Patient Capital Outperformance:

The Investment Skill of High Active Share Managers Who Trade Infrequently

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Among high Active Share portfolios – whose holdings differ substantially from their benchmark – only those with patient investment strategies (with holding durations of over two years) on average outperform, over 2% per year. Funds trading frequently generally underperform, including those with high Active Share. Among patient funds, separating closet index from high Active Share funds matters, as low Active Share funds on average underperform even with patient strategies. Our results suggest that U.S. equity markets provide opportunities for longer-term active managers, perhaps because of the limited arbitrage capital devoted to patient and active investment strategies.

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Introduction

Which, if any, actively managed portfolios can outperform passive benchmarks? The previous literature has documented that, on average, the long-term net performance of actively managed mutual funds is similar to or slightly below the performance of their benchmark. However, some papers argue that some smaller subset of actively managed mutual funds – that is identifiable *ex ante* – is able to consistently outperform, on average, over fairly long periods of time (see, e.g., Cohen, Coval, and Pastor, 2005; Kacperczyk, Sialm, and Zheng, 2005; Mamaysky, Spiegel, and Zhang, 2008; Kacperczyk and Seru, 2007; Cremers and Petajisto, 2009). One common thread in these papers is that the outperforming funds tend to have substantially different holdings than the benchmark, which is considered particularly by Kacperczyk, Sialm, and Zheng (2005), and Cremers and Petajisto (2009). Both find that only mutual funds whose holdings are most different from their benchmarks tend to outperform their benchmarks net of fees.[1]

In this paper, we further examine the source of this apparent investment skill by the most active managers, focusing on how fund outperformance is related to fund holding durations or how frequently the fund manager trades. *Ex-ante*, it is not clear whether funds would generally be more successful through holding stocks for long periods or through frequently changing the portfolio. On the one hand, if markets are fairly information-efficient, then any information that a fund manager is trading on will be quickly incorporated in the market. In that case, managers may need to frequently trade in order to benefit from their temporary superior information.[2]

On the other hand, fund managers may be able to spot market mispricing that is only reversed over longer periods. This requires conviction and patience on the part of the manager, as stock prices

[1] Kacperczyk, Sialm, and Zheng (2005) consider only industry bets using the Industry Concentration Index, and Cremers and Petajisto (2009) consider all stock positions using Active Share, i.e., the proportion of fund holdings that is different from the benchmark.

[2] Frequent trading could also be due to behavioral biases, though the association between e.g. overconfidence and trading frequency does not seem clear *ex-ante*. Overconfidence could lead to either too frequent trading on private information if private signals occur frequently, or to too slowly updating after public information contradicts the private information, or to both (Daniel, Hirshleifer, and Subrahmanyam, 1998).

may initially move adversely before any mispricing is reversed. Similarly, it requires that investors are fairly patient in giving the manager time to stick with the strategy, rather than evaluate the performance after relatively brief periods of time. Patient investing may also benefit from opportunities to buy relatively illiquid or deep-value stocks on the cheap (see Amihud, Mendelson, and Pedersen, 2005).

Further, both short-term and long-term opportunities may co-exist, if different managers have diverse skills set, convictions and opportunities, each focusing on where they have the strongest advantage. Whether some managers are able to benefit from their short-term trades that could potentially exploit temporary mispricing or short-term liquidity provision opportunities (see Da, Gao, and Jagannathan, 2011), and whether other managers can exploit long-term undervaluation or benefit from an illiquidity premium are thus separate but related empirical questions.

Theoretically, any evidence on predictable fund outperformance needs to be reconciled with the ability of investors to move their assets into and out of funds, and thus needs to be explained by market frictions. Specifically, we would expect any outperformance predictability to be stronger for investment strategies where frictions are greater or taking advantage of mispricing is harder. Patient strategies may be especially conducive to market frictions such as asymmetric information and related agency costs from the separation between fund managers and investors (see, e.g., Gorton, He, and Huang, 2010, for an asset-pricing perspective and Gilson and Gordon, 2013, for a corporate governance viewpoint). In particular, the literature on limited arbitrage (see, e.g., Shleifer and Vishny, 1990, 1997) has argued that trading on long-term mispricing is more expensive and difficult, especially if the fund manager risks being fired in the short-term before *ex-post* successful long-term bets pay off. In equilibrium, that could allow relatively more long-term mispricing and thus greater profitability for the more limited arbitrage capital that is pursuing patient active strategies.

The extant empirical literature is mixed and has not documented a strong link between fund holding durations (or trading frequency) and subsequent fund outperformance.[3] The reason why we are able to find a stronger association is that we distinguish between actively managed funds and those whose holdings are fairly similar to the benchmarks, i.e., that we separate funds with low versus high Active Share. In particular, among funds with long holding durations, most assets tend to be in (closet) index funds with few active bets, such that managers with high Active Share who patiently await the outcome of their long-term bets are relatively rare.

Our basic set-up is straightforward. We consider both a large sample of actively managed all-equity U.S. retail mutual funds from the Center for Research in Security Prices (CRSP) survivorship-bias-free mutual fund database, and the sample of all aggregated institutional investor equity portfolios as inferred from their quarterly 13F statements. For each sample, we perform 5x5 independent double sorts into holding duration (or turnover) quintiles and into Active Share quintiles, and compare the performance along both dimensions. For robustness, we also consider multivariate performance regressions. For our sample of mutual funds, we consider the future performance over the 24-year period from 1990 – 2013, and evaluate the performance of both the net returns to investors after all trading costs and fees (except loads) and of their holdings-based 'gross' returns. For our sample of aggregate institutional portfolios, we analyze the longer period of 1984 – 2012, but can only consider holdings-based 'gross' returns of their long positions as we do not observe their actual after-fee net returns or their short positions. We evaluate the net mutual fund performance using factor models, employing a five-factor model with market, size, value, momentum and liquidity factors as our default model and an index-based seven-factor model for robustness. We also evaluate the gross holdings-

[3] Elton et al. (1993) and Carhart (1997) find that mutual funds with higher turnover perform worse but do not show that mutual funds with lower turnover on average actually outperform with positive alpha; Wermers (2000) and Edelen, Evans, and Kadlec (2007) find no significant association; Dahlquist, Engström, and Söderlind (2000) and Chen, Jagadeesh, and Wermers (2000) find that funds with higher turnover outperform funds with lower turnover.

based returns by controlling for size, book-to-market and momentum (past-return) characteristics according to Daniel et al. (1997).

We employ three proxies for how long funds hold stocks in their portfolios. The first, Fund Duration, was introduced in Cremers and Pareek (2015), and Cremers, Pareek, and Sautner (2014), is based on quarter-end holdings and measures the weighted-average length of time that the fund has held equities in the portfolio over the last five years (weighted by the size of each stock position). The second proxy is Fund Holdings Turnover as in Gaspar, Massa, and Matos (2005), and is based on previous changes in quarter-end holdings. The third proxy is the self-declared Fund Turnover Ratio, i.e., the ratio of all dollar sales (or buys) in the previous year over the average total net fund assets, which is only available for the mutual fund sample but has the advantage of also capturing round-trip trades within the quarter (which the measures based on quarterly holdings cannot incorporate).

We document that, among high Active Share funds, only patient funds with long holding durations have been able to outperform as a group in the period following portfolio construction.[4] The long-term outperformance of the high Active Share and patient funds is economically noteworthy. For example, the equally-weighted portfolio of mutual funds where both the Active Share and the Fund Duration are in the top quintile has five-factor net alpha of 2.05% per year (t-statistic of 1.95).[5]

In contrast, we find no evidence that even the most active (i.e., in the top Active Share quintile) mutual funds with short durations or frequent trading were able to outperform their benchmarks on

[4] The median Active Share of mutual funds equals 79% in our sample. Funds in the bottom Active Share quintile generally have an Active Share below 60% and can thus be considered 'closet index funds.' Funds in the top Active Share quintile portfolio have an Active Share of at least 90%, and are thus quite distinct from their benchmarks. The median holding duration is our mutual fund sample equals 14 months, while mutual funds in the bottom Fund Duration quintile portfolio hold stocks generally for less than 7 months and those in the top Fund Duration quintile for more than 24 months. The cross-section of Fund Durations has been fairly stable over time.

[5] The analogous value-weighted portfolio generates a five-factor net alpha of 2.23% per year (t-statistic of 2.27), showing that fund size is not driving this result. These results use net fund returns, but are robust to benchmark-adjusting net returns as in Cremers and Petajisto (2009). For example, to using benchmark-adjusted net fund returns, the equally-weighted (value-weighted) portfolio of mutual funds where both the Active Share and the Fund Duration are in the top quintile has a five-factor alpha of 3.57% (2.97%) per year with a t-statistic of 2.44 (1.80).

average. Rather, frequently trading mutual funds systematically underperform their benchmarks, regardless of how different their holdings are relative to their benchmark. For example, the equally-weighted portfolio of mutual funds with short Fund Duration (first quintile) underperformed with a five-factor abnormal net return of -1.44% per year (t-statistic of 2.09), while the analogous value-weighted portfolio had a five-factor alpha of -2.32% per year (t-statistic of 3.00). This underperformance of short duration funds is similar across Active Share quintiles and is robust to using fund turnover as a proxy.

Holding stocks for a relatively long period is in itself not associated with better performance, showing that it is important to distinguish funds by their Active Share. For example and using equal-weighting, the long-short portfolio that buys funds with high Active Share and long Fund Duration and sells funds with low Active Share and long Fund Duration has an annualized alpha of 3.04% (t-statistic of 2.69), while the analogous long-short high-low Active Share portfolio among short Fund Duration portfolios has an alpha of -0.60% per year (t-statistic of 0.58).[6]

We explore the managerial skill of the high Active Share and patient fund managers by examining their exposure to seven factors suggested by the existing literature: market, size, book-to-market, momentum, systematic liquidity, low versus high beta and earnings quality. For the last two factors, we use the recently proposed 'Betting against Beta (BaB)' factor (long-short portfolio in low-high beta stocks, see Frazzini and Pedersen, 2014) and 'Quality minus Junk (QmJ)' factor (long profitable, growing, less uncertainty, higher payout stocks and short the opposite, see Asness, Frazzini, and Pedersen, 2013), respectively. These latter two factors (with the QmJ factor being most relevant) can explain the outperformance of the patient and high Active Share managers of both mutual funds and the institutional portfolios.

In conclusion, our results indicate that Active Share and Fund Duration are both important dimensions of active management that strongly interact in predicting outperformance of the stocks held

[6] As it is not possible to short mutual funds, our use of long-short portfolios here and elsewhere is not meant to mimic an implementable investment strategy but is used to compare performance across mutual fund portfolios.

in both mutual funds and aggregate institutional portfolios. Our results underscore the importance of distinguishing between truly active and closet index funds, and, among truly active funds, between managers pursuing short-term mispricing (generally unsuccessfully in our sample) and managers who patiently (and in our sample on average successfully) follow a buy-and-hold strategy with a distinct portfolio.

Economically, the outperformance of high Active Share and patient managers indicates that longer-term active managers seem able to exploit stock-picking opportunities. This seems consistent with the theory in e.g. Shleifer and Vishny (1990, 1997) that arbitrage trading on long-term mispricing is more difficult and thus in equilibrium more rewarding. As we document that the percentage of assets with high Active Share and long holding periods is limited, such limited long-term arbitrage capital may allow those relatively few active fund managers able and willing to take advantage of long-term mispricing to be more profitable.

2. Data, methodology and descriptive statistics

2.1. Data and methodology

We consider two different samples of funds. The first sample includes actively managed all-equity U.S. retail mutual funds from the CRSP survivorship-bias-free mutual fund database, and the second sample consists of all aggregate institutional investor portfolios from their quarterly 13F statements.

From the CRSP survivorship-bias-free mutual fund database that includes 'dead', merged and delisted funds, we use the net fund returns (after fees, trading costs, other expenses including brokerage commissions, but before taking out any rear or front-end loads), total net assets (TNA) under management, the annual turnover ratio and the annual expense ratio. For funds with multiple share classes, we sum the total net assets in each share class to arrive at the total net assets in the fund. For the expense ratio, turnover, and the percentage of stocks in the portfolio, we average these across share classes weighting by the value of the assets.

We focus on actively managed funds investing almost exclusively in U.S. equities. As a result, we use the following sample selection criteria. First, we require the Lipper Prospectus objective code, the Strategic Insight objective code, and the Weisenberger Objective code in CRSP to indicate that the firm is pursuing an active U.S. equity strategy that is not focusing on one or more particular industries or sectors.[7] Second, we exclude index funds and ETFs as indicated by CRSP. Third, we verify that the fund is primarily focusing on U.S. equities by requiring the percentage of stocks in the portfolio as reported by CRSP to be at least 80% or missing. For funds where this variable is missing, we calculate the value of the stock holdings from the Thomson holdings database and require that the value of U.S. common shares is at least 80% of the fund TNA. Fourth and finally, we require each fund to have at least $10 million under management, which also serves to mitigate any incubation or reporting bias. 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.

The institutional investor holdings data in this study comes from the Thomson Financial CDA/Spectrum database of SEC 13F filings. All institutional investors with greater than $100 million of securities under management are required to report their holdings to the SEC on form 13F. Holdings are reported quarterly; all common stock positions greater than 10,000 shares or $200,000 must be disclosed starting in 1980. We obtain the institutional investor classification data from Brian Bushee's website to identify different types of institutions: banks (equities held in bank trust departments), insurance companies, investment companies (including mutual funds for retail and institutional clients), independent investment advisors (which includes hedge funds), pension funds and other institutions (mostly endowments).

[7] Specifically, we require the Lipper Prospectus objective code to be equal to EI, EIEI, ELCC, G, GI, LCCE, LCGE, LCVE, LSE, MC, MCCE, MCGE, MCVE, MLCE, MLGE, MLVE, MR, S, SCCE, SCGE, SCVE, SESE, SG or missing; we require the Strategic Insight objective code to be equal to AGG, GMC, GRI, GRO, ING, SCG or missing; we require the Weisenberger objective code to be equal to GCI, IEQ, IFL, LTG, MCG, SCG, G, G-I, G-I-S, G-S, G-S-I, GS, I, I-G, I-G-S, I-S, I-S–G, S, S-G-I, S-I, S-I-G or missing; and we require the CDA/Spectrum code to be equal to 2, 3 ,4 or missing. We finally require at least one of these four codes to be non-missing.

Stock returns data are obtained from monthly stock data files from the Center for Research in Securities Prices (CRSP), and accounting data are from COMPUSTAT. To calculate tracking error, we use daily mutual fund returns from Standard & Poor and the Wall Street Web until September 1998, and afterwards from the CRSP daily mutual fund returns database. The same data sources were used in Cremers and Petajisto (2009) to calculate mutual fund tracking errors, and see that paper for details. The fund tracking error is the standard deviation of the difference between the daily fund return and the daily benchmark return over the past 12 months.

We use mutual fund self-declared benchmarks wherever available. The source of the self-declared benchmarks is Morningstar Direct, which we merge to our other data by fund ticker and/or cusip. As Morningstar Direct makes available only the current self-declared benchmark and these benchmarks could change over time for a particular fund, we use historical Morningstar Direct data obtained in 2009, 2011 and 2013, and assume that the self-declared benchmarks in 2009 were applicable also before that year. If the self-declared benchmark is not available, we assign a benchmark ourselves based on the benchmark index that has the closest fit in terms of holdings (i.e., has the lowest Active Share across all benchmarks considered). The main advantage of this is that if we assign an incorrect benchmark in case the self-declared benchmark is not available, then that only happens because the fund's holdings actually resemble that benchmark's holdings more than the holdings of any other benchmark.

We verify that our results are robust to not using the self-declared benchmarks at all but only using the 'minimum Active Share benchmarks' that we assign ourselves based on the most current holdings. This also verifies that our results are robust to significant benchmark manipulation as documented in Sensoy (2009), where funds may choose a self-declared benchmark that may be easier to beat given their actual core strategy. Such manipulation could lead to positive alphas for funds with

high Active Share that are not due to skill but to improper benchmarking, and may be more prevalent for funds that trade less.[8]

The set of benchmarks includes all self-declared benchmarks chosen by funds in our sample as available in our Morningstar Direct data. The benchmarks are from these benchmark families: (1) Calvert Social (one benchmark), Dow Jones (six benchmarks, including the DJ Industrial Average, the DJ US Select Dividend, the DJ Wilshire 4500 and the DJ Wilshire 5000 benchmarks), FTSE (four benchmarks, including the FTSE High Dividend Yield, FTSE RAFI US 100 and Mid Small 1500 benchmarks), Mergent (one benchmark), MSCI (15 benchmarks, including small, mid and large cap benchmarks plus their value and growth components), NASDAQ (two benchmarks, namely the NASDAQ 100 and the NASDAQ Composite benchmarks), Russell (13 benchmarks, including small, mid and large cap benchmarks plus their value and growth components), Standard & Poors (14 benchmarks, including small, mid and large cap benchmarks plus their value and growth components), and Schwab (two benchmarks, including the Schwab 1000 and Schwab Small Cap benchmarks), for a total of 58 benchmarks. We verify that our results are robust to using a smaller set of 19 benchmarks as used in Cremers and Petajisto (2009), who only include benchmarks from the Russell, S&P and Wilshire families.

For the benchmark holdings for the Russell and S&P benchmark, we have the official benchmark constituent weights, from Russell and from Compustat for S&P. For all other benchmarks, we approximate the benchmark constituent weights by using the weights in passive ETFs and passive mutual funds with the same benchmarks, averaged over all available passive funds with complete holdings information in Thomson or CRSP, analogous to the methodology in Cremers, Ferreira, Matos, and Starks (2014). Daily and monthly benchmark returns are from Bloomberg.

[8] We thank the referee for pointing out this possibility.

Active Share measures the proportion of the fund's holdings (considering only U.S. equity positions) that is different from the holdings of the fund's benchmark at a particular point in time. It is calculated as follows:

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

where $w_{fund,i}$ is the weight of stock *i* in the fund and $w_{benchmark,i}$ is the weight of stock *i* in the benchmark, summed up across all stocks in either the fund or the benchmark. A fund with no overlapping holdings in the benchmarks has an Active Share of 100%, and a fund with holdings that are identical to the benchmark holdings has an Active Share of 0%.

Fund Duration, introduced in Cremers and Pareek (2015), is calculated as follows. We first calculate the duration of ownership of each stock in every fund by calculating a weighted measure of buys and sells by a fund over a certain period, weighted by the length of time the stock was held. For each stock in a given fund, the holding duration measure is calculated by looking back to determine how long that particular stock has been held continuously in that fund's portfolio. We calculate the duration for stock *i* that is included in the fund portfolio *j* at time (in quarters) *T-1*, for all stocks *i = 1 … I* and all institutional investors *j = 1 … J*, by using the following equation:

$$Duration_{i,j,T-1} = d_{i,j,T-1} = \sum_{t=T-W}^{T-1}\left(\frac{(T-t-1)\alpha_{i,j,t}}{H_{i,j}+B_{i,j}}\right) + \frac{(W-1)H_{i,j}}{H_{i,j}+B_{i,j}}, \quad (2)$$

where

$B_{i,j}$ = total percentage of shares of stock *i* bought by fund *j* between *t = T-W* and *t = T-1*.

$H_{i,j}$ = percentage of total shares outstanding of stock *i* held by fund *j* at time *t = T-W*.

$\alpha_{i,j,t}$ = percentage of total shares outstanding of stock *i* bought or sold by fund *j* between time (quarter) *t-1* and *t*, where $\alpha_{i,j,t} > 0$ for buys and <0 for sells.

If stock *i* is not included in fund *j* at time *T-1*, then $Duration_{i,j,T-1} = 0$. We require at least two years of holdings reports for a fund or institution to be included in our sample. Finally, we compute the Fund Duration for each fund *j* by averaging $Duration_{i,j,T-1}$ overall stocks *i*, using as weights the market

value of the stock holdings in each fund's portfolio. This measure takes into account cases of tax selling and other kinds of temporary adjustments in the portfolio, because the intermediate sells are cancelled by immediate buybacks, with only a small effect on the duration of current holdings. Like Cremers and Pareek (2015), we choose W = 20 quarters because, beyond five years, any informational or behavioral effects would seem to be marginal.

We can illustrate the construction of the holding duration measure with a simple example. Suppose a fund portfolio consists of two stocks: IBM and Ford. It owns 5% of the total shares of IBM, 2% of which it bought three quarters back, with the remaining 3% of shares bought five quarters back. The weighted age of IBM today in this fund's portfolio is (2%/5% × 3 quarters+3%/5% × 5 quarters) = 4.2 quarters. Also, suppose it currently owns 1% of the shares of Ford, having bought 5% of the shares six quarters back and having sold 4% of them one quarter back. At this point, the portfolio has thus held 1% for six quarters, but previously held another 4% for five quarters, such that over the past five years the weighted average duration (weighted across the percentages of stock owned over time) of Ford is thus (4%/5% × 5 quarters + 1%/5% × 6 quarters) = 5.2 quarters. Similarly, we calculate this duration measure for every stock-fund pair. The measure thus represents the weighted duration of the holding experience that the fund had in its past for a given stock currently in its portfolio.

Next to Fund Duration, we employ two other proxies for the patience of the fund manager as well. The first alternative proxy is the Fund Turnover Ratio from CRSP, which is reported annually as the minimum of aggregate sales or aggregated purchases of stocks, divided by the average total net asset value of the fund. The second alternative proxy is Fund Holdings Turnover, which is calculated as the percentage of holdings that changed from the end of this quarter's holdings report to the previous quarter-end holdings report, averaged over last four quarters (see Gaspar, Massa, and Matos, 2005).

To evaluate the performance of the net fund returns accruing to the end-investor (after all fees and trading costs, except front and rear-end loads), we focus on the results for a five-factor factor model that includes a market, size, value, momentum and liquidity factor, using the data for the first four of

those factors from Ken French's website and the traded liquidity (Pastor-Stambaugh) factor from WRDS. As an alternative factor model, we also consider 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.[9]

While most of our analysis uses net fund returns, we also show some results for mutual funds using benchmark-adjusted net returns. As explained by Cremers, Petajisto, and Zitzewitz (2013), subtracting the benchmark return from the net mutual fund return is a simple and robust method to adjust for funds' remaining exposures to a particular style or to stock characteristics that are left after adjusting for the Fama-French factors (and which exposures are often left even for passive portfolios).

For both mutual funds and institutional 13F portfolios we also calculate the holdings-based 'gross' return. For this, we effectively assume that all trades between quarterly holdings reports are made just before the holdings report is made public. We update weights at the two month-ends in between quarterly portfolio reports by adjusting the weights at the beginning of the month for the stock returns during the month, in order to approximate more closely the return of an actual portfolio.

We control these gross returns for a fund's exposure to a particular style or to particular stock characteristics by calculating the DGTW-adjusted returns of the holdings-based returns. The DGTW-adjusted return of each stock in the fund's portfolio is calculated as the difference of the CRSP monthly stock return and an equally weighted portfolio with similar size, value and momentum as the stock in the portfolio (for details see Daniel, Grinblatt, Titman, and Wermers, 1997). Finally, the holdings-based

[9] In particular, the seven-factor model uses these factors: the market factor is the excess return on the S&P 500; two size factors: a small cap factor equal to the difference between the return of the Russell 2000 and the Russell Midcap, and a 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: a large cap value factor equal to the difference between the return of the S&P 500 value and growth indices, a mid-cap value factor equal to the difference between the return of the Russell Midcap value and growth indices, and a small cap value factor equal to the difference between the return of the Russell 2000 value and growth indices; and finally a momentum factor equal to the return on 'UMD', the up-minus-down portfolio from Ken French's website.

DGTW-adjusted monthly return of the fund is the weighted-average return of the DGTW-adjusted stock returns using the fund's portfolio weights.

At the end of each calendar year, we independently double sort funds into five quintile portfolios depending on their lagged Fund Duration and into five quintile portfolios depending on their lagged Active Share, and consider the performance in the subsequent year. We use the December holdings report if available, and otherwise use the last available holdings report in that year. We show results using both equally-weighting and value-weighting the performance of each of the funds within each portfolio. For robustness, we also employ pooled panel performance regressions.

2.2. Descriptive Statistics of the Mutual Fund Sample

Appendix Table A.1 provides annual descriptive statistics of the mutual fund sample. Given our demanding data requirements (including the use of the previous five years of holdings reports to calculate Fund Duration, with a minimum requirement of at least two years of holdings reports), we start our performance analysis for the mutual fund sample at the end of 1989, covering the 24 year period of 1990 – 2013. As pointed out in Cremers and Petajisto (2009), whose performance sample also starts in 1990, a secondary reason to start then is that prior to 1990, there is limited dispersion in Active Shares across mutual funds, with most funds having a high (in absolute terms) Active Share.

The median Active Share in our sample equals 87% in 1990, drops to 75% in 2002, after which it climbs back to 80% at the end of the sample.[10] Median Fund Durations were 1.4 years at the beginning of the sample, shortened a bit to 0.91 years in 2001, after which they considerably lengthened to 1.7 years at the end of the sample. Fund Turnover Ratio and Fund Holdings Turnover follow a similar pattern, though with less evidence of longer holdings periods at the end of the sample relative to the beginning. For example, Fund Turnover Ratio has a median of 42% in 1990, 80% in 2001 and dropping to 50% in 2013.

[10] Panel A of Appendix Fig. A.1 shows the percentage of all TNA in our sample of actively managed mutual funds, at the end of each year for different five ranges of Active Share. Panel B of Appendix Fig. A.1 shows the percentage of funds in our sample at the end of each year with an Active Share in the same ranges.

The lengthening holdings durations and stable or lower fund turnover ratios both indicate that the recent significant increase in stock turnover cannot be attributed to increased mutual fund trading (but is rather due to increased trading by others, most importantly high frequency traders).Panel A of Table 1 gives basic descriptive statistics – mean, standard deviation, minimum and maximum – for the main variables in our paper across the mutual fund sample. Panel B of Table 1 presents the time series average of the annual quintile breakpoints for sorts on Active Share and the three proxies for trading frequency. On average, funds in the shortest Fund Duration quintile portfolio hold stocks for less than eight months, while funds in the longest Fund Duration quintile portfolio hold stocks generally longer than two years. Funds in the bottom Fund Turnover Ratio quintile portfolio have a turnover ratio below 27% per year, and those in the top Fund Turnover Ratio quintile portfolio have a turnover ratio above 119% per year.

Panel C of Table 1 provides the Spearman rank correlation matrix of the main variables. Active Share is not highly correlated with any of the three trading frequency proxies, with the highest rank correlation equal to -16% for Fund Duration. The two holdings-based proxies are highly correlated, with a Spearman rank correlation of -82% for Fund Duration and Fund Holdings Turnover. Finally, Fund Turnover Ratio has a Spearman rank correlation of -70% with Fund Duration and of 78% with Fund Holdings Turnover. Funds with high Active Share tend to be smaller (rank correlation of -17% with TNA). Moreover, few funds with long holding durations are very active.[11] This underscores the importance of separating funds in both Active Share and Fund Duration (or Fund Turnover Ratio) dimensions. We provide illustrative examples of large funds with distinctive Active Share and Fund Duration at the end of our sample in 2013 in Panel C of Appendix Fig. A.1.

[11] Appendix Table A.2 shows the average percentage of TNA in our sample in each of the 25 portfolios in the 5x5 independent double sort on Active Share and Fund Duration. As Active Share and Fund Duration are not highly correlated, each of the 25 portfolios contain about the same number of funds, i.e., about 4% of the funds in the sample. Funds in the shortest Fund Duration quintile tend to be small, representing on average only around 10% of TNA (though, by construction, 20% of the funds), while funds in the longest Fund Duration quintile represent on average 41.6% of TNA. About a third of that represents funds that also are in the bottom Active Share quintile and only 9.4% of which represents funds that are in the top Active Share quintile.

2.3. Descriptive Statistics of the Institutional Investor Sample

The number of institutions and their Active Share dispersion are both much larger for the institutional portfolio sample than for the mutual fund sample, such that we start the performance analysis for institutional portfolios at the earliest possible time, namely the beginning of 1984. Panel A of Table 2 provides descriptive statistics of Active Share and Fund Duration for the institutional investor sample for 1984 – 2012. The mean Active Share and Fund Duration across all institutions in the pooled sample is 74% and 17 months, respectively. Appendix Table A.3 provides annual descriptive statistics for institutions. As a group, the median institutional ownership of public traded U.S. equities at the beginning of our sample in 1983 equals 40%, grows to 57% in 2000 and to 66% in 2012.

Table 2 reports the summary statistics separately for the following eight types of institutions based on the classification scheme given in Bushee (2001): Banks (BNK), Insurance Companies (INS), Investment Companies (INV), Independent Investment Advisers (IIA), Corporate Pension Funds (CPS), Public Pension Funds (PPS), University and Foundations Endowments (UFE) and other (MSC). Independent Investment Advisers (IIA) are the most active with an average Active Share of 77%, and Public Pension Funds and Banks are amongst the least active with an average Active Share of 50% and 56%, respectively.[12, 13]

At the end of each year, we independently sort the institutions into quintiles by their year-end Fund Duration and their year-end Active Share. Panel E of Appendix Table A.4 reports the average percentage of total institutional investor stock holdings in each of these 5*5 portfolios, averaged across

[12] Panel A of Appendix Fig. A.2 shows that the proportion of assets managed by institutional investors with Active Share less than 60% has gone up from 44% in 1983 to 62% in 2012. The proportion of assets managed by the active funds with Active Share greater than 80% has been relatively stable at around 10% to 15% of total assets. Panel B shows that the number of funds is fairly evenly distributed across Active Share ranges, and that particularly the percentage of high Active Share institutions increased over time. The figures imply that low Active Share institutional portfolios tend to be much larger in size than the institutional portfolios with high Active Share.

[13] Appendix Table A.4 reports the breakdown of the number of institutional portfolios and assets by institutional type and further by Active Share ranges at the end of our sample period in 2012. Independent Investment Advisers (IIA) is the largest group with 1,996 institutions with a total portfolio value of $4.92 trillion, out of total of 2,562 institutions with an aggregate portfolio value of $9.31 trillion. Other major groups of institutions are investment firms (mostly comprised of mutual fund companies) with total assets of $1.45 trillion, and banks, which are largely inactive with $1.53 trillion under management and have an average Active Share of 56%. Appendix Table A.4 also presents the breakdown of assets and the number of funds by institutional types and Fund Duration ranges.

time. Each of these portfolios includes approximately 4% of total number of institutions in each year, due to the low correlation between Active Share and Fund Duration measures, but differs in the amount of assets depending on the size of equities under management at the institutions in each of these portfolios. Institutions with high Active Share and long Fund Duration (both top quintile) hold 1.6% of all institutional holdings at the end of 2011. We provide illustrative examples of large institutional investors with distinctive Active Share and Fund Duration in Panel C of Appendix Fig. A.2.

3. Patience Proxies, Active Share and Fund Performance

3.1. Mutual Fund Performance

Independently sorting all mutual funds into 5x5 portfolios based on lagged Fund Duration and Active Share results in 25 portfolios. Using monthly performance data from January 1990 to December 2013, we first consider the equally- and value-weighted (by total net assets) performance of the funds in these portfolios. Panel A (B) of Table 3 provides the five-factor alphas of the net fund returns using equally (value) weighted portfolios, and Panel C (D) provides results for equally (value) weighted portfolios for the index-based seven-factor model.

Only the most active and patiently managed funds have on average been able to outperform in our sample. Active and patient funds are defined as those whose holdings are substantially different from the benchmarks (high Active Share) and who trade relatively infrequently (long holding durations). The outperformance of the most active and patient funds – the portfolio of mutual funds where both the Active Share and the Fund Duration are in the top quintile – is economically considerable and statistically significant. As shown in Panels A and C of Table 3 using equally-weighted portfolios, these patient funds generated an annualized alpha of 2.05% (t-statistic of 1.95) after costs according to the five-factor model and of 2.22% (t-statistic of 2.72) according to the index-based seven-factor model. Value-weighting the portfolio (see Panels B and D of Table 3) gives similar results, with a five-factor alpha of 2.23% per year (t-statistic of 2.27) and a seven-factor alpha of 2.32% per year (t-statistic of 2.82).

The most active mutual funds with short durations or who frequently trade generally underperformed their benchmarks by a considerable margin, across all levels of Active Share. For example, the equally-weighted portfolio of mutual funds with short Fund Duration and low Active Share (both in the first quintile) underperformed considerably with a five-factor alpha of -1.04% per year (t-statistic of 2.12, see Panel A of Table 3). The analogous portfolio with short Fund Duration and high Active Share similarly underperformed with an annualized five-factor alpha of -1.64% (t-statistic of 1.62, again see Panel A of Table 3). We thus find that only active bets that were also patient (i.e., longer-term) were rewarded in the markets, but find no evidence that active short-term bets were profitable.

Further, the results for our sample confirm that Active Share is useful for predicting the performance of active managers, but find less evidence that high Active Share alone is generally sufficient to find managers who outperform their benchmarks. We replicate the main result in Cremers and Petajisto (2009) that high Active Share funds outperform low Active Share funds. This difference is only significant using the index-based seven-factor model and not using the five-factor model, which is consistent with Cremers and Petajisto (2009), who show that the difference between high and low Active Share fund performance is only significant after benchmark-adjusting. As Cremers, Petajisto, and Zitzewitz (2013) document, this can be explained by the three Fama-French factors in the five-factor model (i.e., the market, book-to-market and size factors) generating large alphas for many of the benchmarks themselves. In particular, fund with high Active Share tend to be small cap funds, whose small cap benchmarks generally have a large negative alpha according to the five-factor model, while funds with low Active Share tend to have large cap benchmarks with positive five-factor alphas. Cremers, Petajisto, and Zitzewitz (2013) further show that this benchmark-effect can be removed by

either benchmark-adjusting the returns or by using the index-based seven-factor model, as we do here, and which also fairly closely replicates the results in Cremers and Petajisto (2009) and Petajisto (2013).[14]

Unconditionally, longer Fund Duration is associated with better performance than shorter Fund Duration, and especially for larger funds. Across all Active Share quintiles, funds with long Fund Duration (top quintile) outperformed funds with short Fund Duration (bottom quintile) for value-weighted portfolios. The long-short portfolio that buys (sells) funds in the top (bottom) Fund Duration quintile has a five-factor alpha of 1.94% per year (t-statistic of 2.36) for value-weighted portfolios, and of 1.10% per year (t-statistic of 1.71) for equal-weighted portfolios.

The stronger positive association between performance and Fund Duration for larger funds is driven by the large negative alpha for short duration funds, which is consistent with those larger funds having more adverse price impact when they trade frequently. Most notable is the economically remarkable degree of underperformance of the larger funds with high Active Share (top quintile) and short Fund Duration (bottom quintile), as shown by the performance of the value-weighted portfolio with an annualized five-factor net alpha of -3.56% (t-statistic of 2.92). This suggests that larger active funds that trade frequently are not providing liquidity to the market but rather seem to be demanding liquidity in a way that is costly to investors.

Holding stocks for a relatively long period is in itself on average not associated with managerial skill or significant outperformance, as the unconditional portfolio of funds in the top Fund Duration quintile has an economically small and statistically insignificant abnormal return. The only portfolios with long Fund Duration whose outperformance is statistically significant are those that also have high Active Share. This again underlines that it is important to distinguish patient funds by their Active Share. For example (and using equal-weighting), the long-short portfolio that buys funds with high Active Share

[14] The five-factor alphas using benchmark-adjusted net fund returns – which Cremers and Petajisto (2009) focus on – can be found in Panel A (B) of Appendix Table A.5 for equal (value)-weighted portfolios, with results that are robust and generally similar to using the index-based seven-factor model.

and long Fund Duration and sells funds with low Active Share and long Fund Duration has a significant annualized five-factor alpha of 3.04% (t-statistic of 2.69), while the analogous long-short high-low Active Share portfolio among short Fund Duration portfolios has an insignificant five-factor alpha of -0.60% per year (t-statistic of 0.60).

Panel A of Fig. A.3 in the Appendix shows the cumulative abnormal net performance of long-short portfolios in high-low Active Share funds. Specifically, we calculate the monthly five-factor alpha for the top quintile and the bottom quintile Active Share portfolios (unconditionally and conditional on Fund Duration) and use these to compute the monthly abnormal performance of a $1 investment in each portfolio. The figure plots the cumulative abnormal performance of investing $1 in the high Active Share portfolio and -$1 in the low Active Share portfolio in order to show how Active Share contributes to any outperformance over our time period. The figure shows that, considering only funds with long Fund Duration, the outperformance of high Active Share funds over low Active Share funds happened neither consistently over time nor all in one isolated episode. Rather, there is outperformance from 1990 – 1992, then the difference in performance is mostly flat from 1992 – 1999, followed by significant outperformance from 1999 – 2001, again flat from 2001 – 2007, and back to another period of outperformance from 2007 – 2011. This suggests that patient active management has been more fruitful during periods of significant market turmoil, as the Nasdaq crash happened in the period 1999 – 2001 and the financial crisis in 2007 – 2009.

Panel B of Fig. A.3 shows the cumulative abnormal performance difference between funds with long and short Fund Duration. After calculating the monthly five-factor alphas for the top quintile and the bottom quintile Fund Duration portfolios (unconditionally and conditional on Active Share), we use these to compute the abnormal performance of a $1 investment in each portfolio. The figure plots the cumulative abnormal performance of investing $1 in the long Fund Duration portfolio and -$1 in the short Fund Duration portfolio in order to show how Fund Duration contributes to outperformance over

our time period. The outperformance of long Fund Duration portfolios, especially for fund with high Active Share, happened fairly consistently between 1996 and the end of the sample.

For robustness, we consider two alternative proxies for how patient the investing strategy of the fund is, and these results confirm that performance tends to be stronger for funds with high Active Shares that trade more patiently compared to funds with high Active Share that trade frequently. Panel A of Table 4 contains the five-factor alphas for equally-weighted portfolios in a double sort of Fund Turnover Ratio and Active Share, and Panel B of Table 4 presents the analogous results for the double sort of Fund Holdings Turnover and Active Share.[15]

Using either proxy, our main result is robust, namely that among high Active Share (top quintile) funds, frequently trading funds underperform patient funds. For example, the long-short portfolio that buys (sells) the portfolio of funds with turnover in the top (bottom) quintile and with top quintile Active Share has a five-factor alpha of -2.77% per year (with a t-statistic of 2.43). The analogous long-short portfolio buying (selling) funds with high (low) Fund Holdings Turnover and high Active Share has a five-factor alpha of -2.36% per year (with a t-statistic of 2.16). An important difference in the results for Fund Duration is that the portfolio of funds with high Active Share and low (holdings) turnover no longer has statistically significant outperformance.

In the final robustness check for the main result in this section, we run pooled panel predictive regressions of the yearly net five-factor alpha on various lagged fund characteristics, presented in Table 5.[16] These regressions allow us to control for several other fund characteristics such as tracking error, fund flows, the log of fund size and the expense ratio, and to verify whether the outperformance of the funds with high Active Share and relatively infrequent trading is robust across years. We also include year fixed effects and benchmark fixed effects, such that any results are not due to benchmark-specific

[15] Panels C and D of Table 4 provide the analogous results for value-weighted results using the five-factor model.

[16] To calculate the yearly net alpha for a fund, we sum the monthly five-factor alphas for the fund over the calendar year. We estimate the monthly fund alphas by taking the excess fund returns over the risk free rate in a month and subtracting the predicted fund excess returns obtained from the factor returns in that month and the fund loadings on the five-factors estimated using monthly fund and factor returns over previous 36 months.

performance, and employ robust standard errors that are independently double clustered by both fund and by year. We enable an easy comparison to the portfolio approach by focusing on the 'High (Low) Active Share' dummy, which equals '1' if the fund's Active Share is in the top (bottom) quintile that year, plus the interactions of these two dummies with the patience proxies. As previously also shown in the double sorts, fund performance in our sample is not linearly related to Active Share or to the proxies for patience (such that using e.g. Active Share rather than the dummies does not produce statistically significant results).

Column (1) of Table 5 shows that funds with high (low) Active Share tend to have positive (negative) five-factor alphas, though without statistical significance.[17] Column (2) shows a positive and statistically significant coefficient for the interaction of High Active Share and Fund Duration, Column (3) for the interaction of High Active Share and Fund Turnover Ratio, and Column (4) for the interaction of High Active Share and Fund Holdings Turnover. This confirms that among funds with high Active Share, only funds that also pursued patient investment strategies were able to outperform their benchmarks in our sample.

Next, we verify that our results are robust to any benchmark manipulation as documented in Sensoy (2009). Column (5) shows that the results in Column (2) are similar if we use the minimum Active Share (across all possible benchmarks) rather than the Active Share with respect to the self-declared benchmark.

[17] The difference between high and low Active Share funds equals about 0.41% (=0.147+0.262) alpha per year, which has a t-statistic of 1.63. As noted earlier, this is consistent with Cremers and Petajisto (2009), who explain that using Active Share alone, the difference in performance between high and low Active Share funds is only statistically significant using the Fama-French factors (i.e., the return on the market, size – SMB – and value – HML – factors) if the fund returns are first adjusted for the benchmark return. The reason is that the Fama-French factors allow economically and statistically significant alphas for the passive benchmarks themselves, as documented in Cremers, Petajisto, and Zitzewitz (2013). As a robustness check, column (4) of Appendix Table A.6 shows the multivariate predictive regression using benchmark-adjusted net returns, which indicate that the high Active Share funds as a group significantly outperformed their benchmarks in our sample. Columns (5) and (6) of Appendix Table A.6 show that the results for the interactions between Active Share and Fund Duration in Table 5 are similar when using net five-factor alphas and benchmark-adjusted net returns.

Appendix Table A.6 adds various robustness checks. First, in Columns (1) and (2) we show that our results are robust to controlling for the past average fund turnover as in Pastor, Stambaugh, and Taylor (2014), who consider how *changes* in fund turnover are related to performance. Column (3) shows robustness to controlling for past fund flows and their interaction with Active Share.

Next, we evaluate the 'gross' mutual fund performance using holdings-based returns, which matter less to investors than the net performance but are informative about managerial skill before trading costs and other expenses are incurred. As described in Section 2, we evaluate the gross performance by DGTW-adjusting and by calculating the five-factor alphas of the holdings-based gross returns. Panel A of Table 6 shows the DGTW-adjusted results for the equally-weighted 5x5 independent double sort on Fund Duration and Active Share, and Panel B shows the five-factor alphas of the holdings-based returns. One noticeable change from the previous results is that using DGTW-adjusted gross returns, we no longer see any portfolios in the double sort with economically and statistically significant negative alphas. This indicates that managers have on average some managerial skill, even if (again on average) not many investors benefit from those in the form of net outperformance.

The portfolio exhibiting the highest gross abnormal performance is the portfolio of funds with high Active Share and high Fund Duration (both quintile 5), with an annualized DGTW-adjusted return of 2.56% (t-statistic of 2.62) and an annualized five-factor alpha of 3.39% (t-statistic of 2.98). This confirms the main result that portfolio managers of the most active and patient funds seem on average to have the most managerial skills. We again see that both Active Share and Fund Duration matter. Similar to the previous results using net returns, funds with long Fund Duration tend to outperform funds with short Fund Duration, especially when Active Share is high, while high Active Share funds tend to outperform low Active Share funds, again especially when Fund Duration is long.

Two alternative interpretations of the underperformance of very active managers with short investment horizons are overconfidence versus trading costs (e.g. through price impact due to costly liquidity demand or the trading of relatively illiquid stocks). The DGTW-adjusted gross returns are useful

to distinguish between these alternative interpretations, as gross returns are hypothetical returns based on end-of-day prices and *last*-quarter's holdings, and thus should not be affected by trading costs or costly liquidity demands from impatient trading. Comparing the abnormal performance of the holdings-based gross returns in Table 6 to the net alphas in Table 3 for funds with short Fund Duration, high Active Share funds seem to lose considerably more in trading costs and other expenses than low Active Share funds. This seems more consistent with the costly liquidity explanation.

3.2. Institutional Performance

This subsection uses the quarterly institutional 13F stock holding reports to evaluate the performance of aggregated institutional portfolios based on holdings-based returns. As far as we know, we are the first to explore the Active Share of institutional stock holding reports, or the ability of Active Share and different proxies for the trading frequency to predict the performance of the stocks held by these institutions. We use two different methods to evaluate the stock-picking ability of the institutional holdings, as based on their quarter-end reports. First, we calculate five-factor gross alphas of the holdings-based returns (see Panel A of Table 7), and second, we compute the DGTW-adjusted mean return of the holdings-based returns (see Panel B of Table 7).

The unconditional sorts on Active Share indicate that the most active managers on average had significant managerial skill, with the stocks held by the institutions in the top quintile portfolio of Active Share outperforming with a five-factor alpha of 1.57% per year (t-statistic of 2.35) and a DGTW-adjusted mean return of 1.27% per year (t-statistic of 2.72). Moreover, there is a uniformly positive relationship between Active Share and performance across all five Active Share quintile portfolios. The two Active Share quintile portfolios lacking any evidence of statistical or economic outperformance are the two lowest Active Share quintiles, which collectively hold about 76% of the institutional assets, while the other three quintile portfolios show increasing evidence of managerial skill. As these institutional holdings reports are at an aggregated level and including a substantially larger fraction of overall equity holdings than those covered in the retail mutual fund database considered in the previous section as

well as in Cremers and Petajisto (2009), these results are to a significant extent an 'out-of-sample' test for the ability of Active Share to predict stock-picking outperformance.

Consistent with our results for mutual funds, the gross outperformance of the high Active Share institutions is largely due to institutions with the longest investment horizons. For example (see Panel A of Table 7), the portfolio of institutions with high Active Share (quintile 5) and short Fund Duration (quintile 1) has an annualized five-factor gross alpha of 1.24% (t-statistic of 1.58), while the portfolio with high Active Share and long Fund Duration (quintile 5) has an annual alpha of 3.58% (t-statistic of 3.77). The difference of 2.34% per year is strongly statistically significant (t-statistic of 2.20).

Stocks in high Active Share (top quintile) institutional portfolios consistently outperform stocks in low Active Share (bottom quintile) institutional portfolios, but the difference in performance is only economically large and strongly statistically significant for institutions that also have long Fund Duration. For example, among short Fund Duration institutions (bottom quintile), the long-short portfolio that is long (short) institutional portfolios with high (low) Active Share has a five-factor gross alpha of 0.83% per year (t-statistic of 1.07), while the analogous long-short portfolio among long Fund Duration institutions (top quintile) has a five-factor alpha of 2.79% per year (t-statistic of 3.06). Similarly, the difference between the performance of the short and long Fund Duration quintile portfolios for the high Active Share (top quintile) institutions is economically meaningful and statistically significant, but is insignificant for the other Active Share quintiles. Results using DGTW-adjusted returns in Panel B of Table 7 are similar.[18]

Panel C of Table 7 shows robustness results using a double sort of all institutional portfolios on Fund Holdings Turnover and Active Share. We again find that the best performance is achieved by the

[18] Panel A of Appendix Fig. A.4 plots the cumulative abnormal performance difference between funds with high and low Active Share, showing that the outperformance of high Active Share funds with long Fund Duration happened fairly consistently across the sample. Panel B of Appendix Fig. A.4 plots the analogous cumulative abnormal performance of investing $1 in the long Fund Duration quintile and -$1 in the bottom Fund Duration, unconditionally and conditional on Active Share, showing that the outperformance of active patient portfolios over active impatient portfolios is also fairly consistent over time.

portfolios with high Active Share (top quintile) and low Fund Holdings Turnover (bottom quintile), which has a five-factor alpha of 2.49% per year with a t-statistic of 2.57. The other four portfolios with Fund Holdings Turnover in the bottom quintile but Active Share below the top quintile have an abnormal performance that falls below the 1.06% per year of the unconditional bottom Fund Holdings Turnover quintile. However, the results using Fund Holdings Turnover rather than Fund Duration are less uniform and statistically weaker.

A final robustness check is given in Table 8 using pooled panel regressions of gross excess (in Columns 1 – 3) and DGTW-adjusted (in Columns 4 – 6) holdings-based annual returns on lagged institutional characteristics. In column (1), we find that having a high Active Share predicts an outperformance of 1.56% per year and low Active Share funds predicts an underperformance of -0.87% per year, which difference is statistically significant. Column (2) adds the interactions of the High and Low Active Share dummies with Fund Duration, and indicates that the outperformance of high Active Share institutions is mostly due to those that also have longer Fund Duration. The coefficient of the interaction of Fund Duration and High Active Share equals 0.72% (t-statistic of 2.13), and once it is included the coefficient on the High Active Share dummy itself drops to less than half its value in Column (1). Economically, a standard deviation increase in institutional holding duration is associated with a 60 basis points (= 0.72 x 0.83 %) higher performance among high Active Share institutions. Column (3) confirms that institutions with high Active Share are more likely to outperform if they trade less using the alternative proxy of Fund Holdings Turnover. Finally, Columns (4) through (6) show that results are similar if we use DGTW-adjusted gross holdings-based returns instead.

3.3. What helps explain the outperformance of the high Active Share and patient funds?

This subsection considers how to explain the abnormal performance shown by the mutual funds and institutional portfolios with high Active Share and either long or short Fund Duration. We consider whether seven different factors, each measuring exposure to different stock characteristics, can explain the abnormal returns. Specifically, we regress the net monthly return of the long-short portfolio that is

long (short) funds with top quintile Active Share and top (bottom) quintile Fund Duration, as well as the net excess returns of both the long and short sides separately, on the monthly returns of the seven factors. The results for mutual funds are presented in Panel A of Table 9.

Column (1) considers the long-short portfolio and only includes the market factor, resulting in an annualized abnormal return of 3.28% (t-statistic of 2.40). Adding factors capturing market capitalization, book-to-market of equity, momentum and systematic liquidity results in a five-factor alpha of 3.68% per year (with a t-statistic of 3.54), corresponding to the result in Panel A of Table 3. Columns (3) and (4) provide the analogous five-factor loadings for the long and short sides, respectively. The loadings indicate that among high Active Share funds, impatient funds tend to buy stocks with higher market betas, small market cap, lower book-to-market and more positive momentum than patient funds. However, these loadings cannot explain the abnormal returns, as the alpha goes up in Column (2) relative to Column (1). The traded systematic liquidity factor proposed by Pastor and Stambaugh (2003) does not play a significant role.

In Column (5), we add two more factors, namely the 'Betting against Beta' (BaB) factor introduced by Frazzini and Pedersen (2013) and the 'Quality minus Junk' (QmJ) factor introduced by Asness, Frazzini, and Pedersen (2013). We find that especially the latter can explain the positive return of the portfolio with high Active Share and long Fund Duration funds, though neither can explain the underperformance of the portfolio with high Active Share and short Fund Duration funds. As shown in Column (6), the seven-factor alpha of the portfolio where both Active Share and Fund Duration are in the top quintile equals -1.01% per year (t-statistic of 1.01), i.e., a difference of 3.06% per year relative to the five-factor model in Column (3). This is almost completely due to exposure to the QmJ factor, as the BaB factor has a small and statistically marginally significant coefficient while the QmJ factor has a large and statistically strongly significant coefficient in Column (6). However, neither the BaB nor the QmJ factors can explain the underperform of the highly active and impatient funds, as shown by the seven-factor alpha of -2.28% per year (t-statistic of 2.12) in Column (7) for the portfolio of funds with Active

Share in the top quintile and Fund Duration in the bottom quintile. We thus conclude that the managerial skill from the most active and patient mutual fund managers can be explained by their investment in high quality stocks, i.e., stocks of firms that are profitable, with growing earnings, with relatively lower valuation uncertainty and higher payout, and then holding on to those over relatively long periods.

Next, we consider whether the performance of the most active and patient institutional portfolios is likewise explained by their buying of safe, value and quality stocks. As indicated by Panel B of Table 9, our results for institutional portfolios are quite similar to those for mutual funds. We first focus on the DGTW-adjusted performance of the long-short portfolio, which has an average DGTW-adjusted return of 2.87% per year (with a t-statistic of 2.54) in Column (1) using the market return as the only factor. Adding all five factors in our default model only reduces the alpha to 2.34% per year (t-statistic of 2.20) in Column (2). However, adding the BaB and QmJ factors as well, as we do in Column (5), renders the abnormal return of the long-short portfolio insignificant at 0.67% per year with a t-statistic of 0.61. Like the results for the mutual funds, this insignificance for the long-short portfolio after adding the BaB and QmJ factors is driven by their (partially) explaining the outperformance of the portfolio of high Active Share and long Fund Duration institutional portfolios (see Columns 3 and 6) rather than of the portfolio of high Active Share and short Fund Duration (see Columns 4 and 7).

4. Conclusion

This paper documents that both Active Share and trading frequency – and their interaction – are important dimensions to explain and predict the ability of stock portfolios to outperform. For both retail mutual funds and general institutional portfolios, we find that among high Active Share portfolios only those with patient investment strategies are able to outperform their benchmarks on average. Funds which trade frequently generally underperform their benchmarks, regardless of Active Share.

This means that among funds that infrequently trade, it is crucial to separate closet index funds – whose holdings largely overlap with the benchmark – from truly active funds – whose holdings are

almost completely different from their benchmarks with high Active Shares. Economically, our results indicate substantial benefits from the investment skill of high Active Share managers that trade infrequently, with average outperformance of over 2% per year. The average underperformance of retail mutual funds that frequently trade and generally hold stocks for less than seven months are similarly economically substantial. Our results suggest that one can *ex ante* identify a group of fund managers that seem to exhibit substantial investment skill, namely the group of patient fund managers that stick to their convictions and combine a high Active Share with relatively infrequent trading.

How did these patient and active mutual fund managers outperform? Perhaps unsurprisingly, their outperformance can largely be explained by their focus on stocks that other investors shun or find less attractive: picking safe (low beta), value (high book-to-market) and high quality (profitable, with growing profit margins, less uncertainty, higher payout) stocks and then sticking with those over relatively long periods until their apparent undervaluation has been reversed.

As the outperformance of the patient high Active Share managers is robust in both our mutual fund and institutional portfolio samples, the competitive nature of investment management suggests that significant frictions exist that prevent others from emulating their success. We speculate that three interrelated restrictions may play a role.

First, it could be that the skill to identify long-term opportunities is rare, and difficult or costly to acquire. Second, our results suggest that relatively few fund managers combine patient strategies with a high Active Share approach. Most patient funds (i.e., with long Fund Duration) have low Active Share. Therefore, our empirical results appear consistent with the theoretical argument in Shleifer and Vishny (1990, 1997) that limits to arbitrage are particularly important for trading opportunities that may take a relatively long-time to be profitable. As they argue, trading on long-term mispricing is generally more expensive and difficult, for example because the fund manager may be fired before *ex-post* successful long-term bets would pay off. In equilibrium, the relative hurdles towards combining patient and active strategies could allow relatively more long-term mispricing and thus greater profitability for the more

limited set of arbitrage capital that is able to invest in patient strategies. Third and relatedly, investing in patient and active managers generally also requires that investors themselves be patient. Such investor patience may be relatively rare as well, as both fund managers and their investors may need to wait years before getting rewarded for their patience.

Table 1

Mutual Fund Sample: Descriptive Statistics.

Panel A reports the descriptive statistics for the mutual fund sample used in this paper. Active Share is the proportion of fund holdings that differs from the benchmark holdings, Fund Duration is the average length of time – in years – stocks have been in the portfolio over the last five years, Fund Turnover Ratio is the fund-reported turnover, Fund Holding Turnover is the turnover based on changes in quarter-end holdings, and TNA is the total net assets. Panel B reports the quintile cutoffs for Active Share and three variables capturing mutual fund trading frequency: Fund Duration, Fund Turnover Ratio and Fund Holding Turnover, with e.g. Q20 denoting the 20th percentile. Panel C presents the correlation between the mutual fund variables.

Panel A

	Mean	StDev.	Min	Max
Active Share	77%	16%	20%	100%
Fund Duration	1.36	1.75	0.00	4.74
Fund Turnover Ratio	85%	80%	0%	2579%
Fund Holding Turnover	162%	49%	0%	747%
Log(TNA)	5.54	1.63	2.30	11.62
Expense Ratio	1.22%	0.42%	0.03%	5.32%
# Stocks	117	195	10	3,450

Panel B

	Q20	Q40	Q60	Q80
Active Share	62%	74%	84%	92%
Fund Duration	0.65	0.99	1.38	2.00
Fund Turnover Ratio	27%	50%	77%	119%
Fund Holding Turnover	83%	122%	164%	227%

Panel C

	Active Share	Fund Duration	Fund Turnover Ratio	Fund Holding Turnover	Log(TNA)	Expense Ratio	# Stocks
Active Share	100%						
Fund Duration	-16%	100%					
Fund Turnover Ratio	3%	-70%	100%				
Fund Holding Turnover	7%	-82%	78%	100%			
Log(TNA)	-17%	20%	-11%	-12%	100%		
Expense Ratio	29%	-22%	16%	16%	-32%	100%	
# Stocks	-29%	-8%	17%	11%	25%	-16%	100%

Table 2

Institutional Investors: Summary Statistics.

This table reports the summary statistics for Active Share and Fund Duration variables for the institutional investor sample. The sample period for institutional investors is from 1984 to 2012. 'N' denotes the number of fund-year observations, and 'P20' and 'P80' denote the 20th and 80th percentiles, respectively. The first row presents the statistics for the aggregate group of all institutions, while the remaining rows present the summary statistics for different institutional investor types as defined in Bushee (2001). See the text for an explanation of the codes for the different investor types.

		Active Share (%)					Fund Duration				
	N	Mean	Stdev	P20	Median	P80	Mean	Stdev	P20	Median	P80
All Institutions	39555	74%	18%	58%	75%	92%	1.40	0.83	0.64	1.32	2.12
BNK	5098	56%	13%	46%	55%	66%	1.95	0.68	1.40	1.96	2.53
INS	1704	66%	21%	47%	69%	84%	1.73	0.89	0.98	1.56	2.53
INV	1397	73%	16%	58%	75%	89%	1.40	0.67	0.85	1.32	1.96
IIA	26740	78%	16%	63%	80%	93%	1.27	0.76	0.57	1.17	1.91
CPS	802	67%	22%	46%	67%	88%	1.76	0.97	0.90	1.57	2.62
PPS	253	50%	21%	27%	49%	69%	1.92	0.71	1.32	1.97	2.58
UFE	355	74%	18%	60%	76%	91%	1.98	1.02	1.10	1.76	2.92
MSC	3206	80%	18%	61%	85%	97%	1.24	1.10	0.13	1.03	2.26

Table 3

Active Share and Fund Duration: Mutual Fund Alphas of Net Returns.

This table reports abnormal returns for mutual funds conditional on Active Share and Fund Duration measures. Funds are assigned to one of the 25 portfolios at the end of each year by independently sorting into quintiles based on their Fund Duration and Active Share measures. Returns are then calculated over next one year. Panel A reports the equally weighted five-factor alpha obtained as the intercept from the regression of the average monthly net fund returns in excess of the risk free rate on the three factors in the Fama and French model (market factor, size factor 'SMB' and value factor 'HML', the Carhart momentum factor and Pastor and Stambaugh traded liquidity factor. The first row reports the returns for five portfolios obtained by sorting funds unconditionally into quintiles by their Active Share. Similarly, the first column reports alphas for portfolios obtained by sorting unconditionally on Fund Duration measure. Rest of the Panel present returns for portfolios obtained by sorting both on Fund Duration and Active Share. Panel B presents the value weighted five-factor alphas. Similarly, Panel C and Panel D report alphas of the equally weighted and value weighted excess mutual fund net returns, using the index-based seven-factor model introduced in Cremers, Petajisto and Zitzewitz (2013).

Panel A

	Equal Weighted Five-Factor Alpha of Net Returns						
		Active Share					
Holding Duration	Uncond.	1	2	3	4	5	5-1
Uncond.		**-1.10**	**-0.91**	**-1.31**	-0.83	-0.30	0.81
		(4.37)	**(2.27)**	**(2.44)**	(1.20)	(0.37)	(1.01)
1	**-1.44**	**-1.04**	**-1.27**	-1.40	-1.08	-1.64	-0.60
	(2.09)	**(2.12)**	**(1.98)**	(1.66)	(1.12)	(1.62)	(0.58)
2	**-1.24**	**-1.02**	-0.83	**-1.52**	**-1.77**	-1.04	-0.02
	(2.24)	**(2.30)**	(1.38)	**(1.98)**	**(2.26)**	(1.14)	(0.02)
3	-0.90	**-1.43**	-0.15	**-1.37**	-1.32	-0.41	1.02
	(1.67)	**(4.43)**	(0.24)	**(2.00)**	(1.39)	(0.35)	(0.89)
4	-0.55	**-1.36**	**-1.43**	-0.59	0.58	-0.19	1.17
	(1.33)	**(4.18)**	**(3.64)**	(1.09)	(0.73)	(0.21)	(1.23)
5	-0.34	**-0.99**	**-1.12**	-0.52	0.32	2.05	**3.04**
	(0.79)	**(3.44)**	**(2.54)**	(0.78)	(0.40)	(1.95)	**(2.69)**
5-1	1.10	0.05	0.15	0.88	1.40	**3.69**	**3.64**
	(1.71)	(0.10)	(0.20)	(0.91)	(1.35)	**(3.54)**	**(3.06)**

Panel B

		Value Weighted Five-Factor Alpha of Net Returns					
		Active Share					
Holding Duration	Uncond.	1	2	3	4	5	5-1
Uncond.		**-0.95**	**-0.89**	**-1.64**	**-1.03**	-0.03	0.92
		(3.20)	**(1.77)**	**(2.74)**	**(1.36)**	(0.04)	(1.02)
1	**-2.32**	**-1.24**	**-2.12**	**-2.19**	**-2.34**	**-3.56**	-2.32
	(3.00)	**(2.17)**	**(2.37)**	**(2.07)**	**(2.26)**	**(2.92)**	(1.88)
2	**-1.91**	-0.60	-1.60	-1.65	**-3.59**	-1.10	-0.50
	(3.08)	(0.91)	(1.94)	(1.64)	**(2.70)**	(1.00)	(0.42)
3	-1.00	**-1.79**	0.77	**-1.62**	-1.16	-1.03	0.76
	(1.62)	**(4.07)**	(0.84)	**(1.96)**	(1.05)	(0.88)	(0.65)
4	**-1.09**	**-1.49**	-1.29	**-2.59**	-0.24	0.91	2.40
	(2.44)	**(3.14)**	(1.87)	**(2.71)**	(0.28)	(0.80)	(1.79)
5	-0.37	-0.59	-0.58	-0.20	0.14	**2.23**	**2.82**
	(1.00)	(1.43)	(0.81)	(0.23)	(0.13)	**(2.27)**	**(2.52)**
5-1	**1.94**	0.65	1.54	1.99	2.48	**5.79**	**5.14**
	(2.36)	(0.95)	(1.29)	(1.46)	(1.84)	**(4.39)**	**(3.74)**

Panel C

		Equal Weighted Seven-Factor Alpha of Net Returns					
		Active Share					
Holding Duration	Uncond.	1	2	3	4	5	5-1
Uncond.		**-1.36**	**-1.15**	**-1.13**	-0.12	0.57	**1.92**
		(6.21)	**(3.36)**	**(3.23)**	(0.26)	(1.02)	**(3.53)**
1	**-0.98**	**-1.16**	**-1.52**	**-1.18**	-0.28	-0.47	0.69
	(2.38)	**(2.51)**	**(3.14)**	**(2.11)**	(0.41)	(0.59)	(0.78)
2	**-0.84**	**-1.22**	-0.96	**-1.40**	-0.85	0.28	1.50
	(2.33)	**(2.96)**	(1.86)	**(2.44)**	(1.50)	(0.39)	(1.87)
3	-0.67	**-1.74**	-0.41	**-1.34**	-0.42	0.32	**2.06**
	(1.67)	**(5.90)**	(0.71)	**(2.47)**	(0.55)	(0.34)	**(2.11)**
4	-0.41	**-1.67**	**-1.68**	-0.38	1.06	0.60	**2.27**
	(1.27)	**(5.47)**	**(4.79)**	(0.84)	(1.74)	(0.88)	**(3.00)**
5	-0.30	**-1.21**	**-1.27**	-0.40	0.77	**2.22**	**3.43**
	(0.91)	**(5.04)**	**(3.27)**	(0.64)	(1.11)	**(2.72)**	**(3.99)**
5-1	0.69	-0.05	0.25	0.79	1.04	**2.69**	**2.74**
	(1.68)	(0.10)	(0.43)	(1.02)	(1.21)	**(2.93)**	**(2.58)**

Panel D

		Value Weighted Seven-Factor Alpha of Net Returns					
		Active Share					
Holding Duration	Uncond.	1	2	3	4	5	5-1
Uncond.		**-1.20**	**-1.07**	**-1.54**	-0.22	0.66	**1.86**
		(4.21)	**(2.27)**	**(3.32)**	(0.36)	(1.12)	**(2.88)**
1	**-2.02**	**-1.37**	**-2.39**	**-1.88**	**-1.84**	**-2.26**	-0.89
	(3.56)	**(2.43)**	**(3.38)**	**(2.31)**	**(2.39)**	**(2.18)**	(0.84)
2	**-1.56**	-0.74	**-1.59**	-1.60	**-2.34**	0.24	0.97
	(3.14)	(1.18)	**(2.23)**	(1.95)	**(1.99)**	(0.26)	(0.91)
3	-0.98	**-2.22**	0.45	-1.70	-0.35	-0.31	1.91
	(1.77)	**(5.10)**	(0.49)	(2.32)	(0.36)	(0.30)	(1.81)
4	**-1.04**	**-1.73**	**-1.46**	**-1.99**	0.24	1.31	**3.04**
	(2.46)	**(3.65)**	**(2.37)**	**(2.14)**	(0.36)	(1.33)	**(2.52)**
5	-0.39	**-0.80**	-0.61	-0.22	0.88	**2.32**	**3.12**
	(1.24)	**(2.03)**	(0.98)	(0.29)	(0.94)	**(2.82)**	**(3.38)**
5-1	**1.63**	0.58	**1.78**	1.66	**2.72**	**4.58**	**4.01**
	(2.64)	(0.86)	**(2.00)**	(1.40)	**(2.22)**	**(3.60)**	**(3.02)**

Table 4

Fund Turnover and Active Share: Five-Factor Alpha of Net Returns

This table reports the average abnormal mutual fund returns conditional on Fund Turnover and Active Share. Funds are assigned to one of the 25 portfolios at the end of each year by independently sorting into quintiles based on their Fund Turnover and Active Share measures. Returns are then calculated over next one year. Panel A report the equally weighted five-factor alphas obtained as the intercept from the regression of the average monthly net fund returns in excess of the risk free rate on the three Fama and French factors (market, size and value), the Carhart momentum factor and Pastor and Stambaugh traded liquidity factor. The first column reports the returns for five portfolios obtained by sorting funds unconditionally into quintiles by their self-reported turnover ratio. Rest of the Panel present returns for portfolios obtained by sorting both on self-reported turnover ratio and Active Share. Panel C presents value-weighted alphas conditional on fund's self-reported turnover ratio and Active Share. Panel B and Panel D report five-factor alphas conditional on fund's Active Share and average quarterly turnover ratio calculated from changes in fund's holdings over last four quarters using the methodology in Gaspar, Massa and Matos (2005). All the returns are in yearly percentages. Significance at the 5% level is denoted in bold, and t-statistics are given in parentheses.

Panel A

	Equal Weighted Five-Factor Alpha of Net Returns						
		Active Share					
Turnover Ratio	Uncond.	1	2	3	4	5	5-1
1	-0.67	**-0.97**	**-1.02**	-0.87	-0.18	-0.16	0.81
	(1.38)	**(2.73)**	**(2.28)**	(1.44)	(0.20)	(0.18)	(0.82)
2	**-1.18**	**-0.89**	**-1.28**	**-1.36**	-1.47	-0.97	-0.08
	(2.44)	**(2.75)**	**(3.12)**	**(2.14)**	(1.64)	(1.17)	(0.10)
3	**-1.12**	**-1.48**	**-1.22**	**-1.78**	-0.52	-0.58	0.90
	(1.98)	**(4.20)**	**(2.36)**	**(2.31)**	(0.55)	(0.59)	(0.88)
4	**-1.93**	**-1.76**	-0.84	**-2.67**	**-2.44**	-1.49	0.27
	(3.21)	**(4.58)**	(1.37)	**(3.52)**	**(2.54)**	(1.61)	(0.29)
5	**-1.75**	**-1.77**	-1.23	-1.49	-1.50	**-2.93**	-1.16
	(2.15)	**(4.00)**	(1.72)	(1.53)	(1.33)	**(2.28)**	(0.95)
5-1	-1.08	-0.80	-0.21	-0.62	-1.32	**-2.77**	-1.97
	(1.37)	(1.55)	(0.23)	(0.63)	(1.11)	**(2.43)**	(1.79)

Panel B

	Equal Weighted Five-Factor Alpha of Net Returns						
		Active Share					
Holdings Turnover	Uncond.	1	2	3	4	5	5-1
1	-0.36	**-0.61**	-0.77	-0.98	-0.02	0.71	1.32
	(0.81)	**(1.96)**	(1.82)	(1.54)	(0.02)	(0.71)	(1.34)
2	-0.76	**-1.57**	**-1.61**	-0.28	-0.09	-0.11	1.46
	(1.79)	**(4.47)**	**(3.83)**	(0.44)	(0.11)	(0.14)	(1.56)
3	-0.52	**-1.73**	0.21	-1.17	-0.29	0.22	1.95
	(0.91)	**(4.58)**	(0.33)	(1.85)	(0.30)	(0.22)	(1.91)
4	**-1.32**	**-1.05**	-1.04	**-2.29**	-1.22	-0.83	0.22
	(2.33)	**(2.86)**	(1.84)	**(3.14)**	(1.43)	(0.75)	(0.19)
5	**-1.50**	**-0.97**	**-1.32**	-0.76	-1.61	-1.65	-0.68
	(2.29)	**(1.96)**	**(2.14)**	(0.81)	(1.69)	(1.62)	(0.67)
5-1	-1.14	-0.35	-0.55	0.22	-1.60	**-2.36**	-2.01
	(1.75)	(0.71)	(0.78)	(0.22)	(1.54)	**(2.16)**	(1.67)

Panel C

	Value Weighted Five-Factor Alpha of Net Returns						
		Active Share					
Turnover Ratio	Uncond.	1	2	3	4	5	5-1
1	-0.26	-0.45	-0.14	-0.91	-1.28	0.49	0.93
	(0.44)	(1.01)	(0.17)	(1.03)	(1.15)	(0.49)	(0.88)
2	**-1.51**	-0.88	-1.32	**-2.84**	-1.62	-0.65	0.23
	(3.53)	(1.54)	(1.67)	**(2.81)**	(1.50)	(0.66)	(0.20)
3	**-1.58**	**-1.46**	**-1.55**	**-2.48**	-0.96	-0.24	1.22
	(2.81)	**(2.65)**	**(1.96)**	**(2.76)**	(0.88)	(0.20)	(0.99)
4	**-2.59**	**-1.88**	-0.45	**-4.91**	**-3.21**	-2.11	-0.23
	(4.25)	**(4.10)**	(0.46)	**(5.11)**	**(2.96)**	(1.83)	(0.20)
5	**-2.15**	-1.03	**-2.12**	-1.36	**-3.28**	**-4.44**	**-3.41**
	(2.19)	(1.50)	**(2.20)**	(1.06)	**(2.57)**	**(3.35)**	**(2.51)**
5-1	-1.89	-0.58	-1.98	-0.45	-2.00	**-4.93**	**-4.34**
	(1.63)	(0.66)	(1.42)	(0.33)	(1.17)	**(3.27)**	**(2.89)**

Panel D

	Value Weighted Five-Factor Alpha of Net Returns						
		Active Share					
Holdings Turnover	Uncond.	1	2	3	4	5	5-1
1	-0.23	-0.19	-0.56	-0.57	-0.32	1.00	1.19
	(0.57)	(0.48)	(0.78)	(0.64)	(0.36)	(0.92)	(1.03)
2	**-1.04**	**-1.64**	-0.14	-1.22	0.49	0.76	**2.40**
	(2.36)	**(3.03)**	(0.17)	(1.51)	(0.43)	(0.76)	**(2.15)**
3	-0.99	**-1.53**	0.28	**-2.09**	-0.31	-1.30	0.23
	(1.84)	**(3.31)**	(0.37)	**(2.69)**	(0.28)	(1.21)	(0.20)
4	**-2.20**	**-1.10**	**-1.55**	**-2.46**	**-3.18**	-1.38	-0.28
	(3.48)	**(2.03)**	**(2.44)**	**(2.66)**	**(2.43)**	(1.15)	(0.23)
5	**-2.09**	**-1.10**	**-2.33**	-1.38	**-2.43**	**-3.13**	-2.03
	(2.77)	**(2.00)**	**(2.33)**	(1.26)	**(2.38)**	**(2.57)**	(1.60)
5-1	**-1.86**	-0.91	-1.77	-0.81	-2.11	**-4.13**	**-3.22**
	(2.11)	(1.49)	(1.29)	(0.54)	(1.70)	**(2.85)**	**(2.18)**

Table 5

Mutual Fund Active Share and Fund Duration: Regression Evidence

This table presents results for pooled-panel regressions of future one year five-factor alphas of net fund return on lagged Fund Duration (MFDURATION), dummies for High and Low Active Share quintiles, fund turnover ratio (TURNOVER RATIO), interaction between Active Share dummies and Fund Duration and interaction between Active Share dummies and Fund Turnover Ratio. Tracking Error, Logarithm of Fund's Total Net Assets (TNA), expense ratio, benchmark fixed effects and year fixed effects are also included as control variables. Column (5) uses the minimum Active Share across benchmarks, all other columns use the Active Share with respect to the self-declared benchmark when available. All independent variables are measured at the end of previous year. Adjusted t-statistics based on standard errors clustered by fund and year are given in parentheses and *,**,*** indicate significance at the 10, 5, and 1 percent levels respectively.

	Five-Factor Alpha of Net Return				
Independent Variable	1	2	3	4	Active Share_Min 5
MFDURATION	0.603***	0.447**			0.484**
	(3.00)	(2.13)			(2.19)
HIGH ACTIVESHARE	0.147	-0.727	1.015**	1.039**	-0.985
	(0.35)	(1.14)	(2.28)	(2.14)	(1.56)
LOW ACTIVESHARE	-0.262	-0.437	-0.004	0.211	-0.130
	(0.81)	(0.68)	(0.01)	(0.61)	(0.24)
TURNOVER RATIO	-0.063	-0.064	-0.145		-0.042
	(0.22)	(0.23)	(0.50)		(0.16)
HOLDINGS TURNOVER				-0.363	
				(1.27)	
FLOW	0.051	0.072	-0.093	-0.001	0.107
	(0.21)	(0.30)	(0.38)	(0.00)	(0.43)
MFDURATION*HIGH ACTIVESHARE		0.668***			0.752***
		(2.70)			(2.98)
MFDURATION*LOW ACTIVESHARE		0.132			0.072
		(0.58)			(0.37)
TURN_RATIO*HIGH ACTIVESHARE			-1.009***		
			(2.87)		
TURN_RATIO*LOW ACTIVESHARE			-0.194		
			(0.79)		
HOLDINGS_TURNOVER*HIGH ACTIVESHARE				-0.537*	
				(1.70)	

HOLDINGS_TURNOVER*LOW ACTIVESHARE				-0.283	
				(0.88)	
TRACKING ERROR	-78.525	-77.315	-63.810	-71.375	-90.363
	(0.86)	(0.86)	(0.71)	(0.77)	(0.85)
LOG(TNA)	-0.127*	-0.132**	-0.085	-0.103*	-0.107*
	(1.90)	(1.99)	(1.36)	(1.64)	(1.88)
EXPENSE RATIO	0.007	0.008	0.009	0.001	0.007
	(0.65)	(0.71)	(0.81)	(0.07)	(0.81)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Benchmark Fixed Effects	Yes	Yes	Yes	Yes	Yes
Clustered (Fund,Year)	Yes	Yes	Yes	Yes	Yes
Rsquare (%)	9.37	9.45	9.24	9.30	9.65
Nobs	14,641	14,641	14,641	14,770	14,641
Number of Years	24	24	24	24	24

Table 6

Mutual Fund Active Share and Fund Duration: Holdings-Based Gross returns

This table reports average DGTW-adjusted returns and the five-factor alphas of gross holdings-based returns for the mutual fund sample conditional on Fund Duration and Active Share. Average equally weighted returns for quintile portfolios obtained by sorting funds either on Active Share or on Fund Duration are presented in first row and column respectively. Average abnormal returns for 25 portfolios obtained by independently sorting funds into quintiles based on Fund Duration and Active Share measures are also reported. Panel A reports the DGTW-adjusted holdings-based returns for the equally-weighted fund portfolios. Panel B presents the five-factor alphas obtained by regressing the equally-weighted average holdings-based fund returns in excess of the risk free rate on three Fama and French factors, a momentum factor and the Pastor and Stambaugh traded liquidity factor. All the returns are in yearly percentages. Significance at the 5% level is denoted in bold, and t-statistics are given in parentheses.

Panel A

		Equal Weighted DGTW-Adjusted Gross Returns					
		Active Share					
Holding Duration	Uncond.	1	2	3	4	5	5-1
Uncond.		-0.04	-0.43	0.04	0.52	0.73	0.78
		(0.20)	(1.19)	(0.94)	(1.04)	(1.23)	(1.44)
1	0.42	-0.11	0.19	0.34	0.58	0.87	0.97
	(0.67)	(0.31)	(0.30)	(0.43)	(0.66)	(1.05)	(1.27)
2	0.01	-0.06	0.60	0.08	-0.22	-0.16	-0.10
	(0.01)	(0.16)	(1.17)	(0.13)	(0.35)	(0.19)	(-0.12)
3	0.34	-0.24	0.77	0.59	0.09	0.24	0.48
	(0.86)	(0.75)	(1.64)	(1.17)	(0.14)	(0.30)	(0.65)
4	0.51	-0.02	0.09	**0.91**	**1.37**	0.21	0.23
	(1.56)	(0.08)	(0.28)	**(2.01)**	**(2.35)**	(0.32)	(0.35)
5	**0.76**	0.08	0.44	0.46	**1.25**	**2.56**	**2.48**
	(2.50)	(0.36)	(1.31)	(1.02)	**(2.23)**	**(2.62)**	**(2.53)**
5-1	0.35	0.19	0.25	0.12	0.67	1.69	1.50
	(0.54)	(0.56)	(0.36)	(0.14)	(0.63)	(1.53)	(1.38)

Panel B

		Equal Weighted Five-Factor Alpha of Gross Returns					
		Active Share					
Holding Duration	Uncond.	1	2	3	4	5	5-1
Uncond.		0.30	0.58	0.02	0.25	0.88	0.57
		(1.03)	(1.29)	(0.03)	(0.33)	(1.02)	(0.67)
1	-0.13	0.49	0.16	-0.52	0.02	0.31	-0.18
	(0.18)	(0.96)	(0.23)	(0.59)	(0.02)	(0.30)	(0.17)
2	-0.17	0.30	0.98	-0.37	-1.25	-0.65	-0.95
	(0.28)	(0.60)	(1.47)	(0.47)	(1.46)	(0.62)	(0.89)
3	0.44	0.11	1.24	0.05	-0.14	0.54	0.43
	(0.75)	(0.29)	(1.89)	(0.07)	(0.13)	(0.47)	(0.38)
4	0.83	0.02	0.11	1.03	1.73	0.82	0.80
	(1.78)	(0.06)	(0.25)	(1.73)	(1.93)	(0.87)	(0.78)
5	**1.04**	0.40	0.32	0.94	**1.72**	**3.39**	**2.99**
	(2.20)	(1.26)	(0.64)	(1.30)	**(2.01)**	**(2.98)**	**(2.46)**
5-1	1.17	-0.09	0.16	1.45	1.71	**3.08**	**3.17**
	(1.69)	(0.17)	(0.20)	(1.33)	(1.53)	**(2.73)**	**(2.50)**

Table 7

Active Share and Fund Duration: Evidence from Institutional Investor Sample

Panel A reports the five-factor alphas of average equally-weighted holdings-based excess returns (over the risk free rate) for the institutional investor sample conditional on Fund Duration and Active Share. Panel B reports the equally-weighted average DGTW-adjusted holdings-based abnormal returns. five-factor alphas are obtained by regressing the average holdings-based excess returns on three Fama and French factors, the momentum factor and the Pastor and Stambaugh traded liquidity factor. Average equally weighted abnormal returns for quintile portfolios obtained by sorting funds either on Active Share or on Fund Duration are presented in first row and column respectively. Average abnormal returns for 25 portfolios obtained by independently sorting funds into quintiles based on Fund Duration and Active Share are also reported. Panel C reports the five-factor alphas of average equally-weighted holdings-based excess returns for the institutional investor sample conditional on Fund Turnover Ratio (Gaspar, Massa and Matos (2005)) and Active Share. All the returns are in yearly percentages. Significance at the 5% level is denoted in bold, and t-statistics are given in parentheses.

Panel A

		Equal Weighted Five-Factor Alpha of Gross Returns					
		Active Share					
Holding Duration	Uncond.	1	2	3	4	5	5-1
Uncond.		0.46	0.48	0.52	0.59	**1.57**	1.11
		(1.63)	(1.52)	(1.49)	(1.17)	**(2.35)**	(1.63)
1	0.57	0.40	0.19	0.31	0.11	1.24	0.83
	(1.03)	(1.22)	(0.42)	(0.57)	(0.16)	(1.58)	(1.07)
2	0.52	0.42	-0.02	0.24	0.36	1.46	1.05
	(1.20)	(1.65)	(-0.05)	(0.63)	(0.64)	(1.83)	(1.44)
3	0.48	0.14	0.36	0.60	0.80	0.54	0.40
	(1.31)	(0.57)	(1.10)	(1.68)	(1.39)	(0.67)	(0.51)
4	**0.79**	0.34	0.61	0.38	**1.34**	1.69	1.35
	(2.28)	(1.11)	(1.78)	(0.99)	**(2.59)**	(1.72)	(1.38)
5	**1.26**	0.79	0.80	1.17	1.11	**3.58**	**2.79**
	(3.11)	**(2.01)**	(1.92)	**(2.65)**	(1.84)	**(3.77)**	**(3.06)**
5-1	0.69	0.39	0.61	0.86	1.00	**2.34**	**1.95**
	(1.06)	(1.23)	(1.24)	(1.37)	(1.28)	**(2.20)**	**(2.00)**

Panel B

		Equal Weighted DGTW-Adjusted Gross Returns					
		Active Share					
Holding Duration	Uncond.	1	2	3	4	5	5-1
Uncond.		0.10	0.18	**0.42**	**0.70**	**1.27**	**1.17**
		(0.64)	(1.05)	**(2.29)**	**(2.45)**	**(2.72)**	**(2.27)**
1	0.58	0.12	0.20	0.43	0.53	0.86	0.74
	(1.44)	(0.62)	(0.70)	(1.12)	(1.04)	(1.44)	(1.22)
2	0.51	0.16	0.08	0.28	0.44	**1.29**	**1.13**
	(1.88)	(0.99)	(0.35)	(1.08)	(1.25)	**(2.22)**	**(1.97)**
3	0.40	0.03	0.09	**0.45**	**0.90**	0.71	0.68
	(1.86)	(0.21)	(0.46)	**(2.07)**	**(2.76)**	(1.15)	(1.11)
4	**0.52**	0.02	0.27	0.29	**1.21**	1.47	1.45
	(2.79)	(0.15)	(1.32)	(1.35)	**(4.05)**	(1.84)	(1.76)
5	**0.67**	0.18	0.24	**0.62**	**0.78**	**2.62**	**2.44**
	(2.63)	(0.72)	(0.92)	**(2.22)**	**(1.97)**	**(3.50)**	**(3.29)**
5-1	0.09	0.06	0.05	0.19	0.24	1.75	**1.69**
	(0.17)	(0.25)	(0.12)	(0.36)	(0.36)	(1.85)	**(1.97)**

Panel C

		Equal Weighted Five-Factor Alpha of Gross Returns					
		Active Share					
Fund Turnover	Uncond.	1	2	3	4	5	5-1
1	**1.06**	**0.83**	**0.92**	0.80	1.00	**2.49**	1.66
	(2.53)	**(2.11)**	**(2.14)**	(1.65)	(1.64)	**(2.57)**	(1.73)
2	**0.88**	0.41	0.56	**0.91**	**1.34**	**1.77**	1.36
	(2.56)	(1.34)	(1.62)	**(2.41)**	**(2.53)**	**(2.10)**	(1.60)
3	0.51	0.22	0.29	0.38	0.64	1.55	1.33
	(1.35)	(0.86)	(0.92)	(1.01)	(1.16)	(1.74)	(1.59)
4	0.60	0.18	-0.11	0.22	0.29	**1.97**	**1.79**
	(1.37)	(0.67)	(-0.31)	(0.53)	(0.49)	**(2.52)**	**(2.46)**
5	0.58	0.39	0.31	0.45	0.26	0.94	0.55
	(1.03)	(1.14)	(0.67)	(0.85)	(0.38)	(1.19)	(0.70)
5-1	-0.48	-0.45	-0.61	-0.35	-0.74	-1.56	-1.11
	(0.72)	(1.40)	(1.21)	(0.53)	(0.93)	(1.46)	(-1.10)

Table 8

Institutional Investors' Active Share and Fund Duration: Multivariate Regressions

This table presents yearly pooled panel regressions of future one-year holdings returns (columns 1 – 3) or the future one-year DGTW-adjusted holding returns (columns 4 – 6) on lagged Fund Duration (INSTDURATION), dummies for High and Low Active Share quintiles, fund turnover ratio (TURNOVER), interaction between Active Share dummies and Fund Duration and interaction between Active Share dummies and fund turnover ratio. Logarithm of Fund's Total Portfolio Value (PORT_VAL), sector fixed-effects and year fixed-effects are included as control variables. All independent variables are measured at the end of previous year. Adjusted t-statistics based on standard errors clustered by fund and year are given in parentheses and *,**,*** indicate significance at the 10, 5, and 1 percent levels respectively.

	Pooled Panel Regressions					
	Excess Holdings Return (over risk-free rate)			DGTW Adjusted Holdings Return		
Independent Variable	1	2	3	4	5	6
INTERCEPT	13.811***	14.235***	13.547***	-1.630*	-1.334*	-1.823**
	(13.65)	(14.99)	(13.29)	(1.91)	(1.75)	(2.08)
INSTDURATION	0.035	-0.211	0.072	0.045	-0.109	0.082
	(0.07)	(0.38)	(0.13)	(0.11)	(0.28)	(0.20)
HIGH ACTIVESHARE	1.561	0.717	2.471**	1.054	0.330	1.753**
	(1.47)	(0.59)	(2.16)	(1.45)	(0.35)	(2.31)
LOW ACTIVESHARE	-0.867*	-1.499	-0.547	-0.433*	-0.539	-0.301**
	(1.69)	(1.52)	(1.59)	(1.86)	(1.14)	(1.97)
TURNOVER	0.139	0.137	0.325*	0.015	0.025	0.151
	(0.84)	(0.81)	(1.78)	(0.12)	(0.21)	(1.12)
INSTDURATION*HIGH ACTIVESHARE		0.721**			0.618*	
		(2.13)			(1.71)	
INSTDURATION*LOW ACTIVESHARE		0.408			0.100	
		(1.30)			(0.62)	
TURNOVER*HIGH ACTIVESHARE			-0.464***			-0.355***
			(3.78)			(3.46)
TURNOVER*LOW ACTIVESHARE			-0.243			-0.075
			(0.75)			(0.44)
LOG(PORT_VAL)	0.128	0.117	0.118	0.025	0.012	0.015
	(1.45)	(1.28)	(1.32)	(0.43)	(0.20)	(0.27)
Year and Style Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Clustered(Year, Fund)	Yes	Yes	Yes	Yes	Yes	Yes
Rsquare (%)	67.96	67.97	67.98	2.37	2.41	2.41
Nobs	37,926	37,926	37,926	37,926	37,926	37,926
Number of Years	29	29	29	29	29	29

Table 9

Explaining the High Active Share and Long Fund Duration Fund Outperformance: Evidence from Factor Loadings

This table reports the regression coefficients obtained by regressing the monthly returns of the top quintile Active Share, top Fund Duration quintile portfolio (Long) or the top Active Share, bottom Fund Duration quintile portfolio (Short) or the Long-Short portfolio (L/S) obtained from these two portfolios on seven different factors that are shown in literature to capture the cross-sectional variation in stock returns: market factor (Mkt-rf), size (SmB), value (HmL), momentum (UmD), systematic liquidity (Liquidity), betting against beta (BaB) and quality minus junk (QmJ) – see the text for further description. The intercept is denoted by Alpha. Panel A estimates the regressions for the mutual fund sample where the dependent variable is net mutual fund returns in excess of the risk free rate. Panel B estimates a similar set of regressions separately for the institutional investor sample. The dependent variable in Panel B is the holdings-based returns in excess of the risk free rate. All the returns are in yearly percentages. t-statistics are in parentheses and *,**,*** indicate significance at the 10, 5, and 1 percent levels respectively.

Panel A

	(1) L/S	(3) L/S	(3) Long	(4) Short	(5) L/S	(6) Long	(7) Short
Alpha (%)	3.28**	3.68***	2.05*	-1.63	1.27	-1.01	-2.28**
	(2.40)	(3.54)	(1.95)	(1.62)	(1.23)	(1.01)	(2.12)
Mkt-rf	-0.15***	-0.11***	0.97***	1.08***	0.00	1.09***	1.10***
	(5.83)	(5.08)	(46.24)	(53.31)	(0.14)	(46.55)	(43.29)
SmB		-0.19***	0.40***	0.59***	-0.07**	0.54***	0.61***
		(6.92)	(14.45)	(22.16)	(2.30)	(18.23)	(19.11)
HmL		0.23***	0.27***	0.04	0.25***	0.27***	0.02
		(7.85)	(9.09)	(1.36)	(7.88)	(8.76)	(0.55)
UmD		-0.12***	-0.08***	0.04**	-0.15***	-0.12***	0.03
		(6.64)	(4.30)	(2.38)	(8.44)	(7.17)	(1.45)
Liquidity		-0.02	-0.01	0.01	-0.02	-0.01	0.00
		(0.99)	(0.69)	(0.31)	(0.88)	(0.76)	(0.14)
BaB					0.00	0.04	0.04
					(0.08)	(1.63)	(1.44)
QmJ					0.30***	0.35***	0.05
					(6.87)	(8.37)	(1.16)
N	288	288	288	288	288	288	288
R-sq	0.11	0.52	0.92	0.94	0.59	0.94	0.94

Panel B

	(1) L/S	(3) L/S	(3) Long	(4) Short	(5) L/S	(6) Long	(7) Short
Alpha (%)	2.87**	2.34**	3.58***	1.24	0.67	1.88*	1.21
	(2.54)	(2.20)	(3.77)	(1.58)	(0.61)	(1.93)	(1.49)
Mkt-rf	-0.19***	-0.14***	0.96***	1.10***	-0.07***	1.02***	1.09***
	(9.33)	(6.74)	(52.94)	(73.84)	(2.75)	(47.24)	(60.55)
SmB		-0.20***	0.21***	0.42***	-0.11***	0.29***	0.40***
		(7.04)	(8.32)	(19.81)	(3.08)	(9.71)	(15.84)
HmL		0.08***	0.23***	0.15***	0.14***	0.24***	0.10***
		(2.61)	(8.46)	(6.74)	(4.03)	(7.68)	(3.79)
UmD		0.02	-0.06***	-0.08***	0.01	-0.09***	-0.10***
		(1.32)	(3.48)	(6.05)	(0.44)	(5.00)	(6.61)
Liquidity		-0.02	0.00	0.02	-0.01	0.00	0.01
		(1.07)	(0.21)	(1.22)	(0.54)	(0.06)	(0.81)
BaB					-0.05*	0.03	0.08***
					(1.85)	(1.16)	(3.89)
QmJ					0.24***	0.20***	-0.05
					(5.04)	(4.61)	(-1.27)
N	348	348	348	348	348	348	348
R-sq	0.20	0.34	0.91	0.96	0.39	0.92	0.96

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Online Appendix to

Patient Capital Outperformance:

The Investment Skill of High Active Share Managers Who Trade Infrequently

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Appendix A

Table A1

Mutual Fund Sample: Medians by Year.

This table provides annual descriptive statistics for the mutual fund sample. Median values for the variables are reported for each sample year.

Year	# of Funds	TNA	Expense Ratio	# Stocks	Active Share	Fund Duration	Fund Turnover Ratio	Fund Holding Turnover
1984	63	167.3	0.91%	63	88%	1.12	52%	1.19
1985	85	201.6	0.91%	64	89%	0.98	57%	1.61
1986	88	196.1	0.92%	63.5	90%	1.07	59%	1.41
1987	79	219.6	0.84%	61	86%	1.14	60%	1.62
1988	104	167.4	1.00%	58.5	90%	1.21	64%	1.33
1989	89	184.0	1.06%	55	87%	1.33	52%	1.30
1990	86	143.8	1.09%	60.5	87%	1.36	42%	1.10
1991	104	227.0	1.04%	77	84%	1.42	47%	1.24
1992	165	198.1	1.13%	67	88%	1.27	46%	1.18
1993	163	215.5	1.17%	69	89%	1.28	44%	1.23
1994	225	189.1	1.09%	70	87%	1.11	46%	1.26
1995	355	190.5	1.12%	73	87%	0.89	54%	1.56
1996	482	232.5	1.13%	75	86%	0.86	58%	1.58
1997	540	268.2	1.15%	72	86%	0.87	63%	1.51
1998	696	314.2	1.14%	72	83%	0.91	67%	1.59
1999	817	273.6	1.16%	70	81%	0.93	67%	1.62
2000	878	265.3	1.17%	72	77%	0.90	76%	1.59
2001	975	249.9	1.23%	73	75%	0.91	80%	1.46
2002	1114	172.5	1.25%	75	75%	1.02	70%	1.36
2003	1112	210.6	1.29%	77.5	76%	1.09	69%	1.47
2004	1112	227.1	1.26%	77	78%	1.14	67%	1.42
2005	1137	241.2	1.24%	76	80%	1.19	66%	1.42
2006	1156	241.4	1.21%	74	81%	1.20	65%	1.43
2007	1062	269.5	1.17%	71	81%	1.25	65%	1.37
2008	1075	176.9	1.15%	73	79%	1.24	72%	1.39
2009	1104	228.7	1.16%	81	80%	1.20	75%	1.45
2010	1174	238.5	1.10%	75	79%	1.23	59%	1.31
2011	1145	282.9	1.09%	73	79%	1.42	56%	1.20
2012	1128	318.3	1.08%	72	79%	1.56	50%	1.14
2013	1002	439.9	1.08%	74	80%	1.72	50%	1.14

Table A2

Percentage of assets in Fund Duration/Active Share groups.

This table reports the percentage of assets in each of the 25 Fund Duration/Active Share groups obtained by independently sorting funds into quintiles at the end of each year by their Fund Duration and Active Share values.

		Active Share					
		Q1	Q2	Q3	Q4	Q5	Sum
Fund Duration	Q1	3.2%	2.4%	1.6%	1.4%	1.1%	9.7%
	Q2	3.7%	3.5%	2.6%	1.7%	1.2%	12.7%
	Q3	4.3%	3.9%	2.9%	2.4%	1.7%	15.2%
	Q4	6.0%	5.5%	3.8%	3.2%	2.4%	20.8%
	Q5	14.6%	9.8%	7.5%	5.8%	3.9%	41.6%
	Sum	31.8%	25.1%	18.4%	14.4%	10.3%	

Table A3

Institutional Investor Sample: Medians by Year.

This table provides annual descriptive statistics for the institutional investor sample. Median values for the variables are reported for each sample year.

Year	# of Funds	TNA	# Stocks	Active Share	Fund Duration	Fund Holding Turnover	% Total Market Cap
1983	483	441.8	130	70%	1.40	1.06	40%
1984	558	400.2	132.5	71%	1.43	1.00	42%
1985	608	444.5	140.5	71%	1.37	1.14	44%
1986	649	490.8	142	73%	1.29	1.13	45%
1987	716	413.3	128	73%	1.28	1.13	44%
1988	750	399.0	119.5	75%	1.29	0.95	46%
1989	802	458.6	123	73%	1.31	1.06	47%
1990	838	357.4	114.5	72%	1.43	0.94	48%
1991	875	474.5	119	72%	1.44	0.94	50%
1992	927	491.4	117	74%	1.43	0.96	50%
1993	979	469.5	120	77%	1.35	1.05	51%
1994	1019	406.0	115	76%	1.36	1.00	51%
1995	1089	487.8	112	75%	1.39	1.08	52%
1996	1131	513.3	115	75%	1.39	1.09	54%
1997	1222	575.0	119	76%	1.37	1.11	55%
1998	1335	547.0	115	73%	1.32	1.06	56%
1999	1420	540.7	107	72%	1.20	1.21	53%
2000	1493	468.2	103	71%	1.19	1.18	57%
2001	1590	372.4	92.5	71%	1.20	1.03	58%
2002	1675	269.0	87	73%	1.22	0.98	61%
2003	1664	356.9	92	74%	1.34	0.97	62%
2004	1797	402.0	88	75%	1.35	0.99	64%
2005	1906	394.0	83.5	77%	1.36	1.04	65%
2006	2051	398.7	81	78%	1.36	1.04	66%
2007	2248	353.1	73	79%	1.31	1.11	66%
2008	2298	181.7	62	78%	1.31	1.15	67%
2009	2405	233.6	66	79%	1.27	1.16	68%
2010	2447	272.9	70	79%	1.28	1.07	67%
2011	2521	262.4	67	78%	1.33	1.05	68%
2012	2455	308.7	70	77%	1.42	0.94	66%

Table A4

Institutional Investors: Summary Statistics.

This table presents the summary statistics for institutional investors sorted into different groups by their Active Share and Fund Duration values. Panel A and Panel B presents the number of institutions and institutional investor assets ($ billion) in different Active Share groups. Panel C and Panel D presents the number of institutions and institutional investor assets ($ billion) in different Fund Duration groups. Panel E reports the percentage of institutional investor assets in each of the 25 Fund Duration/Active Share groups obtained by independently sorting funds into quintiles by their Fund Duration and Active Share values. See the text for a further description.

Panel A

	Number of Institutions								
Active Share	All	BNK	INS	INV	IIA	CPS	PPS	UFE	MSC
0-10	11		1	2	3	2	2		1
10-20	26	5	4		8		8		1
20-30	31	3	4	1	16	3	3		1
30-40	43	10	7	3	14	3	4		2
40-50	118	39	3	1	59	3	3	1	9
50-60	281	52	4	7	189	5	2		22
60-70	437	29	10	4	356	7	1		30
70-80	466	19	7	6	391	4	2	1	36
80-90	470	8	4	8	400	1		3	46
90-100	679	4	2	4	560	6	1	3	99
Total	2,562	169	46	36	1,996	34	26	8	247

Panel B

	Total Assets ($ billion)								
Active Share	All	BNK	INS	INV	IIA	CPS	PPS	UFE	MSC
0-10	728.3		8.9	547.4	29.6	9.7	55.3		77.4
10-20	1,998.9	951.0	146.2		663.1		145.5		93.1
20-30	192.4	10.7	32.7	14.0	80.2	5.2	29.0		20.7
30-40	771.4	229.9	129.8	42.3	329.7	2.0	36.4		1.3
40-50	1,537.5	212.1	11.7	365.0	776.5	1.4	20.5	4.5	145.8
50-60	1,445.1	74.3	47.3	292.7	972.7	27.5	2.5		28.0
60-70	771.1	37.4	30.0	71.3	597.2	7.9	6.6		20.5
70-80	914.7	6.1	9.0	85.7	715.3	1.9	10.1	0.0	86.6
80-90	566.8	2.1	11.4	26.9	458.6	0.7		13.8	53.3
90-100	387.9	2.0	0.1	8.8	301.4	13.0	0.03	1.1	61.6
Total	9,314.0	1,525.6	427.1	1,454.2	4,924.3	69.4	305.9	19.4	588.2

Panel C

	Number of Institutions								
Duration(years)	All	BNK	INS	INV	IIA	CPS	PPS	UFE	MSC
0-0.5	416	4		2	344		1	1	64
0.5-1	515	7	4	3	444	4	3	1	49
1-1.5	532	30	10	12	433	5	5	3	34
1.5-2	419	34	9	5	322	8	4		37
2-2.5	345	40	9	7	249	8	7	2	23
2.5-3	204	37	5	3	129	6	2		22
3-3.5	100	14	5	4	61	3	3	1	9
3.5-4	25	1	3		14		1		6
4-4.5	5	2	1						2
4.5-5	1								1
Total	2,562	169	46	36	1,996	34	26	8	247

Panel D

	Total Assets ($ billion)								
Duration(years)	All	BNK	INS	INV	IIA	CPS	PPS	UFE	MSC
0-0.5	389.8	40.5		3.5	209.6		0.0	0.2	135.9
0.5-1	680.3	44.8	3.4	2.3	561.3	4.2	14.7	0.1	49.4
1-1.5	2,708.7	497.3	136.8	226.3	1,746.9	10.3	36.3	4.9	50.0
1.5-2	2,270.5	198.3	38.8	490.0	1,342.8	7.7	21.7		171.3
2-2.5	1,119.7	28.9	135.3	142.3	657.6	21.5	108.0	14.2	11.9
2.5-3	443.6	34.9	8.6	41.3	310.3	8.4	25.4		14.7
3-3.5	1,628.7	679.4	59.7	548.4	87.5	17.2	91.5	0.01	145.0
3.5-4	18.8	0.1	0.4		8.3		8.3		1.8
4-4.5	48.2	1.4	44.1						2.7
4.5-5	5.6								5.6
Total	9,314.0	1,525.6	427.1	1,454.2	4,924.3	69.4	305.9	19.4	588.2

Panel E

		Active Share					
		Q1	Q2	Q3	Q4	Q5	Sum
Fund Duration	Q1	2.0%	1.4%	1.7%	1.9%	1.0%	7.9%
	Q2	5.2%	4.2%	3.1%	1.9%	0.9%	15.2%
	Q3	14.3%	5.6%	3.5%	1.6%	0.7%	25.7%
	Q4	21.4%	4.4%	3.1%	1.4%	0.7%	31.1%
	Q5	10.6%	4.4%	2.5%	0.9%	1.6%	20.0%
	Sum	53.5%	20.0%	13.9%	7.7%	4.9%	

Table A.5

Active Share and Fund Duration: Mutual Fund Alphas of Benchmark-Adjusted Net Returns.

This table reports abnormal returns for mutual funds conditional on their Active Share and Fund Duration. Funds are assigned to one of the 25 portfolios at the end of each year by independently sorting into quintiles based on Fund Duration and Active Share measures. Returns are then calculated over next one year. Panel A reports the equally weighted five-factor alpha obtained as the intercept from the regression of the average monthly net fund returns in excess of their self-declared benchmark on three Fama and French factors, the Carhart momentum factor and the Pastor and Stambaugh traded liquidity factor. If the self-declared benchmark is missing, then the benchmark index with minimum deviation is assigned as that fund's benchmark. The first row reports the returns for five portfolios obtained by sorting funds unconditionally into quintiles by their Active Share. Similarly, the first column reports alphas for portfolios obtained by sorting unconditionally on Fund Duration measure. Rest of the Panel present returns for portfolios obtained by sorting both on Fund Duration and then on Active Share. Panel B presents the value-weighted five-factor alphas.

Panel A

	Equal Weighted Five-Factor Alpha of Benchmark Adjusted Net Returns						
		Active Share					
Fund Duration	Uncond.	1	2	3	4	5	5-1
Uncond.		-0.38	-0.38	-0.46	0.06	1.40	**1.79**
		(0.41)	(0.36)	(0.41)	(0.05)	(1.06)	**(2.99)**
1	-0.53	-0.90	-0.69	-0.58	-0.28	0.05	0.95
	(0.44)	(0.94)	(0.61)	(0.46)	(0.20)	(0.04)	(1.06)
2	-0.29	-0.56	-0.67	-0.71	-0.41	0.67	1.23
	(0.26)	(0.57)	(0.61)	(0.57)	(0.33)	(0.46)	(1.46)
3	0.11	-0.55	0.08	-0.72	0.33	1.34	1.89
	(0.10)	(0.57)	(0.08)	(0.64)	(0.25)	(0.87)	(1.93)
4	0.28	-0.44	-0.70	0.10	0.47	1.98	**2.43**
	(0.26)	(0.48)	(0.67)	(0.08)	(0.39)	(1.44)	**(3.35)**
5	0.68	-0.10	-0.24	0.12	1.06	**3.57**	**3.67**
	(0.63)	(0.10)	(0.23)	(0.11)	(0.85)	**(2.44)**	**(4.10)**
5-1	**1.21**	**0.79**	0.45	0.70	1.34	**3.51**	**2.72**
	(2.52)	**(1.98)**	(0.79)	(0.93)	(1.42)	**(3.60)**	**(2.72)**

Panel B

	Value Weighted Five-Factor Alpha of Benchmark Adjusted Net Returns						
		Active Share					
Fund Duration	Uncond.	1	2	3	4	5	5-1
Uncond.		0.08	-0.05	-0.69	-0.21	1.57	1.49
		(0.08)	(0.05)	(0.62)	(0.16)	(1.02)	(1.78)
1	-1.16	-0.53	-0.85	-1.18	-1.49	-2.12	-1.59
	(0.92)	(0.47)	(0.65)	(0.86)	(0.93)	(1.33)	(1.56)
2	-0.99	-0.25	-0.69	-0.66	-2.29	-0.47	-0.23
	(0.85)	(0.23)	(0.57)	(0.50)	(1.56)	(0.29)	(0.20)
3	0.28	-0.77	1.47	-0.90	0.61	1.43	2.19
	(0.24)	(0.75)	(1.13)	(0.81)	(0.40)	(0.80)	(1.79)
4	0.38	0.01	-0.56	-0.76	0.20	**3.72**	**3.71**
	(0.35)	(0.01)	(0.51)	(0.57)	(0.16)	**(2.25)**	**(3.14)**
5	0.52	0.50	0.02	0.23	0.55	2.97	**2.47**
	(0.47)	(0.46)	(0.01)	(0.19)	(0.38)	(1.80)	**(2.38)**
5-1	**1.68**	1.03	0.86	1.41	2.04	**5.09**	**4.06**
	(3.06)	(1.71)	(1.11)	(1.56)	(1.66)	**(4.31)**	**(3.26)**

Table A.6

Mutual Fund Active Share and Fund Duration: Additional Regression Evidence

This table presents results for pooled-panel regressions of future one year five-factor alphas of net fund return (columns 1 – 3) or benchmark-adjusted yearly net returns (columns 4 – 6) on lagged Fund Duration, dummies for High and Low Active Share quintiles, fund turnover ratio, average past turnover ratio (defined in Pastor, Stambaugh and Taylor (2014) as a ratio of most recent turnover ratio and average past turnover ratio), interaction between Active Share dummies and different fund characteristics. Tracking Error, Logarithm of Fund's Total Net Assets, expense ratio, Flows, Flow-Volatility measured over past five years, benchmark fixed effects and year fixed effects are also included as control variables. All independent variables are measured at the end of previous year. Adjusted t-statistics based on standard errors clustered by fund and year are given in parentheses and *,**,*** indicate significance at the 10, 5, and 1 percent levels respectively.

	Pooled Panel Regressions Dependent Variable					
	Five-Factor Alpha of Net Return			Benchmark Adjusted Yearly Net Return		
Independent Variable	1	2	3	4	5	6
MFDURATION	0.54***	0.37*	0.41**	0.29	0.13	
	(2.86)	(1.87)	(1.99)	(1.15)	(0.43)	
HIGH ACTIVESHARE	0.16	-1.38**	-0.87*	0.91*	0.04	1.66
	(0.46)	(2.13)	(1.69)	(1.81)	(0.07)	(3.05)
LOW ACTIVESHARE	-0.26	-0.81	-0.49	-0.05	-0.29	0.22
	(1.04)	(1.19)	(0.68)	(0.14)	(0.61)	(0.49)
TURN_RATIO	-0.24	-0.23	-0.07	0.02	0.02	0.07
	(0.93)	(0.92)	(0.29)	(0.07)	(0.06)	(0.25)
AVG_PAST_TURN	0.08	-0.06				
	(0.66)	(0.44)				
FLOW	0.20	0.22	0.08	-0.45**	-0.43*	-0.53**
	(0.75)	(0.82)	(0.23)	(2.06)	(1.95)	(2.38)
FLOW5YRVOL			-0.58			
			(0.47)			
MFDURATION*HIGH ACTIVESHARE		0.77***	0.80***		0.66***	
		(2.94)	(3.40)		(3.55)	
MFDURATION*LOW ACTIVESHARE		0.13	0.13		0.17	
		(0.62)	(0.57)		(0.72)	
TURN_RATIO*HIGH ACTIVESHARE						-0.88***
						(3.93)
TURN_RATIO*LOW ACTIVESHARE						-0.29
						(1.09)

AVG_PAST_TURN*HIGH ACTIVESHARE		0.44*				
		(1.71)				
AVG_PAST_TURN*LOW ACTIVESHARE		0.30				
		(1.56)				
FLOW*HIGH ACTIVESHARE			0.38			
			(0.96)			
FLOW*LOW ACTIVESHARE			-0.53			
			(0.83)			
FLOW5YRVOL*HIGH ACTIVESHARE			-1.20			
			(0.47)			
FLOW5YRVOL*LOW ACTIVESHARE			1.37			
			(0.77)			
TRACKING_ERROR	-117.66	-117.08	-70.41	75.29	76.21	84.62
	(1.27)	(1.26)	(0.71)	(0.46)	(0.46)	(0.52)
LOG(TNA)	-0.12*	-0.12*	-0.13*	-0.12	-0.12	-0.10
	(1.71)	(1.79)	(1.95)	(1.14)	(1.19)	(1.06)
EXP_RATIO	0.01	0.01	0.01	-0.01	-0.01	-0.01
	(0.56)	(0.68)	(0.70)	(0.59)	(0.56)	(0.56)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Benchmark Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Clustered (Firm,Year)	Yes	Yes	Yes	Yes	Yes	Yes
Rsquare (%)	9.04	9.19	9.55	32.10	32.15	32.14
Nobs	13,486	13,486	14,289	14,649	14,649	14,649
Number of Years	24	24	23	24	24	24

Table A.7

Minimum Active Share and Fund Duration: Mutual Fund Alphas of Net Returns

This table reports abnormal returns for mutual funds conditional on 'Minimum Active Share' and Fund Duration measures. Following the methodology in Cremers and Petajisto (2009), we calculate a fund's Active Share corresponding to all benchmark indexes in our sample and choose the benchmark index with the minimum Active Share as that fund's benchmark. Funds are assigned to one of the 25 portfolios at the end of each year by independently sorting into quintiles based on their Fund Duration and Minimum Active Share measures. Returns are then calculated over next one year. Panel A reports the equally weighted five-factor alpha obtained as the intercept from the regression of the average monthly net fund returns in excess of the risk free rate on three Fama and French factors, the Carhart momentum factor and the Pastor and Stambaugh traded liquidity factor. The first row reports the returns for 5 portfolios obtained by sorting funds unconditionally into quintiles by their Active Share. Similarly, the first column reports alphas for portfolios obtained by sorting unconditionally on Fund Duration measure. Rest of the Panel present returns for portfolios obtained by sorting both on Fund Duration and Active Share. Panel B presents the value weighted 5 factor alphas. Similarly, Panel C and Panel D report alphas of the equally weighted and value weighted excess mutual fund net returns, using the index-based seven-factor model introduced in Cremers, Petajisto and Zitzewitz (2013).

Panel A

	Equal Weighted Five-Factor Alpha of Net Returns					
	Active Share_Min					
Holding Duration	1	2	3	4	5	5-1
	-1.03	**-1.27**	-0.78	-0.93	-0.57	0.46
	(4.52)	**(3.50)**	(1.36)	(1.34)	(0.71)	(0.56)
1	-0.74	**-1.93**	-0.82	-0.90	-2.05	-1.32
	(1.49)	**(3.14)**	(0.97)	(0.91)	(1.94)	(1.27)
2	**-1.18**	**-1.14**	-1.07	**-2.07**	-1.06	0.12
	(2.70)	**(2.20)**	(1.36)	**(2.41)**	(1.27)	(0.13)
3	**-1.42**	**-1.01**	-1.06	-1.04	-0.46	0.97
	(4.40)	**(2.02)**	(1.41)	(1.20)	(0.38)	(0.78)
4	**-1.25**	**-1.07**	-0.39	0.22	-0.24	1.01
	(3.98)	**(2.33)**	(0.72)	(0.27)	(0.27)	(1.02)
5	**-0.91**	**-1.32**	-0.22	-0.23	1.85	**2.76**
	(3.45)	**(3.11)**	(0.32)	(0.27)	(1.83)	**(2.53)**
5-1	-0.17	0.61	0.60	0.67	**3.90**	**4.07**
	(0.33)	(0.87)	(0.63)	(0.64)	**(3.81)**	**(3.54)**

Panel B

	Value Weighted Five-Factor Alpha of Net Returns					
	Active Share_Min					
Holding Duration	1	2	3	4	5	5-1
	-0.99	**-1.11**	**-1.48**	-1.26	-0.69	0.30
	(3.69)	**(2.27)**	**(2.09)**	(1.77)	(0.89)	(0.36)
1	-0.69	**-2.10**	**-2.49**	-2.00	**-3.51**	**-2.82**
	(1.10)	**(2.65)**	**(2.35)**	(1.81)	**(2.73)**	**(2.14)**
2	-0.84	**-1.95**	-1.45	**-4.34**	-1.53	-0.69
	(1.16)	**(2.39)**	(1.28)	**(3.67)**	(1.56)	(0.61)
3	**-1.09**	-0.29	-0.96	-0.97	-1.29	-0.20
	(2.62)	(0.38)	(0.90)	(0.92)	(1.13)	(0.16)
4	**-1.26**	-0.99	**-2.01**	-0.35	0.65	1.91
	(2.74)	(1.16)	**(2.48)**	(0.37)	(0.64)	(1.57)
5	-0.75	-0.94	-0.25	-0.18	**2.52**	**3.28**
	(1.81)	(1.26)	(0.28)	(0.18)	**(2.48)**	**(2.84)**
5-1	-0.06	1.16	2.24	1.83	**6.03**	**6.10**
	(0.08)	(1.07)	(1.72)	(1.31)	**(4.21)**	**(4.06)**

Panel C

	Equal Weighted Seven-Factor Alpha of Net Returns					
	Active Share_Min					
Holding Duration	1	2	3	4	5	5-1
	-1.26	**-1.43**	-0.72	-0.36	0.43	**1.69**
	(5.94)	**(4.53)**	(1.84)	(0.86)	(0.75)	**(3.00)**
1	-0.89	**-2.18**	-0.74	-0.10	-0.78	0.12
	(1.91)	**(4.49)**	(1.30)	(0.13)	(0.94)	(0.13)
2	**-1.34**	**-1.33**	-0.86	**-1.47**	0.26	**1.60**
	(3.23)	**(2.96)**	(1.39)	**(2.34)**	(0.42)	**(2.28)**
3	**-1.68**	**-1.13**	-1.07	-0.34	0.48	**2.16**
	(5.34)	**(2.38)**	(1.78)	(0.52)	(0.48)	**(2.04)**
4	**-1.55**	**-1.22**	-0.44	0.64	0.82	**2.37**
	(5.23)	**(2.87)**	(0.99)	(1.07)	(1.15)	**(2.98)**
5	**-1.11**	**-1.36**	-0.26	0.14	**2.22**	**3.33**
	(4.74)	**(3.42)**	(0.45)	(0.19)	**(2.93)**	**(4.07)**
5-1	-0.22	0.82	0.48	0.23	**3.00**	**3.22**
	(0.44)	(1.43)	(0.64)	(0.27)	**(3.52)**	**(3.19)**

Panel D

	Value Weighted Seven-Factor Alpha of Net Returns					
	Active Share_Min					
Holding Duration	1	2	3	4	5	5-1
	-1.24	**-1.20**	**-1.25**	-0.60	0.19	**1.43**
	(4.50)	**(2.62)**	**(2.24)**	(1.22)	(0.34)	**(2.41)**
1	-0.87	**-2.25**	**-2.43**	-1.24	**-2.33**	-1.46
	(1.42)	**(3.31)**	**(3.05)**	(1.52)	**(2.18)**	(1.26)
2	-0.89	**-2.09**	-1.10	**-3.63**	-0.26	0.64
	(1.27)	**(2.82)**	(1.11)	**(3.62)**	(0.33)	(0.61)
3	**-1.46**	-0.38	-1.08	-0.25	-0.25	1.21
	(3.38)	(0.51)	(1.16)	(0.28)	(0.24)	(1.12)
4	**-1.56**	-0.97	**-1.71**	-0.13	**1.88**	**3.44**
	(3.29)	(1.31)	**(2.24)**	(0.17)	**(2.12)**	**(3.19)**
5	**-0.97**	-0.94	0.01	0.55	**2.79**	**3.76**
	(2.36)	(1.47)	(0.01)	(0.61)	**(3.18)**	**(3.76)**
5-1	-0.10	1.31	**2.44**	1.79	**5.12**	**5.22**
	(0.14)	(1.48)	**(2.17)**	(1.41)	**(3.82)**	**(3.61)**

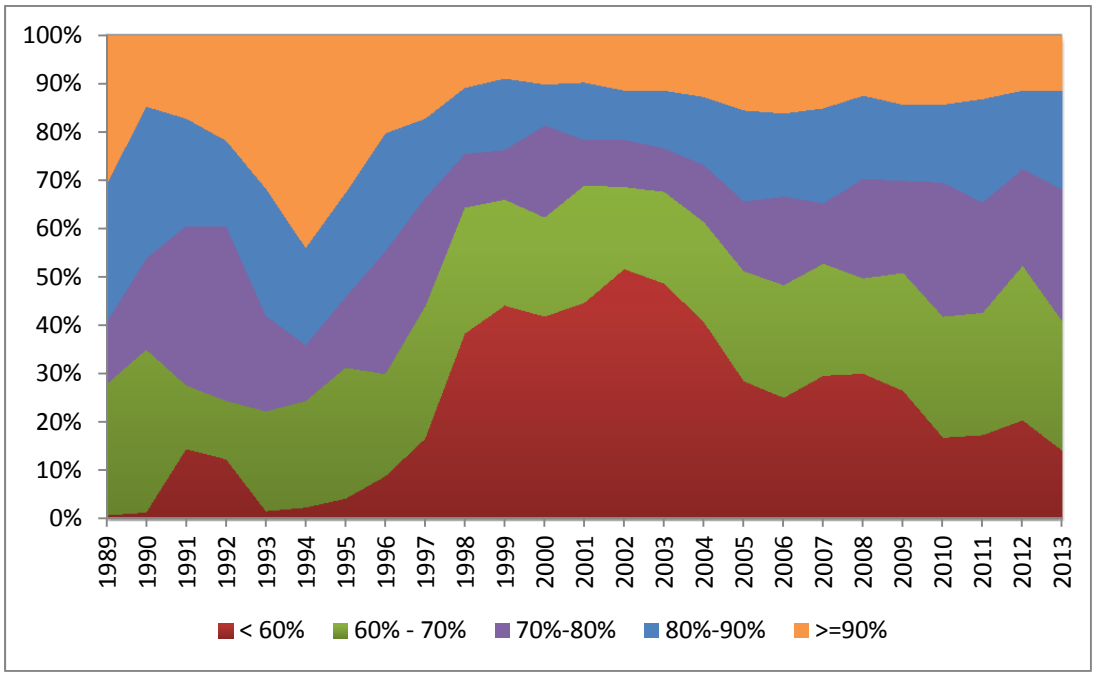


Fig. A.1. Panel A
Percentage of TNA in Actively Managed Mutual Funds by Active Share Range

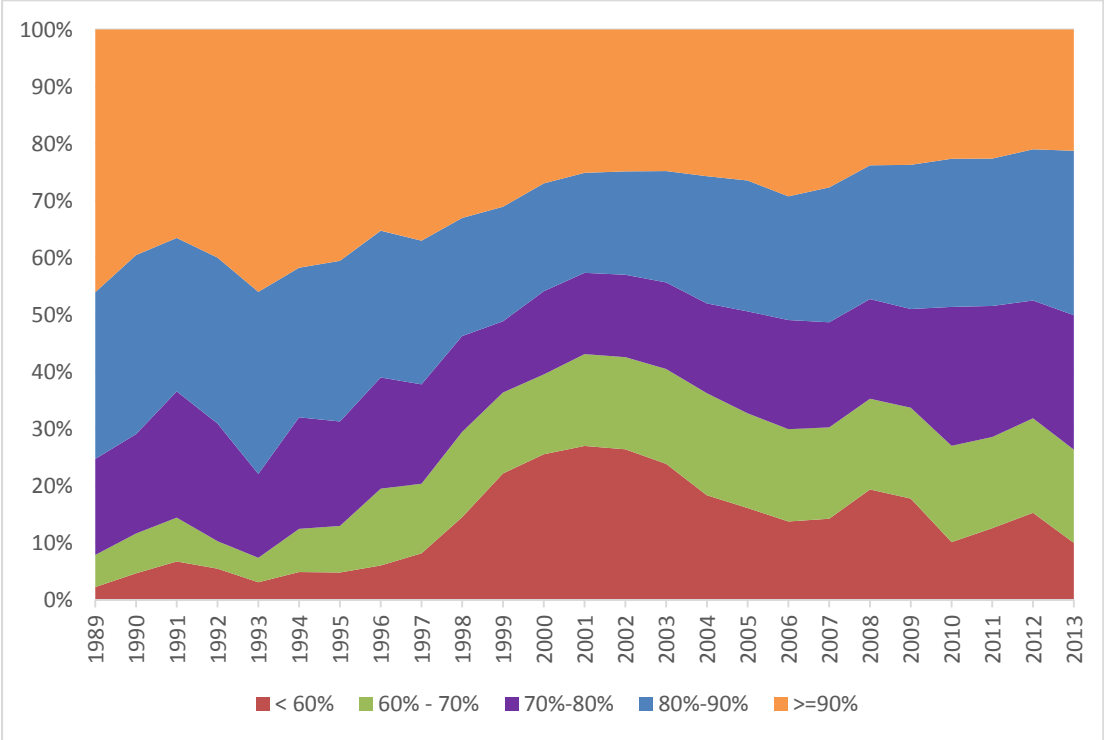


Fig. A.1. Panel B
Percentage of Actively Managed Mutual Funds by Active Share Range

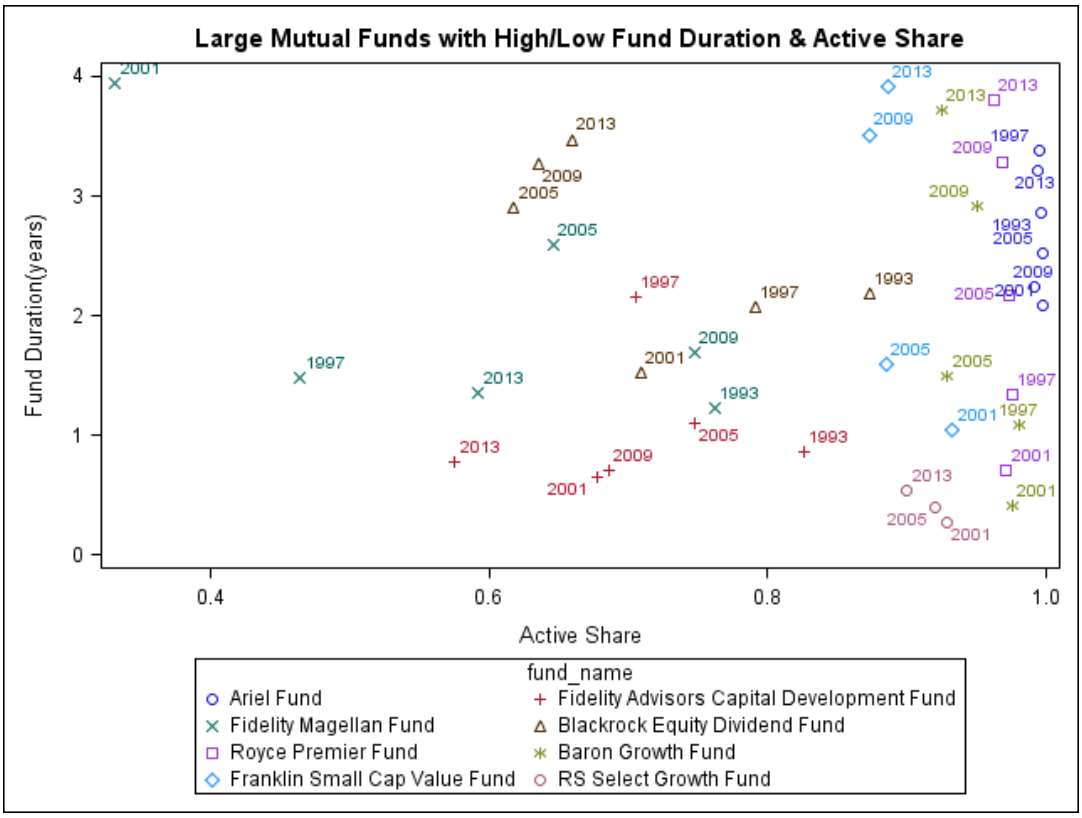


Fig. A.1. Panel C

Examples of Mutual Funds with High/Low Active Share and Fund Duration

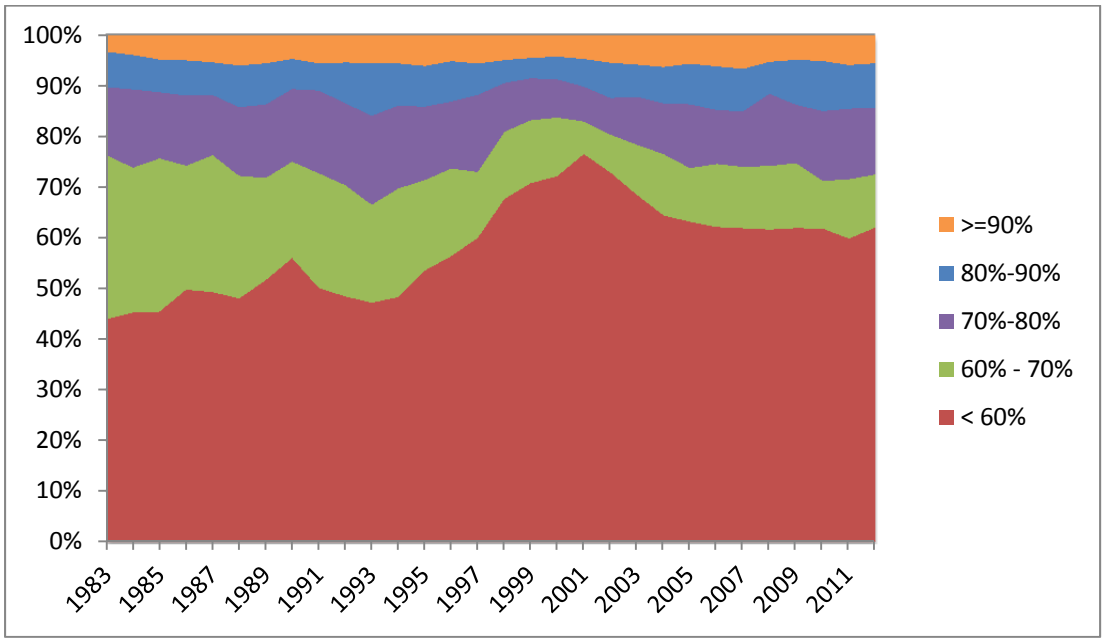


Fig. A.2. Panel A
Percentage of Assets in Institutions by Active Share Range

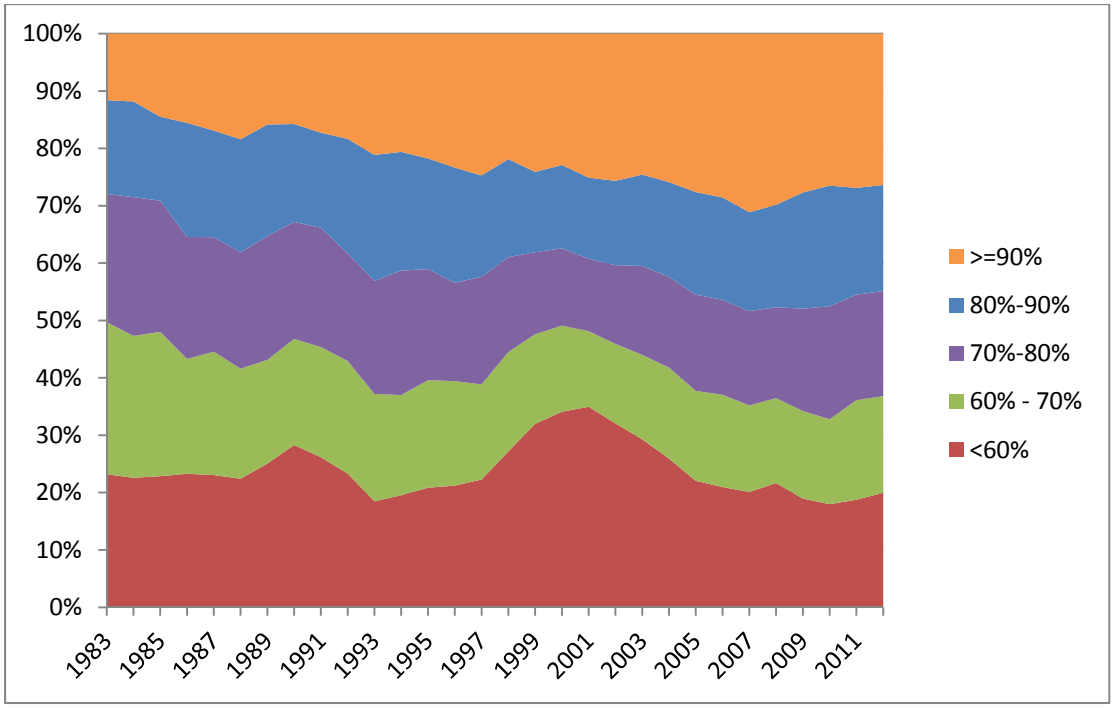


Fig. A.2. Panel B
Percentage of Number of Institutions by Active Share Range

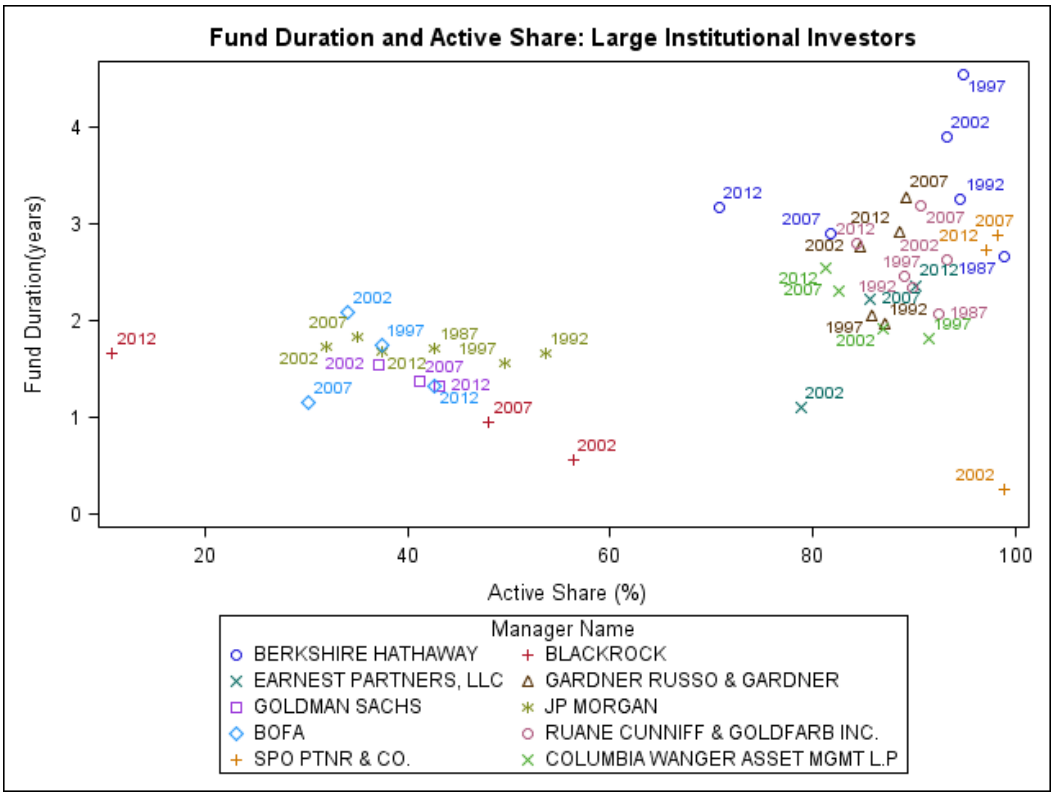
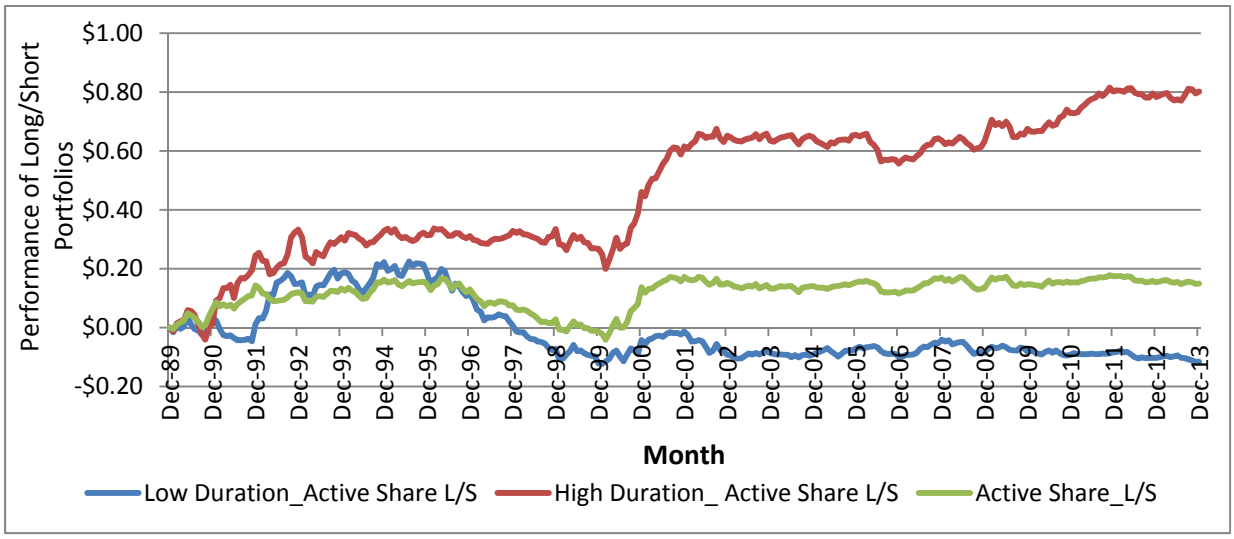


Fig. A.2. Panel C

Examples of Institutional Portfolios with High/Low Active Share and Fund Duration

Panel A



Panel B

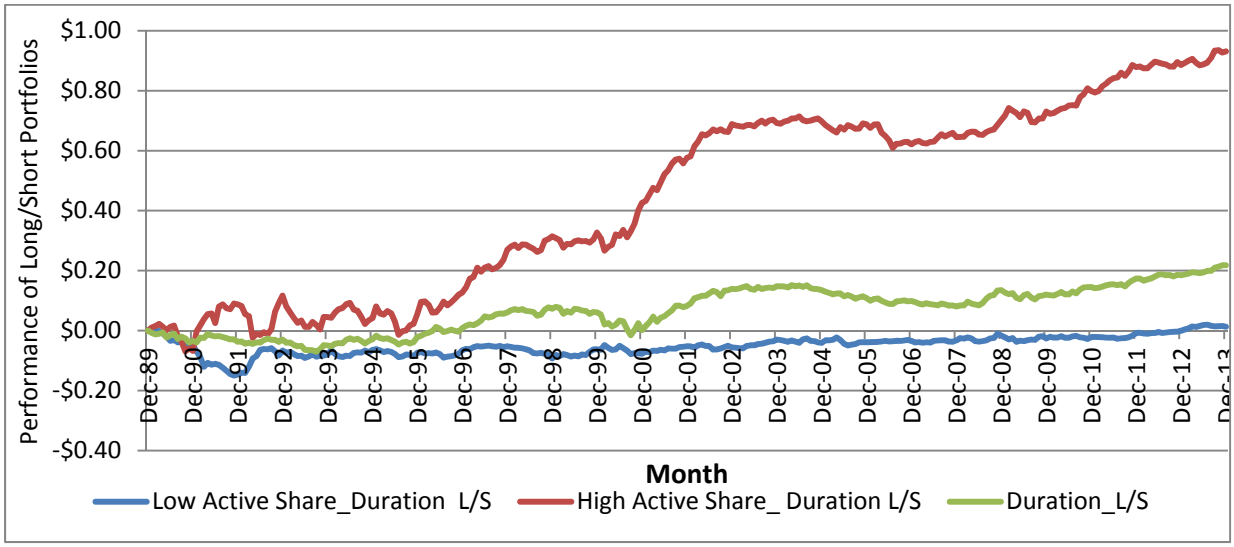
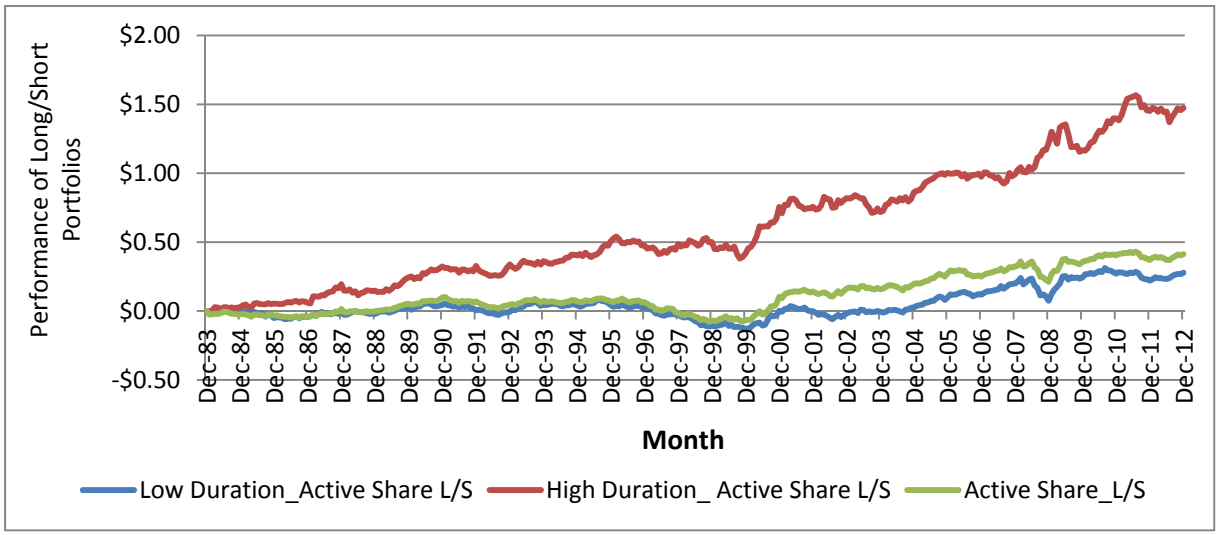


Fig. A.3

Cumulative Abnormal Net Returns for $1 Investment in Mutual Fund Portfolios

Panel A of Appendix Fig. A.3 illustrates the difference in performance of mutual funds with high versus low Active Share, unconditionally and conditional on Fund Duration. After calculating monthly five-factor alphas, we use these to compute the abnormal performance of a $1 investment in different portfolios. The figure plots the difference in the cumulative abnormal performance of investing $1 in the high Active Share quintile portfolio and -$1 in the low Active Share quintile portfolio, for the sample of all funds (in green), among funds in the top Fund Duration quintile only (in red) and among funds in the bottom Fund Duration quintile only (in blue). Panel B plots the difference between funds with long and short Fund Duration, unconditionally and conditional on Active Share.

Panel A



Panel B

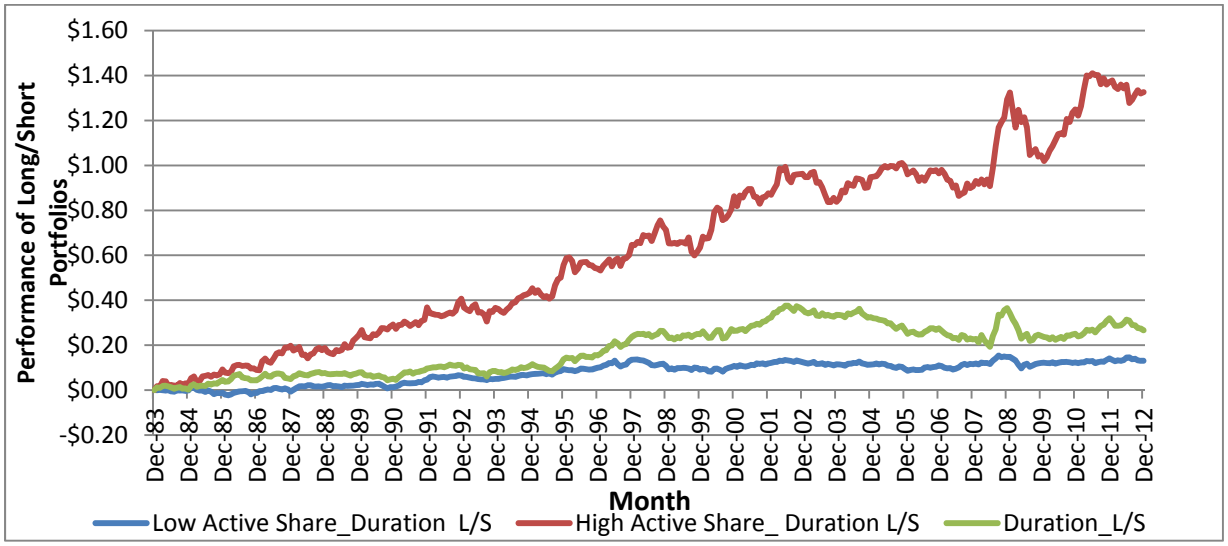


Fig. A.4

Cumulative Abnormal Gross Returns for $1 Investment in Institutional Holdings

Panel A of Appendix Fig. A.4 illustrates the difference in performance of institutional holdings with high versus low Active Share, unconditionally and conditional on Fund Duration. After calculating monthly five-factor alphas, we use these to compute the abnormal performance of a $1 investment in different portfolios. The figure plots the difference in the cumulative abnormal performance of investing $1 in the high Active Share quintile portfolio and -$1 in the low Active Share quintile portfolio, for the sample of all funds (in green), among funds in the top Fund Duration quintile only (in red) and among funds in the bottom Fund Duration quintile only (in blue). Panel B plots the difference between funds with long and short Fund Duration, unconditionally and conditional on Active Share.