of high Active Share funds (let alone assets). Using the set of funds with at least 75% Active Share, which minimum level of Active Share is mentioned in the introduction in FFP in an example of a request for proposals from a large public pension plan, we find that the fraction of small (large) cap funds in this set equals 6% (82%) in 1990, 22% (55%) in 2000 and 23% (52%) in 2015. As a result, most funds with Active Shares above 75% – which funds can certainly be considered active stock pickers – are large cap funds.

Table 3 provides some descriptive statistics of the subsamples of small cap and large cap funds. Small cap funds have larger Active Share, higher expenses, are smaller, have a higher turnover and shorter Fund Holding Duration than large cap funds. Online Appendix Figure A.5 presents the percentage of assets across Active Share groups for the subset of small cap funds only,[19] showing that while most small cap funds tend to have high Active Share, small cap funds as a group exhibit a significant trend towards lower Active Shares. For example, about 70% of assets in small cap funds in 1990 are in small cap funds with an Active Share above 90%, but only 43% of assets at the end of 2015.

Next, we independently double sort funds into Active Share and Fund Holding Duration quartiles, separately for small cap and large cap funds. We switch from quintile groups to quartile groups here because we have fewer funds after forming these subsamples, especially in the small cap fund subsample. The annualized abnormal returns for the 4x4 = 16 portfolios resulting from this double sort for the small cap fund subsample and using the 7-benchmark factor model are reported in Table 4, and for the large cap fund subsample in Table 5.[20]

There is little evidence that small cap stocks typically underperform, irrespective of Active Share and Fund Holding Duration. Similar to the results in the full sample as shown in Table 2, the main outperformance among small cap funds is due to high Active Share funds that also have long Fund Holding Duration. Specifically, the portfolio of funds where both Active Share and Fund Holding Duration are in the top quartile has an annualized 7-factor alpha of 1.94%, which is statistically significant with a t-statistic of 2.00. In contrast, the portfolio of funds where Active Share is in the top quartile and Fund Holding Duration is in the bottom quartile has an abnormal return of -1.15% per year, which is insignificant with a t-statistic of 0.96.

The main difference for large cap funds is that there is strong underperformance for portfolios of large cap funds with low Active Share and short Fund Holding Duration. As a result, the difference in performance between high and low Active Share funds is significant for both

[19] The analogous figure for large cap funds is shown in the Online Appendix Figure A.4, which is quite similar to Figure 1 for the full sample.

[20] In order to save space, both Table 4 and 5 only show results for the first and fourth quartile portfolios, with the full results in Online Appendix Table A.8 and A.9, respectively. Results using the four-factor Fama-French-Carhart model are given in Online Appendix Table A.10 (A.11) for small (large) cap funds.

the full subsample of large cap funds and for the subsample of only those large cap funds with patient strategies. For the small cap fund subsample, the difference in performance between funds with high and low Active Share is only significant among funds with long Fund Holding Duration. This can largely be explained by Active Shares being generally lower in the large cap subsample and the general positive predictive association between Active Share and performance. Overall, these results seem broadly consistent with our hypothesis that small cap managers have better stock picking opportunities than large cap managers, except for managers pursuing patient strategies, where the difference between small and large cap managers seems small.[21]

3. Conclusion

Active Share measures the percentage of holdings of a fund that is different from the holdings of the fund's benchmark. Having a high Active Share is suggestive of an active stock picker with considerable conviction and opportunity, with the caveat that Active Share only measures the amount of individual stock picking and not the skill with which stocks are picked.

We introduce a new formula for Active Share that emphasizes how Active Share only decreases due to overlapping holdings in the fund and its benchmark. We further show that expense ratios need to be interpreted in light of the fund's Active Share and the cost of investing in the benchmark. To that end, we propose the Active Fee as a measure of the cost of active stock picking, where Active Fee adjusts the expense ratio for the level of Active Share and the cost of investing in the benchmark.

Empirically, we document three results in a large sample of actively managed retail U.S. equity mutual funds over 1990 – 2015. First, low Active Share funds with relatively high expenses – and accordingly with a high Active Fee – underperform strongly, while the level of expenses seems unrelated to performance for high Active Share funds. This indicates that investors in funds with low Active Share should carefully monitor the amount they pay. Second, only active stock pickers with long-term convictions have been successful, while short-term stock pickers generally underperform. Third, small cap funds tend to have higher Active Shares and better performance than large cap funds, which suggests that small cap managers have better stock picking opportunities in general. However, the ability to outperform with patient, high Active Share strategies has been similar for small cap and large cap fund managers.

[21] Online Appendix Figure A.6 presents the cumulative abnormal returns for four portfolios of funds that are in the top Active Share quartile in their respective subsample: with small cap funds with Fund Holding Duration in the first and fourth quartile, and with large cap funds with Fund Holding Duration in the first and fourth quartile. The abnormal return patterns are similar across the large and small cap subsamples, and are also similar to the patterns for the full sample in Figure 4. Patient managers with high Active Share have on average been able to outperform in the first half of our sample, 1990 – 2003, and have had more mixed on average in 2004 – 2015, though without significant periods of underperformance. In contrast, impatient managers with high Active Share on average underperformed after 1995, with the exception of 2000 – 2001.

We conclude that Active Share matters for investors in three ways. First, Active Share allows one to distinguish between funds that do and do not engage in a lot of stock picking. Second, by avoiding low Active Share funds that are not cheap, investors would have been more likely to avoid underperforming funds, which is likely to remain the case in the future. Third, Active Share may be helpful to select actively managed funds in a positive sense as well. We find no evidence that high Active Share funds have underperformed on average in the long-term, suggesting that investors interested in individual stock pickers could use high Active Share as a starting point for fund selection, but with no ex-ante expectation that the typical high Active Share fund is going to either underperform or outperform. Sustained long-term outperformance relies on frictions that limit the amount of arbitrage capital pursuing attractive investment opportunities. Therefore, high Active Share managers can be expected to be most successful if they also follow strategies that are more difficult to implement – such as patient strategies requiring a higher level of investor trust and manager conviction.

References

Cohen, Tim, Brian Leite, Darby Nelson and Andy Browder, 2014, "Active Share: A Misunderstood Measure in Manager Selection," *Fidelity Leadership Series Investment Insights*, February

Cremers, Martijn, and Quinn Curtis, 2016, "Do Mutual Fund Investors Get What They Pay For? The Legal Consequences of Closet Index Funds", *Virginia Law & Business Review* 11(1), 31-93

Cremers, Martijn, Miguel Ferreira, Pedro Matos, and Laura Starks, 2016, Indexing and Active Fund Management: International Evidence, *Journal of Financial Economics* 120(3), pp. 539-560

Cremers, Martijn and Antti Petajisto, 2009, "How Active Is Your Fund Manager? A New Measure that Predicts Performance," *Review of Financial Studies*, 22 (9), pp. 3329-3365

Cremers, Martijn, Antti Petajisto, and Eric Zitzewitz, 2013, "Should Benchmark Indices Have Alpha? Revisiting Performance Evaluation," *Critical Finance Review*, 2, pp. 1-48

Cremers, Martijn, and Ankur Pareek, 2016, "Patient Capital Outperformance: The Investment Skill of High Active Share Managers Who Trade Infrequently," *Journal of Financial Economics* 122, 288-306

Doshi, Hitesh, Redouane Elkamhi and Mikhail Simutin, 2015, "Managerial Activeness and Mutual Fund Performance," *Review of Asset Pricing Studies*, 5(2), pp. 156-184.

Frazzini, Andrea, Jacques Friedman and Lukasz Pomorski, 2016, "Deactivating Active Share", *Financial Analyst Journal,* Mar/April, 72(2), pp. 14-21

Jiang, Hao, Marno Verbeek and Yu Wang, 2014, "Information Content When Mutual Funds Deviate from Benchmarks", *Management Science*, 60(8), pp. 2038-2053

Kacperczyk, Marcin, Clemens Sialm, and Lu Zheng, 2005, "On the Industry Concentration of Actively Managed Equity Mutual Funds", *Journal of Finance*, 60, pp. 1983-2011

Kekes, John, 1983, "Wisdom," *American Philosophical Quarterly*, 20(3), pp. 277–286

Nozick, Robert, 1989, "What is Wisdom and Why Do Philosophers Love it So?" in *The Examined Life*, New York: Touchstone Press, pp. 267–278

Petajisto, Antti, 2013, "Active Share and Mutual Fund Performance," *Financial Analyst Journal*, 69(4), pp. 73-93

Petajisto, Antti, 2016, "Author Response to 'Deactivating Active Share'", *Financial Analyst Journal*, 72(4), pp. 11-12

Ryan, Sharon, 2014, "Wisdom", *The Stanford Encyclopedia of Philosophy* (Winter 2014 Edition), Edward N. Zalta (ed.), http://plato.stanford.edu/archives/win2014/entries/wisdom/

Schlanger, Todd, Christopher B. Philips, and Karin Peterson LaBarge, 2012, “The Search for Outperformance: Evaluating ‘Active Share’”, Vanguard (May)

Sensoy, Berk, 2009, “Performance evaluation and self-designated benchmark indexes in the mutual fund industry”, *Journal of Financial Economics*, 92, pp. 25–39

Shleifer, Andrei, and Robert Vishny, 1990, “Equilibrium short horizons of investors and firms”, *American Economic Review Papers and Proceedings*, 80, pp. 148–153

Shleifer, Andrei, and Robert Vishny, 1997, “The limits of arbitrage”, *Journal of Finance*, 52, pp. 35–55

Figure 1. Percentage of U.S. Equity Mutual Fund Assets by Active Share

The figure plots the percentage of U.S.-equity retail mutual fund assets in our sample by Active Share group, over the period 1990-2015. The sample includes U.S. retail mutual funds with at least $10 million under management. We distinguish these Active Share groups: below 60%, between 60% and 70%, between 70% and 80%, between 80% and 90%, and above 90% Active Share.

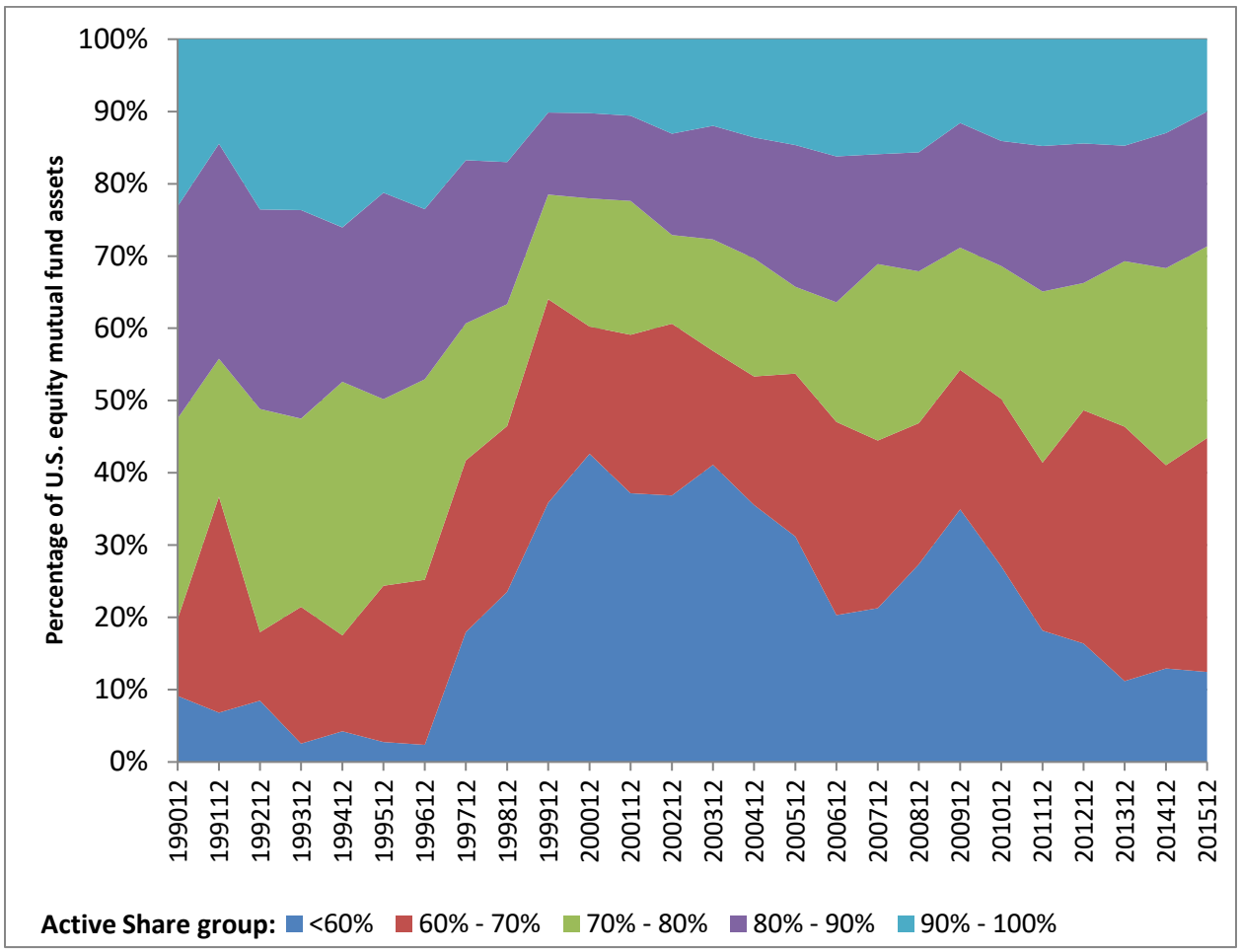

Figure 2. Cumulative Abnormal Net Returns of Active Share Quintile Portfolios

This figure presents the cumulative abnormal net performance of the five Active Share quintile portfolios, applying their abnormal returns to a fictitious $1 investment at the start of 1990 until the end of 2015. We use the 7-factor benchmark model to estimate abnormal returns. These cumulative abnormal returns are estimated ex-post over the full period. The sample includes U.S. retail mutual funds with at least $10 million under management. 'Q1' refers to the performance of the first (low) Active Share quintile portfolio, and 'Q5' refers to the performance of the fifth (high) Active Share quintile portfolio.

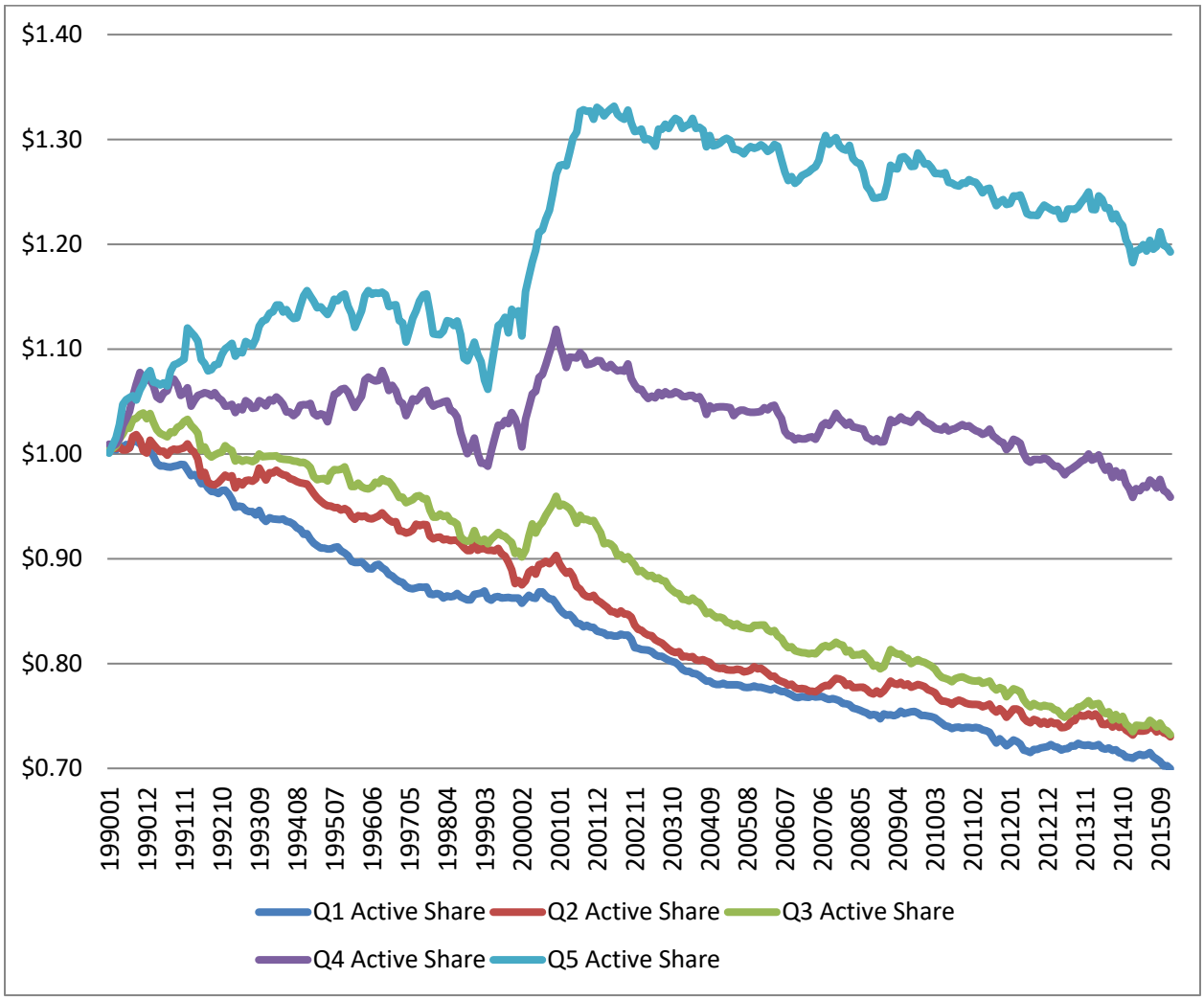

Figure 3. Percentage of U.S. Equity Mutual Fund Assets by Fund Holding Duration

The figure plots the percentage of U.S.-equity retail mutual fund assets in our sample by Fund Holding Duration group, over the period 1990-2015. Fund Holding Duration measures the average length of time the stocks have been in the portfolio, weighted by the size of the investment. The sample includes U.S. retail mutual funds with at least $10 million under management. We distinguish these Fund Holding Duration groups: less than 6 months, between 6 months and 1 year, between 1 and 2 years, between 2 and 3 years, and longer than 3 years.

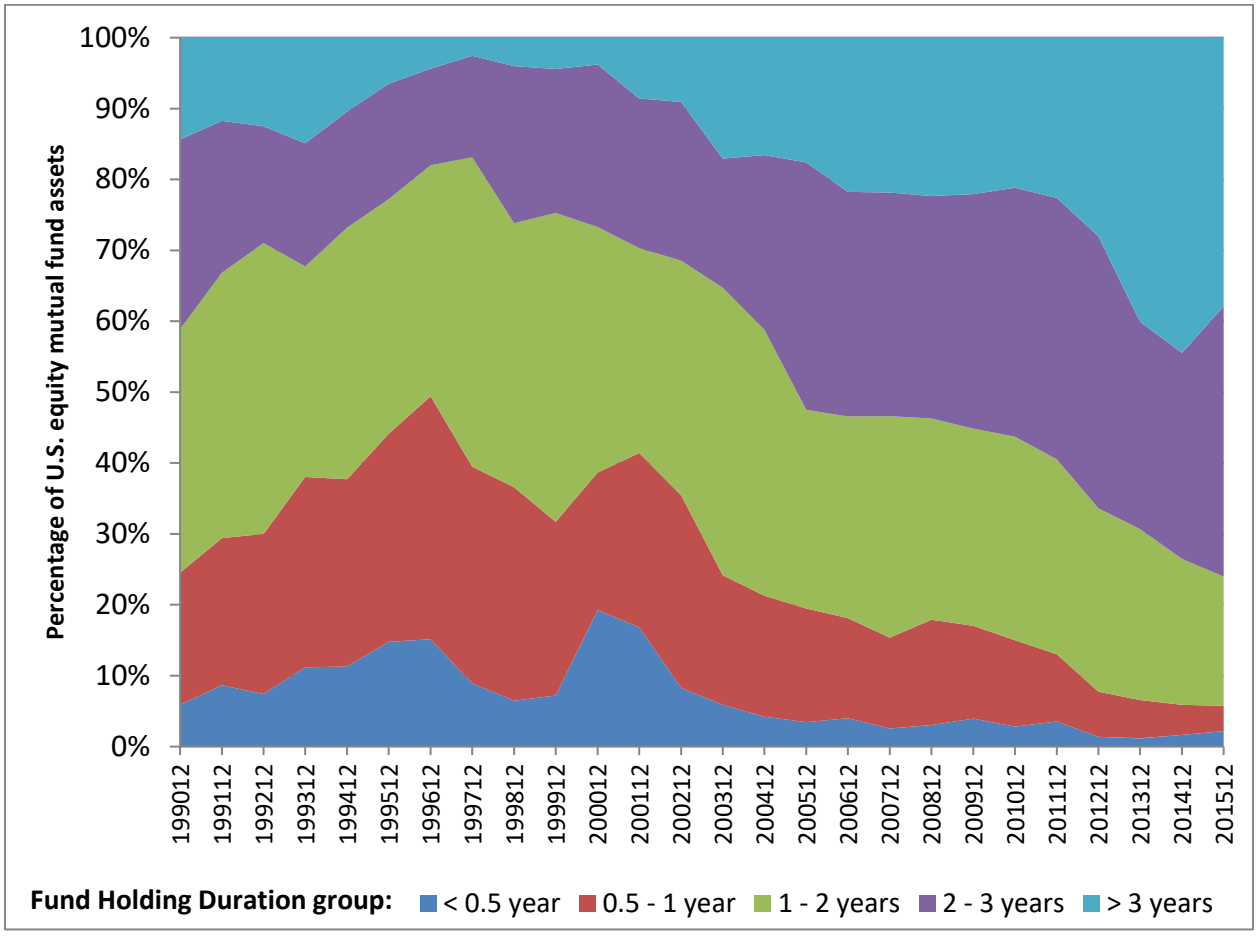

Figure 4. Cumulative Abnormal Net Returns of High Active Share Quintile Portfolios Conditional on Fund Holding Duration

This figure presents the cumulative abnormal net performance of five portfolios, all of which contain high Active Share funds (i.e., in the top quintile of Active Share), conditional on also being in one of the five Fund Holding Duration quintile portfolios. We apply the abnormal returns of these portfolios to a fictitious $1 investment at the start of 1990 until the end of 2015. We use the 7-factor benchmark model to estimate abnormal net returns. These cumulative abnormal net returns are estimated ex-post over the full period. 'Q5 AS – Q1 Fund Holding Duration' refers to the performance of the portfolio with funds with high Active Share (AS) that are also in the short (first) Fund Holding Duration quintile portfolio, and 'Q5 AS – Q5 Fund Holding Duration' refers to the performance of the portfolio with funds with high Active Share (AS) that are also in the long (fifth) Fund Holding Duration quintile portfolio.

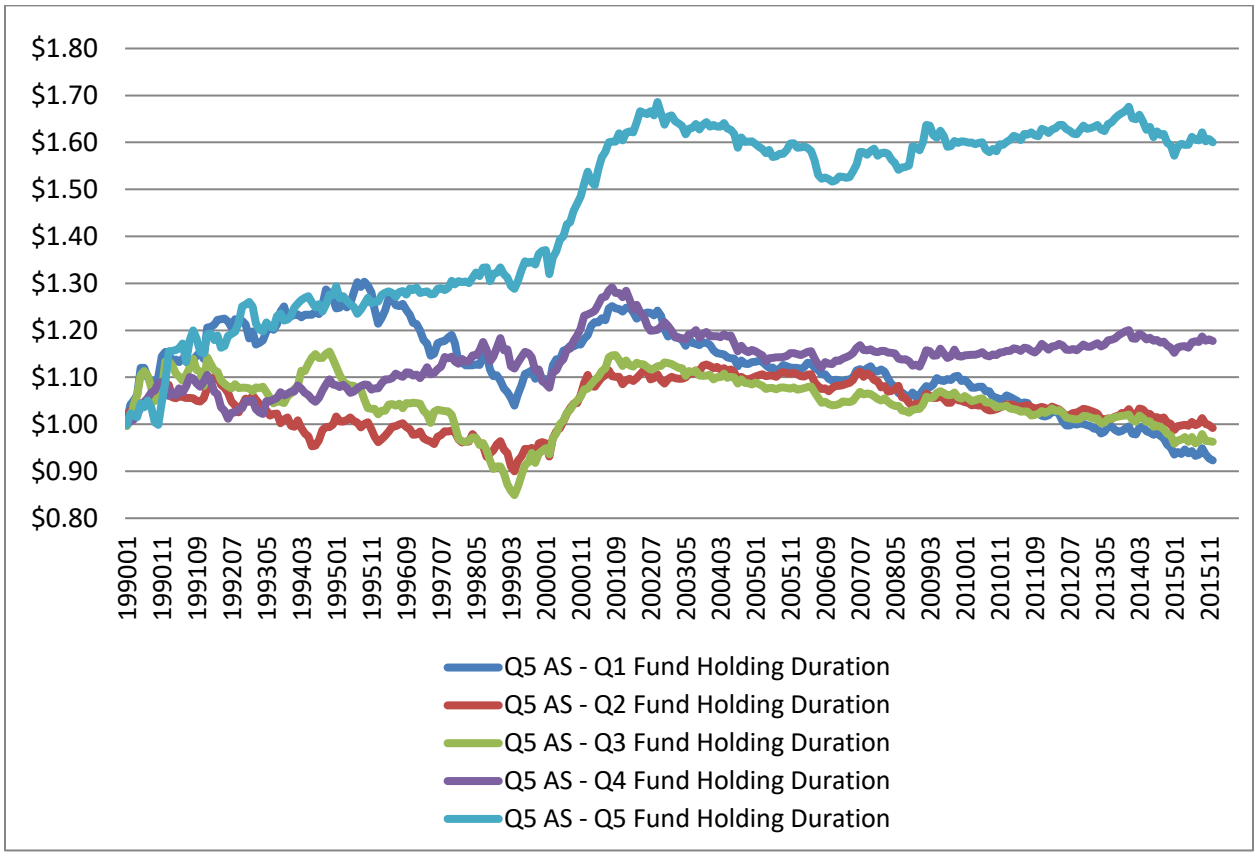

Table 1. Expense Ratio, Active Share, and Mutual Fund Performance

The table reports the annualized 7-factor net alphas (in percentage) of the various quintile, equally-weighted portfolios (in both single sorts as well as independent double sorts on lagged expense ratio and lagged Active Share). The sample includes U.S. retail mutual funds with at least $10 million under management, and covers 1990 – 2015. The t-statistics are given below the annualized net alpha between parentheses. '5-1' indicates a long-short portfolio which buys the fifth quintile portfolio and sells the first quintile portfolio.

Expense Ratio		**Active Share Quintile**					
Quintile	Uncond.	**1**	**2**	**3**	**4**	**5**	**5-1**
Uncond.		-1.37	-1.20	-1.19	-0.14	0.71	2.08
		(7.06)	(4.21)	(3.69)	(0.33)	(1.37)	(4.19)
1	-0.38	-0.76	-0.61	-0.54	0.59	0.91	1.67
	(1.63)	(4.05)	(1.99)	(1.20)	(0.99)	(1.29)	(2.36)
2	-0.61	-1.60	-0.90	-0.82	0.41	1.04	2.64
	(1.91)	(6.47)	(2.63)	(2.15)	(0.70)	(1.52)	(4.08)
3	-0.99	-1.72	-1.52	-1.50	-0.97	-0.23	1.48
	(2.97)	(5.95)	(3.56)	(4.01)	(4.76)	(0.34)	(2.15)
4	-0.49	-1.45	-1.54	-1.39	-0.10	0.78	2.23
	(1.48)	(5.28)	(4.76)	(2.89)	(0.22)	(1.49)	(4.08)
5	-0.71	-2.29	-1.76	-1.62	-0.07	0.86	3.16
	(1.96)	(6.01)	(4.07)	(4.08)	(0.12)	(1.36)	(4.60)
5-1	-0.32	-1.54	-1.15	-1.09	-0.66	-0.05	
	(1.25)	(4.36)	(2.85)	(2.38)	(1.11)	(0.07)	

Table 2. Fund Holding Duration, Active Share, and Mutual Fund Performance

The table reports the annualized 7-factor net alphas (in percentage) of the first and fifth quintile, equally-weighted portfolios (in both single sorts as well as independent double sorts on lagged Fund Holding Duration and lagged Active Share). Fund Holding Duration is the average length of time the stocks have been in the manager's portfolio over the last 5 years, averaged by the portfolio weight invested in the stock. The sample includes U.S. retail mutual funds with at least $10 million under management, and covers 1990 – 2015. The t-statistics are given below the annualized net alpha between parentheses. '5-1' indicates a long-short portfolio which buys the fifth quintile portfolio and sells the first quintile portfolio.

Fund Holding	**Active Share Quintile**			
Duration Quintile	Uncond.	**1**	**5**	**5-1**
Uncond.		-1.24	0.42	1.67
		(5.42)	(0.80)	(3.27)
1	-0.81	-0.85	-0.23	0.62
	(2.00)	(1.63)	(0.30)	(0.68)
5	-0.18	-1.22	1.88	3.11
	(0.57)	(4.81)	(2.35)	(3.73)
5-1	0.63	-0.37	2.12	
	(1.50)	(0.65)	(2.43)	

Table 3. Descriptive Statistics of Small Cap Funds and Large Cap Funds

The table reports summary statistics of the subsample of funds with a small cap benchmark in Panel A and of funds with a large cap benchmark in Panel B. Active Share is the percentage of equity holdings that differs from the benchmark, expense ratio is not adjusted for loads and is annual, TNA is the fund's total net assets in millions, turnover is the fund's turnover ratio over the year, the Fund Holding Duration is in years.

Panel A. Subsample of small cap funds

Variable	# of observ.	Mean	Std. Dev.	Min	Max
Active Share	6,810	89%	11%	20%	100%
Expense Ratio	6,668	1.33%	0.41%	0.003%	8.89%
TNA (million)	6,810	$595	$1,395	$10	$45,783
Turnover	6,524	89%	77%	0%	925%
Fund Holding Duration (years)	6,810	1.21	0.81	0.00	4.33

Panel B. Subsample of large cap funds

Variable	# of observ.	Mean	Std. Dev.	Min	Max
Active Share	17,031	72%	15%	20%	100%
Expense Ratio	16,598	1.17%	0.43%	0.001%	5.17%
TNA (million)	17,031	$1,664	$6,363	$10	$169,121
Turnover	15,985	78%	128%	0%	5734%
Fund Holding Duration (years)	17,031	1.53	0.93	0.00	4.73

Table 4. Fund Holding Duration, Active Share, and Performance for Small Cap Funds

The table reports the annualized 7-factor net alphas (in percentage) of the first and fourth quartile, equally-weighted portfolios (in both single sorts as well as independent double sorts on lagged Fund Holding Duration and lagged Active Share). Fund Holding Duration is the average length of time the stocks have been in the manager's portfolio over the last 5 years, averaged by the portfolio weight invested in the stock. The sample includes only U.S. retail mutual funds with at least $10 million under management that have a small cap benchmark, and covers 1990 – 2015. The t-statistics are given below the annualized net alpha between parentheses. '4-1' indicates a long-short portfolio which buys the fourth quartile portfolio and sells the first quartile portfolio.

		Active Share Quartile		
Fund Holding Duration Quartile	Uncond.	**1**	**4**	**4-1**
Uncond.		-0.10	0.92	1.02
		(0.16)	(1.20)	(1.21)
1	-0.57	0.10	-1.15	-2.08
	(0.80)	(0.11)	(0.96)	(1.25)
4	0.85	-0.04	1.94	2.04
	(1.55)	(0.06)	(2.00)	(1.71)
4-1	1.42	-0.95	3.10	
	(1.84)	(0.68)	(2.14)	

Table 5. Fund Holding Duration, Active Share, and Performance for Large Cap Funds

The table reports the annualized 7-factor net alphas (in percentage) of the first and fourth quartile, equally-weighted portfolios (in both single sorts as well as independent double sorts on lagged Fund Holding Duration and lagged Active Share). Fund Holding Duration is the average length of time the stocks have been in the manager's portfolio over the last 5 years, averaged by the portfolio weight invested in the stock. The sample includes only U.S. retail mutual funds with at least $10 million under management that have a large cap benchmark, and covers 1990 – 2015. The t-statistics are given below the annualized net alpha between parentheses. '4-1' indicates a long-short portfolio which buys the fourth quartile portfolio and sells the first quartile portfolio.

		Active Share Quartile		
Fund Holding Duration Quartile	Uncond.	**1**	**4**	**4-1**
Uncond.		-1.40	-0.02	1.38
		(6.79)	(0.04)	(2.48)
1	-1.20	-1.28	-0.50	0.77
	(2.75)	(3.35)	(0.70)	(1.11)
4	-0.55	-1.51	1.37	2.88
	(1.99)	(5.73)	(1.98)	(3.67)
4-1	0.66	-0.23	1.87	
	(1.66)	(0.49)	(2.48)	