

# **Patient Capital Outperformance: The Investment Skill of High Active Share Managers Who Trade Infrequently**

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This paper documents that among high Active Share portfolios – whose holdings differ substantially from the holdings of their benchmark – only those with patient investment strategies (i.e., with long stock holding durations of at least 2 years) outperform their benchmarks on average. Funds trading frequently generally underperform, regardless of Active Share. Among funds that infrequently trade, it is crucial to separate closet index funds – whose holdings largely overlap with the benchmark – from truly active funds. The average outperformance of the most patient and distinct portfolios equals 2.30% per year – net of costs – for retail mutual funds. Stocks held by patient and active institutions in general outperform by 2.22% per year and by hedge funds in particular by 3.64% per year, both gross of costs.

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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 the performance of their benchmark (with actively managed funds generally underperforming their benchmarks but without strong statistical significance on average). 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; and Cremers and Petajisto, 2009). A necessary condition for long-term outperformance is that the actively managed portfolio is substantially different than the benchmark, which is considered in Kacperczyk, Sialm, and Zheng (2005) and Cremers and Petajisto (2009). Both find that mutual funds whose holdings are more different from their benchmarks, on average and in the long-term, outperform their benchmarks net of fees. 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.

Funds with high Active Share have little overlap with the benchmark holdings and thus are truly actively managed. Mutual funds with low Active Shares have similar holdings as their benchmark. Cremers and Petajisto (2009) found that such ‘closet index funds’ have tended to significantly underperform their benchmarks (after fees) in the future by about 1% per year. At the same time, they also found that funds with above 90% Active Share outperformed their benchmarks by about 1% a year, after fees were taken out. Cremers, Ferreira, Matos and Starks (2014) analyze a large international sample of mutual funds domiciled in 32 different countries, and likewise find that high Active Share funds on average outperform their benchmarks in the future while low Active Share funds underperform.

In this paper, we 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 incorporated in the market quickly. As a result, managers may need to frequently trade in order to benefit from their temporary superior information.

On the other hand, fund managers may be able to spot market mispricing that is only reversed over longer periods, requiring strong manager conviction and investor patience. In this case, managers would only outperform by holding stocks over longer periods. This requires a strong conviction on the part of the manager, as stock prices may initially move adversely before reversing any mispricing. Similarly, it requires that investors are fairly patient in giving the manager time to see the strategy through, rather than evaluate the performance over relatively brief periods of time. An investment approach with long holding durations may benefit from opportunities to buy relatively illiquid or deep-value stocks on the cheap (see Amihud, Mendelson and Pedersen, 2005), at the detriment of potentially allowing overconfident fund managers to persist in wrong convictions.

Finally, it seems possible *ex ante* that both short-term and long-term opportunities may co-exist, and that different managers with different skills set, convictions and opportunities focus on where they think 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-lived information advantages, and whether other managers can exploit long-term undervaluation or benefit from an illiquidity premium are thus separate but related empirical questions.

The extant empirical literature has not documented a strong link between fund holding durations (or trading frequency) and subsequent fund performance. We argue that the reason for this, and the explanation that we are able to find a strong association, is that we distinguish between truly actively managed funds and those whose holdings are fairly similar to the benchmarks, i.e., that we distinguish between funds with low versus high Active Share. Among funds with long holding durations, one will naturally find both (closet) index funds and very

active managers who patiently wait for the market to reward their long-term bets against it. Similarly, among funds with short average holding periods, one may expect to find funds which are aggressively trading with the bulk of their portfolio as well as funds which hold substantial positions overlapping the benchmark but who churn or very frequently turn over a smaller fraction of their portfolio.

Our basic set-up is straightforward. We consider both a large sample of actively managed all-equity U.S. retail mutual funds from the CRSP Survivorship-free mutual fund database, and the sample of all aggregated institutional investor portfolios from their quarterly 13F statements. For each sample, we perform 5x5 double sorts of portfolios into holding duration (or turnover) quintiles and Active Share quintiles, and then compare the performance along both dimensions. For our sample of mutual funds, we consider the future performance over the 19-year period from 1995 – 2013, and evaluate the performance of both the net returns to investors after all trading costs and fees (except front and rear-end loads) and of their holdings-based ‘gross’ returns. For our sample of aggregate institutional portfolios, we analyze the longer period of 1986 – 2013, but only consider holdings-based ‘gross’ returns as we do not observe their actual after-fee net returns. We evaluate performance of the net after-cost trading returns after benchmark-adjusting as motivated by Cremers, Petajisto and Zitzewitz (2013) – generally using the mutual funds’ self-declared benchmarks – and evaluate the performance of the gross holdings-based returns after controlling for size and book-to-market characteristics according to Daniel, Grinblatt, Titman and Wermers (1997).

We employ three proxies for how long funds hold stocks in their portfolios. The first proxy is the Fund Duration as recently introduced in Cremers and Pareek (2013) and Cremers, Pareek and Sautner (2013) at the portfolio level. Fund Duration measures the weighted-average length of time that the fund has held \$1 of equities in the portfolio over the last 5 years. The second proxy is the holdings-based fund turnover, which we calculate ourselves for the mutual-fund and institutional quarterly portfolios as in Gaspar, Massa, and Matos (2005). The third proxy is only available for the mutual fund sample, and is the self-declared Fund Turnover Ratio,

i.e., the ratio of all sales / buys in the calendar year over the number of fund shares outstanding.

The median Active Share – i.e., the proportion of portfolio weights that does not overlap with benchmark weights – of mutual funds equals 79% in our sample, with a high of 86% at the beginning of our sample in 1994 and a low of 73% in 2002. 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 thus have holdings that are quite distinct from their benchmarks. The median holding duration in 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.<sup>1</sup>

Our evidence shows that, among high Active Share funds, patiently managed portfolios have been most likely to outperform. Patient funds are those which trade relatively infrequently, i.e., funds with long holding durations or low portfolio turnover. The long-term outperformance of the high Active Share and patient funds is economically remarkable. For example, let’s consider the equally-weighted portfolio of mutual funds where both the Active Share and the Fund Duration are in the top quintile. These patient funds were able to beat their benchmarks in the 12 months following portfolio construction, after costs, by 1.92% per year (t-stat of 2.08). Adjusting the benchmark-adjusted net returns for exposure to the standard five-factors (market, size, book-to-market, momentum and liquidity) increases the outperformance to 2.30% per year (t-stat of 3.14). Compounding this over the 19-year period (1995-2013) produces a cumulative outperformance of 54%.

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<sup>1</sup> The median Active Share for our institution investor sample is similar to the mutual fund sample at 73%, Hedge funds are the most active group of institutions with a median Active Share of 84% and public pension funds are the least active with a median Active Share of 21%. Hedge Funds are also the most short-term with a median Fund Duration of 0.75 years and public pension funds are the most long-term with a median Fund Duration of 2.41 years.

Similarly, the stocks held by high Active Share and patient institutional portfolios outperform by 2.22% per year on average (t-statistic of 4.10), which compounded over the 27-year period (1986-2012) accumulates to an outperformance of 80%. Finally, among patient institutions with high Active Share we find that hedge funds have particularly strong outperformance, with an annualized alpha of 3.64% (t-statistic of 3.04), which compounded over the 19-year period (1994-2012) aggregates to 97% outperformance. In contrast, there is little evidence that the holdings of hedge funds generally outperform (see also Griffin and Xu, 2009). This again highlights the importance of distinguishing between high and low Active Share hedge funds, and among high Active Share hedge funds between short-term and long-term investors.<sup>2</sup>

We find no evidence that even the most active (i.e., high Active Share) mutual funds with short durations or frequent trading were able to outperform their benchmarks on average. Rather, we find that frequently trading mutual funds systematically underperformed 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 and low Active Share (both in the first quintile) underperformed considerably with an abnormal return of -2.46% per year (t-stat of 5.52). The mutual fund portfolio with short Fund Duration and high Active Share funds similarly underperformed with an annual abnormal return of -1.94% (t-stat of 2.45). This suggests that only active bets that were also patient (or longer-term) were rewarded in the markets, while we active short-term mutual fund bets were on average quite unprofitable.<sup>3</sup>

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<sup>2</sup> Our results are robust to removing from our sample the group of institutions whose portfolios are dominated (with portfolio weights above 90%) by one single stock that is held long-term. Examples are the institutional filings of American Express Company, various ESOPs holdings almost exclusively the stock of the sponsoring company, and foundations and endowments whose 13F filings almost exclusively contain a single stock (such as the Gannett Foundation, the General Electric Foundation, the William & Flora Hewlett Foundation, the Robert Wood Johnson Foundation, the Kresge Foundation, the Lilly Endowment and the University of Delaware).

<sup>3</sup> For our institutional sample, the stocks held by institutions (and hedge funds) with short Fund Durations had insignificant alphas and DGTW-adjusted returns. Naturally, that does not mean that these institutions did not outperform or underperform, as we only observe their holdings and not, for example, their within-quarter round-trip trades. The more often an institution trades, the less informative about investment skill the quarter-end holdings will be. Therefore, we cannot conclude anything about the investment skill of the short-term institutions

The lack of profitability from active short-term bets is consistent with the literature arguing that short-term trading by institutional investors is associated with greater pricing efficiency (see, e.g., Collins, Gong, and Hribar, 2003; Ke and Ramalingegowda, 2005; Bartov, Radhakrishnan and Krinsky, 2000; and Boehmer and Kelley, 2009). This literature argues that the stocks in which short-term institutions trade tend to be efficiently priced and thus unlikely to allow profitable short-term trades. On the other hand, Puckett and Yan (2011) find that institutional round-trip trades within the quarter are generally profitable, estimating that these short-term trades add about 26 basis points per year on average. However, Chakrabarty, Moulton and Trzcinka (2014), examining the same data as Puckett and Yan (2011), document that short-term round-trip trades in general (i.e., not limited to only those that are within a calendar quarter) are not profitable. One contribution of our paper is to consider this debate within the context of the large literature on mutual fund performance.

Holding stocks for a relatively long period is in itself on average not associated with greater investment skill. Rather, Active Share matters most among funds with long Fund Durations, while among funds with short Fund Durations the difference in the performance between closet index funds and high Active Share funds is economically small and statistically insignificant. For example and using equal-weighting, the long-short portfolio that is long in funds with high Active Share and long Fund Duration and shorts funds with low Active Share and long Fund Duration has an annualized alpha of 3.47% (t-statistic of 4.78), while the analogous long-short high-low Active Share portfolio among short Fund Duration portfolios has an alpha of 0.44% per year (t-statistic of 0.57).

We try to explain the managerial skill of the high Active Share and patient fund managers by examining their exposure to 7 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 (see Frazzini and Pedersen, 2013) and 'Quality minus Junk (QmJ)' factor (see Asness, Frazzini, and Pedersen, 2013), respectively. We find that these latter two factors can explain

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per se, and only observe that their quarter-end holdings do not exhibit any investment skill. See further our discussion in the next paragraph.

most of the outperformance of the patient and high Active Share managers of mutual funds, but only a fairly small fraction of the gross outperformance of the stocks in the institutional portfolios with high Active Share and long Fund Duration. Specifically, the clear majority of the outperformance of the patient and active mutual fund managers seems due to their picking safe (low beta), value (high book-to-market) and quality (profitable, growing, less valuation uncertainty, higher payout) stocks, and then sticking with their convictions and holding on to those over relatively long periods. Our results thus suggest that Warren Buffett's investment skill (see Frazzini, Kabiller and Pedersen, 2013) seems generally shared by mutual fund managers in the top Active Share and Fund Duration quintiles.

In conclusion, our results indicate that Active Share and Fund Duration are both important dimensions of active management that strongly interact in predicting the ability of fund managers to beat their benchmarks and in predicting the outperformance of the stocks held in institutional portfolios. While long-term fund managers in general were unable to beat their benchmark, only high Active Share managers pursuing patient strategies were successful. This underscores the importance of distinguishing between truly active funds and those funds whose holdings have significant overlapping holdings with their benchmarks. Similarly, our results highlight the importance of distinguishing among the truly active funds between managers pursuing short-term mispricing (generally unsuccessfully in our sample) versus managers who stick with the courage of their convictions and patiently (and in our sample successfully) follow a buy-and-hold strategy with a distinct portfolio.

## **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-free mutual fund database, and the second sample all aggregate institutional investor portfolios from their quarterly 13F statements.



From the CRSP Survivorship-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, which are standard in the literature and were also used in Cremers and Petajisto (2009). 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.<sup>4</sup> 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

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<sup>4</sup> 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 2, 3, 4 or missing. We finally require at least one of these four codes to be non-missing.

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 and combine those with the information in the Thomson Financial database to identify different types of institutions: banks (i.e., equities held in bank trust departments), insurance companies, investment advisors (including mutual funds for retail and institutional clients), hedge funds, pension funds and other (mostly endowments and unclassified institutions).

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 & Poors 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 closet 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. Another advantage of assigning benchmarks using the minimum Active Share is that this requires no return history and can take account of changes in

the fund's style. Finally, 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.

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 (1 benchmark), Down Jones (6 benchmarks, including the DJ Industrial Average, the DJ US Select Dividend, the DJ Wilshire 4500 and the DJ Wilshire 5000 benchmarks), FTSE (4 benchmarks, including the FTSE High Dividend Yield, FTSE RAFI US 100 and Mid Small 1500 benchmarks), Mergent (1 benchmark), MSCI (15 benchmarks, including small, mid and large cap benchmarks plus their value and growth components), NASDAQ (2 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 and Poors (14 benchmarks, including small, mid and large cap benchmarks plus their value and growth components), and Schwab (2 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.

The holdings of the various benchmarks come from a variety of sources. For the Russell and S&P benchmark families – which are the most frequently used as self-declared benchmarks – we have the official benchmark constituent weights, from Russell directly 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.

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:

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

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. Active Share thus sums up the absolute difference in weights across all stocks that are in either the fund or the benchmark and divides that sum by two, treating overweights and underweight identically. 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%. If a fund does not lever up or short, the Active Share will be between 0% and 100%, and measures the size of the active (i.e., different) positions as a fraction of the entire portfolio.

Fund Duration, introduced in Cremers and Pareek (2013), 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 (either a mutual fund or an institutional portfolio), 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 institutional portfolio  $j$  at time  $T-1$ , for all stocks  $i = 1 \dots I$  and all institutional investors  $j = 1 \dots J$ , 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 institution  $j$  between  $t = T-W$  and  $t = T-1$ ;  $t, T$  are in quarters.

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

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

This measure for portfolio holding duration 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. The literature does not provide clear guidance on the value of  $W$  or the time period over which to calculate holding changes. Like Cremers and Pareek (2013), we choose  $W = 20$  quarters because, beyond that, any informational or behavioral effects would seem to be marginal. If stock  $i$  is not included in fund  $j$  at time  $T-1$ , then  $\text{Duration}_{i,j,T-1} = 0$ . We require at least 2 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  $\text{Duration}_{i,j,T-1}$  over all stocks  $i$ , using as weights the market value of the stock holdings in each fund's portfolio.

We can illustrate the construction of the holding duration measure with a simple example. Suppose the institutional portfolio of Fidelity owns two stocks: IBM and Ford. It owns 5% of total shares of IBM, 2% of which it bought 3 quarters back, with the remaining 3% shares bought 5 quarters back. The weighted age of IBM today in Fidelity's portfolio is  $(2\%/5\% \times 3 \text{ quarters} + 3\%/5\% \times 5 \text{ quarters}) = 4.2$  quarters. Also, suppose it currently owns 1% shares of Ford, having bought 5% shares 6 quarters back and having sold 4% of them 1 quarter back. At this point, the portfolio has thus held 1% for 6 quarters, but previously held another 4% for 5 quarters, such that over the past 5 years the weighted average duration (weighted across the percentages of stock owned over time) of Ford is thus  $(4\%/5\% \times 5 \text{ quarters} + 1\%/5\% \times 6 \text{ quarters}) = 5.2$  quarters. Similarly, we calculate this duration measure for every stock-institutional investor 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 by funds 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

the 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 (see Gaspar, Massa, and Matos, 2005).

To evaluate the performance of the fund accruing to the end-investor, we use the benchmark-adjusted return for mutual funds. 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 the fund's exposure to a particular style or to particular stock characteristics. We calculate the five-factor alphas of the benchmark-adjusted net returns to control for any remaining exposure to the market, size, book-to-market, momentum and liquidity factors, using the data for those factors from Ken French's website and the traded liquidity (Pastor-Stambaugh) factor from WRDS.

For both mutual funds and institutional 13F portfolios we calculate the holdings-based return. For this, we assume that all trades between quarterly holdings reports are made just before the holdings report is made public. We update weights also 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 with identical holdings at the beginning of the quarter. We control 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 DGTW-adjusted monthly return of the fund is the weighted-average return of the DGTW-adjusted stock returns using the fund's (adjusted) portfolio weights. We again calculate the five-factor alphas of the holdings-based DGTW-adjusted monthly returns to control for any remaining exposure to the market, size, book-to-market, momentum and liquidity factors.

Given our demanding data requirements (including the requirement of at least 2 years of holdings reports to calculate Fund Duration), we start our performance analysis for the

mutual fund sample at the end of 1994, and for the institutional portfolio sample at the end of 1985. At the beginning of each year, we sort funds into 5 quintile portfolios depending on their Fund Duration, and within each Fund Duration (or fund turnover) quintile we sort funds into 5 quintile portfolios depending on their Active Share. 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 Fama-MacBeth cross-sectional as well as pooled panel performance regressions.

## **2.2 Descriptive Statistics of the Mutual Fund Sample**

Table 1 provides annual descriptive statistics of the mutual fund sample. The number of funds starts at 239 at the end of 1994 and climbs to 1,212 in 2002, and remains fairly stable around 1,200 thereafter. The median fund size equals \$180 million in 1994 and \$418 million at the end of our sample in 2013. Expense ratios have been fairly stable with a median of 1.1% per year. The typical number of stocks in the portfolio is about 73. The median Active Share in our sample equals 86% in 1994, drops to 73% in 2002, after which it climbs back to 80% at the end of the sample. About 66% of the Active Shares are based on the self-declared benchmark from Morningstar Direct, about half the sample in the beginning and about 90% at the end. Median Fund Durations were 1.1 years at the beginning of the sample, shortened a bit to 0.92 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 38% in 1994, 77% in 2001 and dropping to 49% in 2013.

Panel A of Figure 1 shows the percentage of all TNA in our sample at the end of each year by five ranges of Active Share: (i) closet index funds with Active Share (below 60%), (ii) low Active Shares (between 60% and 70%), (iii) moderate Active Share between (70% and 80%), (iv) high Active Share (between 80% and 90%), and (v) very high Active Share (above 90%). The percentage of TNA in closet index funds equals 2% in 1994, climbs to over half the assets in 2002 and steadily drops after that to e.g. 31% in 2008 and only 14% in 2013. The percentage of

assets in very high Active Share funds has been more stable, with a sample-high of 27% at the beginning of our sample in 1995, a low 8.5% in 2001 and equaling 12% in 2013.

Panel B of Figure 1 shows the percentage of funds in our sample at the end of each year with an Active Share in the same five ranges as used in Panel A of Figure 1. Comparing this figure of the percentage of funds to the figure based on TNA shows that most closet index funds in the early 2000s were large funds, though that is much less the case at the end of our sample. A large group of funds has a high Active Share between 80% and 90%, which group comprises 28% of funds in 1994, 18% of funds in 2001 and 29% of funds in 2014. The percentage of very high Active Share funds has steadily declined over time, standing at 38% in 1994, 29% in 1999 and 22% in 2013.

Panel A of Table 2 gives basic descriptive statistics – mean, standard deviation, minimum and maximum – for the main variables in our paper across the full sample. Panel B of Table 2 presents the time series average of the annual quintile breakpoints for sorts on Active Share and the three proxies for trading frequency. The Active Share breakpoints show that the bottom Active Share quintile portfolio consists of closet index funds, and the top Active Share quintile portfolio of very high Active Share funds. On average, funds in the shortest Fund Duration quintile portfolio hold stocks for at most 0.65 years (less than 8 months), while funds in the longest Fund Duration quintile portfolio hold stocks generally longer than 2 years. Fund 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 2 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 most 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. Other notable rank correlations are that funds with high Active Share tend to be smaller (rank correlation of -17% with TNA), more



expensive (rank correlation of 29% with the total expense ratio) and contain fewer stocks (rank correlation of -29% with the number of stocks).

Table D of Table 2 shows the average percentage of TNA in our sample in each of the 25 portfolios in the 5x5 sort on Fund Duration and Active Share, with each of the 25 portfolios containing about the same number of funds. Funds in the shortest Fund Duration quintile tend to be small, representing on average only 9.7% of TNA, 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, i.e., showing that many funds with long holding durations are not very active. This further underscores the importance of separating funds in both Active Share and Fund Duration (or fund turnover) dimensions. In the Active Share dimension, closet index funds in the bottom Active Share quintile on average hold about 32% of the assets in the sample, and the very high Active Share funds in the top quintile hold about 10% of the assets.

Panel A of Figure 3 provides the historical Active Share and Fund Duration for 8 generally large mutual funds. These 8 funds are chosen for their distinctive Active Share and Fund Duration at the end of our sample in 2013, and only serve for illustration. Examples of funds that at the end of the sample have a high Active Share and long Fund Duration (both top quintile), included in this figure, are the the Baron Growth Fund after 2009, the Royce Premier Fund after 2005 and the Ariel Fund also after 2005. All of these funds generally had consistently high Active Shares, though exhibited considerably shorter Fund Durations previously. Examples of funds with low Active Share and high Duration would be the Blackrock Equity Dividend Fund after 2005 and the Fidelity Magellan Fund around 2001. Both funds can also be classified as closet index funds at the end of our sample in 2013, where the Fidelity Magellan Fund has fairly short Fund Duration and the Blackrock Equity Dividend Fund fairly long Fund Duration.

### **2.3 Descriptive Statistics of the Institutional Investor Sample**

Panel A of Table 3 provides descriptive statistics of Active Share and Fund Duration for the institutional investor sample for 1986 – 2012. The mean Active Share and Fund Duration across all institutions in the pooled sample is 73% and 17 months, respectively. As a group,

these institutions own 36% of public traded U.S. equities at the beginning of our sample in 1986, 45% in 2000 and 48% in 2012.

We also report 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), Public Pension Funds (PPS), Corporate Pension Funds (CPS), University and Foundations Endowments (UFE) and other. Independent Investment Advisers (IIA) are the most active with a mean active share of 77% and further within the IIA group, Hedge Funds<sup>5</sup> are most active with mean Active Share of 84%. Panel A of Figure 2 shows that the proportion of assets managed by institutional investors with Active Share less than 60% has gone up from 49.4% in 1985 to 73.5% in 2012. The proportion of assets managed by the active funds with Active Share greater than 80% has been relatively stable at around 10% of total assets (less than half of which is in institutional portfolios with Active Share above 90%). Panel B of Figure 2 shows that the number of funds is fairly evenly distributed across the various Active Share ranges, implying that low Active Share institutional portfolios tend to be much larger in size than the institutional portfolios with high Active Share.

Panels B and C of Table 3 reports the breakdown of number of funds and assets by institutional type and further by various Active Share ranges at the end of our sample period. Independent Investment Advisers is the largest group with 1,944 institutions with a total portfolio value of \$3.47 trillion out of total of 2,491 institutions with an aggregate portfolio value of \$6.64 trillion. Hedge Funds comprised a major portion of the investment advisers group with 707 funds with total portfolio value of \$1.28 trillion. Assets for hedge funds are concentrated in high Active Share groups (except for Blackrock with \$404 billion invested mostly in passive funds with an overall Active Share of 14%, though is still misclassified as a hedge fund). Other major groups of institutions are investment firms with total assets of \$1.05

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<sup>5</sup> We thank Vikas Agarwal for kindly providing us the list of Hedge Funds in Thomson 13F database. This list of hedge funds is based on 13F filings and is manually classified by Agarwal, Jiang, Tang, and Yang ( 2013) and Agarwal, Fos, and Jiang (2013).

trillion which are mostly comprised of the mutual fund companies and Banks which are largely inactive with \$1.1 trillion under management with an average Active Share of 55%.

Similarly, Panels A and B of Appendix 1 presents the breakdown of assets and number of funds by institutional types and Fund Duration ranges. Hedge Funds have the lowest holding duration with more than half of the funds with holding duration less than one year whereas independent investment advisers are evenly distributed with Fund Durations of up to 3.5 years.

At the end of each year, we first sort the institutions into quintiles by Fund Duration and then within each Fund Duration quintile, we further sort the institutions into quintiles based on their year-end Active Share. Panel D of Table 3 reports the average percentage of total institutional investor stock holdings in each of these 5\*5 portfolios sorted by Holding Duration and Active Share, averaged across time. Each of these portfolios includes 4% of total number of institutions in each year but may differ in the amount of assets depending on the size of equities under management at the institutions in each of these portfolios. The low Active Share and high Fund Duration portfolio (bottom and top quintile, respectively), i.e., with passive long-term institutions, comprises of 20.5% of total institutional investor portfolio value. Institutions with high Active Share and long Fund Duration (both top quintile) hold 2.1% of all assets on average, jointly holding equities worth \$93.2 billion in their stock portfolio at the end of 2011.

Panel B of Figure 3 gives some examples across time of large institutional investors whose Active Share and Fund Durations are distinctive. These examples are only chosen as illustrative. The portfolio of publicly traded stocks as reported in the quarter-end 13F holdings of Berkshire Hathaway shows a general lowering of the Active Share over time, while its Fund Duration is about 3 years from 1987 – 1992 and again after 2007, but reached over 4 years around 1997 – 2002. Other large institutions that combine a generally high Active Share and long Fund Duration are Gardner Russo & Gardner, SPO Partners & Co., Ruane Cunniff & Goldfarb, Earnest Partners and Columbia Wanger Asset Management. Blackrock's Active Share is generally low and has particularly declined after 2007, indicating the growing importance of passive products. The quarter-end 13F portfolios reported by Bank of America, Goldman Sachs and JP Morgan can all be classified as closet index funds.

Panel C of Figure 3 shows the Active Share and Fund Duration of nine hedge funds across time, again solely for illustrative purposes. Hedge Funds whose quarter-end 13F holdings exhibit high Active Share and long Fund Duration only MHR Fund Management, Wayzata Investment Partners, Fortress Investment Group and TPG Capital. Hedge funds whose quarter-end 13F portfolios indicate fairly low Active Shares and short Fund Durations include AQR Capital Management (especially after 2008), D.E. Shaw and Citadel Investment Group. Their low Active Shares do not mean that these hedge funds do not tend to take market positions that are substantially different from some benchmark index. As previously mentioned, quarter-end portfolios with fairly short Fund Durations are inherently less reflective of the long side of the trading positions, as the short Fund Duration shows that a considerably part of the institution's trading is likely round trip within the quarter. Therefore, their quarter-end holdings are likely much less informative about the fund's trading strategy relative to institutions with generally long Fund Durations.

### **3. Patience Proxies, Active Share and Fund Performance**

#### **A. Mutual Fund Performance**

Sorting all mutual funds into 5x5 portfolios based on Fund Duration and Active Share results in 25 portfolios. Using monthly performance data from January 1994 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 4 provides the five-factor alphas of the benchmark-adjusted net fund returns using equally (value) weighted portfolios, and Panel C (D) of Table 4 provides the benchmark-adjusted returns themselves again using equally (value) weighted portfolios.

Among all portfolios of funds, only the most active and patiently managed funds have on average been able to outperform their benchmarks in our sample. Active and patient funds are defined as those whose holdings are substantially different than the benchmarks (i.e., have high Active Share) and who trade relatively infrequently (i.e., they have long holding durations or low portfolio turnover). 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 strong. As shown in Panel C of Table 4 using equally-weighted portfolios, these patient funds beat their benchmarks in the 12 months following portfolio construction by 1.76% per year (t-stat of 1.98) after costs.

Adjusting the benchmark-adjusted net returns for exposure to the five-factors (market, size, book-to-market, momentum and liquidity) increases the outperformance to 2.30% per year (t-stat of 3.14), as shown in Panel A of Table 4. Value-weighting the portfolios of mutual funds gives similar results, albeit with weaker statistical significance (outperformance of 1.86% per year and a t-stat of 1.66 after benchmark-adjusting, see Panel D of Table 3, and of 1.85% per year and a t-stat of 1.88 after also adjusting for exposure to the five-factors, see Panel B of Table 4). The weaker statistical significance may be due to a few large funds dominating a portfolio of funds, given the large skew in fund size.

The most active mutual funds with short durations or who frequently trade were generally unable to outperform their benchmarks. Rather, we find that mutual funds that frequently trade on average underperformed their benchmarks by a considerable margin, across all levels of Active Share. For example, the equally-weighted portfolio of mutual fund with short Fund Duration and low Active Share (both in the first quintile) underperformed their benchmarks considerably with an abnormal return of -2.46% per year (t-stat of 5.57 see Panel A of Table 4). The underperformance of the analogous portfolio with short Fund Duration and high Active Share (in the top quintile) similarly underperformed with an annual abnormal return of -1.94% (t-stat of 2.45, again see Panel A of Table 4). We thus find that only active bets that were also patient (or 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 picking 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. However, we do not find that high Active Share funds as a group have economically and statistically meaningful outperformance, but only high Active Share funds that also have longer investment

durations. Unconditionally, the funds in the top Active Share quintile tend to outperform their benchmarks on average for equally-weighted portfolios, but this outperformance is modest economically (e.g., 25 basis points per year alpha in Panel A of Table 4) and not statistically significant (t-statistic of 0.45). Furthermore, the outperformance of the high Active Share funds is on average negative using value-weighted portfolios, showing that large funds with high Active Share (who are naturally weighted more heavily in the value-weighted portfolios) were less likely to outperform, as also found in Cremers and Petajisto (2009).<sup>6</sup>

Longer Fund Duration is associated with better performance, and especially for larger funds. Across all Active Share quintiles, funds with long Fund Duration (top quintile) considerably and statistically significantly outperformed funds with short Fund Duration (bottom quintile) for value-weighted portfolios. The stronger positive association between performance and Fund Duration for larger funds is consistent with those larger funds having more price impact when they trade.

Holding stocks for a relatively long period is in itself on average not associated with managerial skill or significant out- or underperformance, and the only portfolios with long Fund Duration that outperform are those that also contain high Active Share funds. The unconditional portfolio of funds in the top Fund Duration quintile has an economically small and statistically insignificant abnormal return. This suggests that the positive abnormal returns documented by Cremers, Sautner and Pareek (2014) for portfolios of stocks sorted by duration (i.e., averaging Fund Duration over all funds owning the stock, using the dollar amount invested by each fund in the stock as the weights) is due to the stock selection skills of the most active funds rather than to some stock-related anomaly.

Active Share matters most among funds with long Fund Durations, while among funds with short Fund Durations the difference in the performance between closet index funds and high Active Share funds is economically small and statistically insignificant. For example and

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<sup>6</sup> We can reconcile our results from those in Cremers and Petajisto (2009), who reported a four-factor alpha for the highest Active Share quintile portfolio of 1.15% per year with a t-statistic of 1.86, from the differences in time period. Cremers and Petajisto (2009) show results for 1990 – 2003, while our time series extends from 1995 – 2013. In our sample, the cumulative abnormal return of the top Active Share quintile portfolio equals 4% from 1995 to the end of 2003, but is negative -2% from 2004 to the end of 2013.

using equal-weighting, the long-short portfolio that is long in funds with high Active Share and long Fund Duration (both top quintile) and shorts funds with low Active Share and long Fund Duration has an annualized alpha of 4.32% (t-stat of 5.18). In comparison, the analogous long-short high-low Active Share portfolio conditional on short Fund Duration (bottom quintile) has a five-factor alpha of 0.44% per year (t-stat of 0.57).

Panel A of Figure 4 shows the cumulative abnormal net returns of a \$1 investment in the four mutual fund portfolios defined by the extremes in the 5x5 sort on Fund Duration and Active Share. As shown in the figure, the \$1 investment in the portfolio of mutual funds at the end of 1994 would have outperformed a \$1 investment in the portfolio of respective benchmarks over 40% over our time period, while the other portfolios underperformed the benchmarks.

One possible interpretation of these results is that fund managers with very distinct portfolios (i.e., with high Active Share) who also trade a lot may be overconfident. Alternatively, funds in the top Active Share quintile may be focusing on relatively illiquid stocks (i.e., relative to the stocks in the benchmark), and frequent trading in those stocks may significantly hurt performance. This would mean that the impatient and very active fund managers are demanding costly liquidity provision. In subsequent analysis, we try to shed further light upon these alternative explanations.

For robustness, we also consider two alternative proxies for how patient the investing strategy of the fund is, and these results confirm that the outperformance tends to be strongest for funds with high Active Shares that trade more patiently. First, Panel A of Table 5 contains the five-factor alphas based on net benchmark-adjusted returns for equally-weighted portfolios in a double sort of Fund Turnover Ratio and Active Share, and Panel B of Table 5 presents the analogous results for the double sort of Fund Holdings Turnover and Active Share.

Using either proxy, we find that out of the 25 portfolios, the only portfolios with positive alphas are those with funds in the top Active Share quintile and the bottom three quintiles for the alternative patience proxy. For example, the portfolio with high Active Share (quintile 5) and low Fund Holdings Turnover (quintile 1) has an annualized alpha of 1.44% with a t-statistic

of 1.91. The portfolio with high Active Share (quintile 5) and low Fund Turnover Ratio (quintile 1) has an economically meaningful alpha of 0.90% per year that is insignificant (t-statistic of 1.10), while the portfolio with high Active Share (quintile 5) and next-lowest Fund Turnover Ratio (quintile 2) has an annualized alpha of 1.07% that is statistically significant (t-statistic of 1.82).

Using either turnover proxy, we find that funds that trade more tend to have greater underperformance, and especially so for funds that also have a high Active Share. First, in the single sort on Fund Turnover Ratio, the portfolio of funds trading the most (quintile 5) has a five-factor alpha of -1.58% per year (t-statistic of 2.81), while the quintile 1 portfolio exhibits no significant underperformance (alpha of -0.38% per year with a t-statistic of 1.05). Similarly, using Fund Holdings Turnover single sorts, the quintile 5 portfolio has an annualized alpha of -1.97% (t-statistic of 4.29) and the quintile 1 portfolio has an annualized alpha of -0.14% (t-statistic of 0.39). In both cases, the difference in performance across the quintile 1 and 5 portfolios is statistically significant as well.

The final robustness check for the main result in this section using net benchmark-adjusted returns is to run 19 annual Fama-MacBeth predictive cross-sectional regressions of the yearly net benchmark-adjusted fund return on various fund characteristics, with their mean coefficients presented in Table 6. These regressions allow us to control for several other fund characteristics such as tracking error, 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 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 three patience proxies. As previously also shown in the double sorts, fund performance in our sample is not linearly related to Active Share and the proxies for trading frequency, such that using Active Share itself rather than the dummies does not produce statistically significant results.



Column (1) of Table 6 shows that funds with high Active Share tended to outperform their benchmarks by about 79 basis points, though without statistical significance (t-statistic of 1.45). Likewise, none of the 3 patience proxies are significantly predictive of fund performance. In Column (1), the only fund characteristic strongly related to future fund performance is the expense ratio, indicating that more expensive funds performed worse on average. 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 only mutual funds with high Active Share that also pursued patient investment strategies were able to outperform their benchmarks in our sample.

Next, we evaluate the fund performance using the holdings-based gross returns, which is less relevant to end investors but is informative about managerial skill before trading costs and other expenses are incurred. As described in Section 2, we calculate the DGTW-adjusted holdings-based returns, and control for any remaining exposure to the standard market, size, book-to-market and momentum factors. Table 7 shows the results for the equally-weighted 5x5 double sort on Fund Duration and Active Share. One noticeable change from the previous results is that once we use DGTW-adjusted gross returns, we no longer see many portfolios in the double sort with economically and statistically significant negative alphas. This indicates that many managers have on average managerial skill, even if (again on average) not many investors benefit from those in the form of net performance that is superior to the performance of the benchmark.

The only portfolios exhibiting a positive and statistically significant alpha for the DGTW-adjusted gross returns is the portfolio with high Active Share (quintile 5) and high Fund Duration (quintile 5), with an annualized five-factor alpha of 1.26% (t-statistic of 1.94). This confirms the main result that active and patient investors outperform. Both Active Share and Fund Duration matter. Similar to the previous results using net benchmark-adjusted returns, funds with long Fund Duration tend to outperform funds with short Fund Duration, especially when Active Share is high. For example, the long-short portfolio buying (stocks in) funds with

long Fund Duration and selling funds with short Fund Duration unconditionally has a 4-factor alpha of 1.21% per year (t-statistic of 2.31) in the single sort, declining to 0.60% per year (t-statistic of 1.62) for funds that are also in the bottom Active Share quintile and, alternatively, rising to 2.38% per year (t-statistic of 3.28) for funds that are also in the top Active Share quintile.

Previously, we had raised two alternative interpretations of the underperformance of very active managers with short investment horizons: overconfidence versus a focus on relatively illiquid stocks. The DGTW-adjusted gross returns are useful to distinguish between these alternative interpretations, as gross returns are not affected by trading costs or costly liquidity demands from impatient trading. Comparing the alphas using DGTW-adjusted gross returns in Table 7 to the analogous alphas using benchmark-adjusted net returns in Panel A of Table 3 suggests that low Active Share funds lose more in trading costs and other expenses than high Active Share funds. This casts doubt on the liquidity explanation. We will empirically revisit both interpretations in Section 4, by exploring what strategies the patient managers with high Active Share used to substantially outperform.

## **B. Institutional Performance**

This subsection uses the institutional 13F stock holding reports to evaluate the performance of aggregated institutional funds based on DGTW-adjusted gross holdings-based returns. As far as we know, we are the first to explore the ability of Active Share and different proxies for the trading frequency to predict the performance of the stocks held by these institutions. Panel A of Table 8 reports the equally-weighted five-factor alphas in a 5x5 sorts on Active Share and Fund Duration, and Panel B of Table 8 reports the equally-weighted DGTW-adjusted returns themselves without adjusting these for any remaining exposure to the market, size, book-to-market, momentum and liquidity factors.

The unconditional sorts on Active Share indicate that active managers had significant managerial skill, with the stocks held by the institutions in the top quintile portfolio of Active Share outperforming considerably, with an annualized 5-factor alpha of 2.10% (t-statistic of 2.75) and a DGTW-adjusted return of 1.15% per year (t-statistic of 2.36). As these institutional

holdings reports are at an aggregated level and including substantially larger assets 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 outperformance. The other five Active Share quintile portfolios show statistically insignificant performance.

The outperformance of the high Active Share managers is largely due to institutions with the longest investment horizons. For example and as shown in Panel A of Table 8, the portfolio of institutions with high Active Share (quintile 5) and short Fund Duration (quintile 1) has an annualized 5-factor alpha of 0.40% (t-statistic of 0.50), while the portfolio with high Active Share and long Fund Duration (quintile 5) has an annual alpha of 2.22 (t-statistic of 4.10). We illustrate the substantial outperformance of the holdings in institutional portfolios with high Active Share and long Fund Duration in Panel B of Figure 4.

Stocks in high Active Share (top quintile) institutions outperform stocks in low Active Share (bottom quintile) institutions, 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 5-factor alpha of 0.65% per year (t-statistic of 0.84), while the analogous long-short portfolio among long Fund Duration institutions (top quintile) has a 5-factor alpha of 2.07% per year (t-statistic of 3.85). 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 8 are similar, if with generally (slightly) weaker statistical significance.

Panel C of Table 8 shows robustness results using a double sort of all institutions on Fund Holdings Turnover and Active Share. We again find that the best performance is achieved by the portfolios with high Active Share (top quintile) and low Fund Holdings Turnover. The three portfolios with top quintile Active Share and bottom three quintiles Fund Holdings

Turnover are the only three portfolios with positive and statistically significant performance in the 5x5 sort (though the performance among these 3 portfolios is not statistically different from each other or from the performance of the portfolio with top quintile Active Share and top quintile Fund Holdings Turnover).

Table 9 focuses on the sample of hedge funds. As discussed in Section 2.3, hedge funds are an important subset of institutions that at the end of our time series constitutes about a quarter of the observations in the institutional sample and about a fifth of the assets. As discussed previously, we start our hedge fund sample in 1995. Quarter-end holdings of hedge funds tend to have high Active Share (median of 89%), and often without much persistence over time (median Fund Duration of around 9 months). Two major limitations in evaluating the performance of hedge funds are that we only observe the long positions (while short positions may be even more important for many hedge funds) and only the quarter-end positions (while roundtrip trades within the quarter may make up the bulk of their trading activity). Nonetheless, as hedge funds are among the most active and unconstrained institutions, and fast growing in size and number, it is worth considering how their Active Shares and patience are related to their holdings-based performance, even if based on quite limited data. In Table 8, we use a 5x3 sort on Fund Duration and Active Share (rather than a 5x5 sort) due to the considerably lower number of institutions and reduce noise. We report 5-factor alphas of DGTW-adjusted returns, though results using DGTW-adjusted returns themselves are similar.

Hedge fund quarter-end long holdings significantly outperform if their portfolios have higher Active Share. In the unconditional sort of hedge funds in Active Share tercile portfolios, the low Active Share tercile portfolio has a 5-factor alpha is basically zero, while the high Active Share tercile portfolio has a 5-factor alpha of 1.52% per year with a t-statistic of 2.08. The double sort indicates that this is more likely to be due to hedge funds with long Fund Duration. While alphas are not monotonic across the five Fund Duration quintiles within the top Active Share quintile, among those the only portfolio with a positive and statistically significant alpha is the portfolio with longest Fund Duration, with an economically remarkable 3.64% per year (t-statistic of 3.04). We illustrate the substantial outperformance of the long-only quarter-end

holdings in hedge fund portfolios with high Active Share and long Fund Duration in Panel C of Figure 4.

A final robustness check is given in Table 10 using Fama-MacBeth predictive cross-sectional regressions of DGTW-adjusted holdings-based annual returns on lagged institutional characteristics. Columns (1) – (3) use the sample of all institutional portfolios and columns (4) – (6) use the sample of hedge funds only. In column (1), we find that having a high Active Share predicts an outperformance of 0.79% per year (t-statistic of 2.31) and low Active Share funds predicts an underperformance of 0.28% per year (t-statistic of 1.68, and thus marginally insignificant). Column (2) adds the interactions of the High and Low Active Share dummies with Fund Duration, and finds strong evidence that the outperformance of high Active Share institutions is due to those that also have longer Fund Duration. The coefficient of the interaction of Fund Duration and High Active Share equals 0.64% (t-statistic of 3.16), and once it is included the coefficient on the High Active Share dummy itself becomes very close to zero and insignificant. Economically, a standard deviation increase in institutional holding duration is associated with a 55 basis points ( $= 0.86 \times 0.64\%$ ) higher performance among high Active Share institutions. Column (3) robustly confirms that institutions with high Active Share are more likely to outperform if they trade less using the alternative proxy of Fund Holdings Turnover.

The Fama-MacBeth regressions for the hedge fund sample likewise show robustness of our main result that hedge funds with higher Active Shares tend to have better future performance, and especially if they also have longer holding durations or less quarter-end turnover. As the sample is smaller and starts only in 1995, statistical significance is a bit weaker compared to the full sample of all institutions, especially using Fund Holdings Turnover. Economically, the results are strong. For example, the interaction coefficient in column (5) indicates that a standard deviation increase in Fund Duration is associated with a 138 basis points ( $= 0.86 \times 1.6\%$ ) higher performance among high Active Share hedge funds. Fund Duration does not seem to predict performance for low Active Share hedge funds, which tend to underperform by about 90 basis points.

### **C. What helps explain the outperformance of the high Active Share and patient funds?**

This subsection considers how to explain the managerial skill shown by the funds with high Active Share that trade infrequently. We aim to do so by regressing the monthly returns of the top quintile Active Share and Fund Duration portfolios on seven different factors to measure the portfolio's exposure to different groups of stocks. We start with the benchmark-adjusted returns for the portfolio of mutual funds with the most patient and distinct portfolios, and present results in Panel A of Table 11.

Column (1) does not include any factor and reports an annualized benchmark-adjusted return of 1.92% (t-statistic of 2.08), corresponding to the result in Panel C of Table 4. Adding the market factor in column (2) increases the alpha substantially to 2.63% (t-statistic of 3.01). This indicates that the patient and active managers tend to buy stocks with lower market betas. Column (3) shows a negative loading on the size factor, suggesting that these portfolios tend to buy larger stocks relative to the benchmark. The positive loading on the book-to-market factor in column (4) indicates that active and patient managers tend to be value managers. Economically, exposure to the book-to-market factor seems important, explaining about 54 basis points a year (= 2.92% - 1.36%). Next, the portfolio has a negative loading on momentum in column (5) that increases the alpha to 2.22% a year (t-statistic of 2.46), suggesting a contrarian tendency that also moderately matters for the alpha. The traded systematic liquidity factor proposed by Pastor and Stambaugh (2003) does not play a significant role in column (6).

Column (7) confirms that active and patient funds tend to buy low beta stocks, and that this exposure is better captured by the 'Betting against Beta (BaB)' factor introduced by Frazzini and Pedersen (2013) than by the market factor. Regressing the benchmark-adjusted net returns on a constant and the BaB factor gives a statistically insignificant alpha of 0.92% per year with a t-statistic of 1.07. Column (8) shows that a major part of the managerial skill is further captured by the 'Quality minus Junk (QmJ)' factor introduced by Asness, Frazzini, and Pedersen (2013). The regression on a constant and the QmJ factor results in an annualized alpha of 1.18% with a t-statistic of 1.38.

Column (9) shows the 5-factor results corresponding to Panel A of Table 4, with an alpha of 2.30% per year with a t-statistic of 3.14. The next 3 columns show that both BaB and QmJ factors help to reduce and thus explain this alpha, with column (11) suggesting that most of the reduction from the 5-factor alpha in column (9) comes from controlling for exposure to high-quality stocks as measured by the QmJ factor. In particular, the 7-factor model that includes all factors considered here produces an annualized alpha of 0.59% per year with a t-statistic of 0.83, which constitutes a reduction of 74 percentage points of the 5-factor alpha.

We thus conclude that the managerial skill from the most active and patient mutual fund managers is quite similar to that manifested by Warren Buffett, as documented by Frazzini, Kabiller and Pedersen (2013). They document that Berkshire Hathaway, managed by Warren Buffett, as well as Berkshire's public equity holdings identified from quarterly 13F holdings have significantly positive alphas that become insignificant only when controlling for their exposure to BaB and QmJ. Our results thus indicate that Warren Buffett's skill seems generally shared by mutual fund managers in the top Active Share and Fund Duration quintiles: the clear majority of their outperformance seems due to their picking safe (low beta), value (high book-to-market) and quality (profitable, growing, less uncertainty, higher payout) stocks and 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 columns (1) – (3) in Panel B of Table 11, we do not find evidence for this. Starting with the average DGTW-adjusted return of 1.88% per year (with a t-statistic of 3.49) in column (1) – see also Panel B of Table 8 – adding all seven factors only reduces the alpha to 1.73% per year (with a t-statistic of 3.06) in column (3). We thus conclude that Warren Buffett's style – as captured by the BaB and QmJ factors as in Frazzini, Kabiller and Pedersen (2013) – is not generally shared among other institutions who invest actively and patiently.

Finally, columns (4) – (6) of Table 11, Panel B focuses on the performance of the stocks in the quarter-end portfolios of the hedge funds with high Active Share and long Fund Duration, who have an average DGTW-adjusted outperformance of 3.53% per year (see column (4)). We

find that about a third of this outperformance – or 1.2% per year, see column (6) – can be explained by buying value stocks, being contrarian with a large negative loading on momentum, and buying quality stocks with a large positive loading on QmJ. Like the outperformance of the high Active Share and patient institutions, we leave the explanation of the remainder of this outperformance by these hedge funds for future research.

#### **4. Conclusion**

This paper documents that both Active Share and trading frequently – 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. The average outperformance of the most patient and distinct portfolios (using quintile sorts) equals 2.30% per year – net of costs – for retail mutual funds (t-statistic of 3.14). Compounding this 2.30% annual outperformance over the 19 years over which it is estimated (1995-2013) gives a cumulative outperformance of 54%. Stocks held by patient and active institutions in general outperform by 2.22% per year (t-statistic of 4.10) and by hedge funds in particular by 3.64% per year (t-statistic of 3.04), both gross of costs.

The average underperformance of retail mutual funds that frequently trade and generally hold stocks for less than 7 months are likewise economically substantial. For example, the portfolio of mutual funds with short Fund Duration and low Active Share (both in the first quintile) had an abnormal net return of -2.46% per year (t-stat of 5.52), which compounded



over our 19-year period from 1995-2013 would accumulate to a total loss of 38% of the initial amount invested relative to a passive investment in the market at no cost.

Our results suggest that U.S. stock markets may be too information-efficient, with too much competition among active investors or too much price impact of information trades, for investors to systematically benefit from frequently trading mutual fund managers pursuing short-term predictability. At the same time, our results also suggest that one can ex ante identify a distinctive group of fund managers that seem to exhibit substantial investment skill when measured over sufficient long periods of time. This is the group of patient fund managers that stick to their convictions and combine a high Active Share with infrequent trading. In our 5x5 sort of retail mutual funds, the outperformance is strongest in the 2 portfolios with high Active Share (top quintile) and top 40% of Fund Duration (top 2 quintiles), constituting 8% of funds and on average about 6% of assets in our sample of retail mutual funds.

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 for their impatient strategies: 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. Our findings thus suggest that Warren Buffett's investment skill (see Frazzini, Kabiller and Pedersen, 2013) seems generally shared by these retail mutual fund managers in the top Active Share and Fund Duration quintiles.

We have less success in explaining the large gross outperformance of institutions – especially hedge funds – with high Active Share and long Fund Duration. This group includes Berkshire Hathaway, probably the best known patient investor, for much of our time period. However, we find that Berkshire Hathaway public equity holdings in the last 10 years of our sample are no longer very distinct from the market portfolio (with an Active Share around 80% since 2007 and around 70% at the end of our sample in 2012). Berkshire Hathaway remains a patient investor in public equities, even though the holding duration of public stocks in the quarter-end 13F reports of Berkshire Hathaway's portfolio has shortened from over 4 years in

2002 to a bit over 3 years. Frazzini, Kabiller and Pedersen (2013) show that Berkshire Hathaway's remarkable performance can largely be explained by exposure to safe and high quality stocks, which we likewise document for patient and active mutual funds. However, we find that exposure to low beta, book-to-market and quality factors explains only a small fraction of the outperformance of the stocks in the quarter-end portfolios of high Active Share and long Fund Duration institutions and hedge funds generally.

We thus leave the the investment skill of patient institutions with very distinct public equity portfolios like Ruane Cunniff & Goldfarb, Gardner Russo & Gardner, SPO Partners & Co, for example, as largely unexplained. The investment skill of the fund managers at these institutions may not be easily captured in quantitative factors or may change substantially over time depending on the circumstances. Perhaps their success depends on being truly patient and contrarian, willing to wait years before deploying cash in a world where typical institutional portfolios have 100% turnover based on quarter-end holdings (and thus ignoring any round-trip trading within quarters). Relatedly, perhaps these institutions are too idiosyncratic and unique to summarize their collective investment skill as we can for the most active and patient retail mutual funds.

At the same time, the outperformance we document is based on publicly available quarter-end portfolio holdings that anyone can easily access on the SEC website. This suggests that other market participants may be either unaware of the persistent success of these institutions, or, if they are aware, other market participants may underestimate their investment skill.

Or, alternatively, even if other market participants see and appreciate the track record, they may simply be discouraged because of their own lack of patience. As a result, conditions such as having a stable investor base and a relative lack of persistent copycats may allow these institutions to be unique and patient (and, it turns out, outperform).

How patient does one need to be? In Panel A of Figure 4, plotting the cumulative abnormal outperformance for portfolios of mutual funds shows that the portfolio of mutual funds with high Active Share and long Fund Duration outperformed only slightly in the first 5

years (1995-1999), then substantial outperformance was achieved in 2000, with again little gain in the 8 year period of 2001-2008, after which again substantial outperformance followed. Panel C of Figure 4 shows similarly that for hedge funds one needed to be patient from the middle of 2000 to the end of 2008 before the quarter-end holdings of the patient and high Active Share hedge funds substantially outperformed. Panel B of Figure 4 for all institutions indicates that the portfolio of high Active Share and long Fund Duration institutions outperformed quite consistently over time. However, this masks much dispersion and time variation within the portfolio, as shown in Panel D of Figure 4, which presents the cumulative abnormal returns for some of the largest institutions with long Fund Duration and high Active Share. These figures underscore that both fund managers and investors sometimes need to wait several years before getting rewarded for their patience.

A good example of an institution with a very active and patient approach is Ruane, Cunniff & Goldfarb Inc., manager of e.g. the Sequoia fund that typically invests in a handful of publicly traded stocks. The large idiosyncratic element in their investment strategy could illustrate well why trying to explain their outperformance is hard if not impossible, i.e., high Active Share, patient institutions may generally be very distinct from each other and idiosyncratic to the market. This does not mean that there is no particular investment strategy. For example for the investment strategy of the Sequoia fund, a preference for stocks that can be held for the long-term rather than for stocks whose performance may depend on the business cycle (potentially warranting trading at business cycle turning points) seems foundational: “‘We're really one-balance-sheet-at-a time, one-company-at-a-time kind of investors,’ Mr. Poppe [co-manager of the Sequoia fund] said in May 2008 at the shareholder meeting. ‘We don't spend a lot of time on macro.’... Today, the focus is still on balance sheets, but the Sequoia managers try to minimize the impact of economic ups and downs on the portfolio. ‘There's a heavier burden on a cyclical company’ to find its way into the portfolio, says Mr. Goldfarb [co-manager of the Sequoia fund],” as quoted in the Wall Street Journal (2010).

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**Table 1. 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.

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Year	# of Funds	TNA	Expense Ratio	# Stocks	Active Share	Fund Duration	Fund Turnover Ratio	Fund Holding Turnover
1994	239	180	1.11%	69	86%	1.08	38%	1.29
1995	382	181	1.15%	72	85%	0.91	44%	1.58
1996	500	227	1.14%	75	84%	0.87	47%	1.58
1997	583	259	1.15%	72	84%	0.88	50%	1.51
1998	727	290	1.16%	71	82%	0.91	63%	1.59
1999	881	290	1.19%	70	79%	0.93	65%	1.66
2000	958	261	1.18%	71	76%	0.93	72%	1.64
2001	1,036	242	1.23%	73	74%	0.92	77%	1.44
2002	1,166	172	1.25%	74	73%	1.02	68%	1.36
2003	1,180	197	1.30%	77	75%	1.09	69%	1.47
2004	1,167	219	1.27%	76	78%	1.14	67%	1.42
2005	1,185	239	1.25%	75	79%	1.19	66%	1.42
2006	1,187	240	1.21%	74	80%	1.21	64%	1.43
2007	1,141	248	1.18%	72	80%	1.26	64%	1.37
2008	1,136	165	1.16%	73	78%	1.22	72%	1.40
2009	1,196	197	1.16%	80	79%	1.18	75%	1.47
2010	1,263	225	1.14%	76	78%	1.22	60%	1.34
2011	1,255	269	1.12%	73	79%	1.40	54%	1.23
2012	1,182	298	1.11%	71	79%	1.55	50%	1.15
2013	1,066	418	1.10%	74	80%	1.69	49%	1.15

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**Table 2. Mutual Fund Sample: Descriptive Statistics**

Panel A reports the descriptive statistics for the mutual fund sample used in this paper. 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. Panel C presents the correlation between the mutual fund variables. At the end of each year, funds are first sorted into quintiles by their Fund Duration value and then within each fund duration quintile further sorted into quintiles based on their Active Share. Panel D reports the percentage of assets in each of the 25 Fund Duration/Active Share groups obtained by sorting funds into quintiles first by their Fund Duration value and then by Active Share value within each Fund Duration quintile.

**Panel A**

	<b>Mean</b>	<b>StDev.</b>	<b>Min</b>	<b>Max</b>
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**

	<b>Q20</b>	<b>Q40</b>	<b>Q60</b>	<b>Q80</b>
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**

	<b>Active Share</b>	<b>Fund Duration</b>	<b>Fund Turnover Ratio</b>	<b>Fund Holding Turnover</b>	<b>Log(TNA)</b>	<b>Expense Ratio</b>	<b># Stocks</b>
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%



Panel D

		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 3. Institutional Investors: Summary Statistics**

Panel A reports the summary statistics for Active Share and Fund Duration variables for the institutional investor sample. The sample period for institution investors is from 1986 to 2012 except for Hedge Funds where the sample period is from 1995 to 2012 due to fewer funds in the earlier years. N denotes the number of fund-year observations. First and Second rows present the statistics for all institutions and hedge funds respectively, remaining rows present the summary statistics for different institutional investor types as defined in Bushee (2001). Panel B and Panel C presents the number of institutions and institutional investor assets (\$ billion) in different Active Share groups. Panel D reports the percentage of institutional investor assets in each of the 25 Fund Duration/Active Share groups obtained by sorting funds into quintiles first by their Fund Duration value and then by Active Share value within each Fund Duration quintile.

**Panel A**

	N	Active Share (%)					Fund Duration				
		Mean	Stdev	P20	Median	P80	Mean	Stdev	P20	Median	P80
All Institutions	38769	72.60	19.48	56.29	74.80	91.61	1.42	0.85	0.64	1.34	2.16
Hedge Funds	7713	83.90	15.38	72.33	89.20	96.61	0.92	0.74	0.27	0.74	1.50
BNK	4828	55.1	13.9	45.0	54.7	65.7	1.97	0.69	1.40	1.98	2.56
INS	1673	62.7	23.5	41.4	66.7	83.2	1.75	0.89	1.00	1.59	2.58
INV	1353	70.5	19.6	55.4	73.5	88.4	1.45	0.70	0.88	1.34	2.04
IIA	26265	77.0	16.6	62.7	79.3	92.9	1.28	0.78	0.57	1.19	1.94
CPS	865	58.5	27.8	32.7	61.8	85.1	1.79	0.98	0.91	1.64	2.64
PPS	410	33.5	23.9	12.4	23.8	60.9	2.21	0.79	1.53	2.30	2.88
UFE	325	72.2	19.6	57.0	75.4	90.9	1.89	0.96	1.08	1.73	2.76
OTHER	3050	78.4	18.7	60.6	83.3	96.4	1.25	1.11	0.14	1.02	2.26

**Panel B**

<b>Active Share</b>	<b>Number of Institutions</b>									
	<b>All</b>	<b>Hedge Funds</b>	<b>BNK</b>	<b>INS</b>	<b>INV</b>	<b>IIA</b>	<b>CPS</b>	<b>PPS</b>	<b>UFE</b>	<b>MSC</b>
<b>0-10</b>	11	0		1	2	3	2	2		1
<b>10-20</b>	26	1	5	4		8		8		1
<b>20-30</b>	31	4	3	4	1	16	3	3		1
<b>30-40</b>	43	7	10	7	3	14	3	4		2
<b>40-50</b>	118	9	39	3	1	59	3	3	1	9
<b>50-60</b>	281	33	52	4	7	189	5	2		22
<b>60-70</b>	436	56	29	10	4	355	7	1		30
<b>70-80</b>	462	112	19	7	6	388	4	2		36
<b>80-90</b>	467	164	8	4	8	398	1		3	45
<b>90-100</b>	616	321	3		4	514	6		2	87
<b>Total</b>	2491	707	168	44	36	1944	34	25	6	234

Panel C

Active Share	Total Assets (\$ billion)									
	All	Hedge Funds	BNK	INS	INV	IIA	CPS	PPS	UFE	MSC
<b>0-10</b>	522.0	0.0	0.0	6.4	392.1	21.3	7.0	39.9		55.4
<b>10-20</b>	1438.7	406.4	691.7	105.0	0.0	472.5	0.0	104.7		64.8
<b>20-30</b>	137.4	29.5	7.8	23.1	10.0	57.5	3.5	20.7		14.8
<b>30-40</b>	552.1	52.8	165.0	90.3	31.7	236.7	1.4	26.1		0.9
<b>40-50</b>	1080.8	155.8	155.2	7.8	260.9	536.2	1.0	13.9	3.1	102.8
<b>50-60</b>	1037.3	94.2	50.6	39.6	212.5	692.9	19.0	1.9		20.7
<b>60-70</b>	555.6	106.9	27.6	21.2	51.9	429.2	5.8	5.0		14.9
<b>70-80</b>	670.0	158.9	4.6	6.3	64.2	513.7	1.6	7.2		72.5
<b>80-90</b>	396.9	127.8	1.9	7.5	18.8	319.8	0.2	0.0	11.4	37.4
<b>90-100</b>	253.3	143.9	1.4	0.0	6.8	192.0	8.5	0.0	1.0	43.6
<b>Total</b>	6644.3	1276.2	1105.9	307.2	1048.8	3471.7	48.0	219.4	15.5	427.7

Panel D

		Active Share				
		Q1	Q2	Q3	Q4	Q5
<b>Fund Duration</b>	<b>Q1</b>	3.7%	1.5%	1.0%	0.7%	0.3%
	<b>Q2</b>	6.5%	3.3%	1.8%	1.1%	0.5%
	<b>Q3</b>	12.9%	4.4%	2.9%	1.7%	0.8%
	<b>Q4</b>	16.0%	4.7%	2.4%	2.5%	1.2%
	<b>Q5</b>	20.5%	2.6%	2.6%	2.4%	2.1%

**Table 4. Active Share and Fund Duration: Mutual Fund 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 sorting into quintiles first based on Fund Duration and then further by Active Share within each Fund Duration quintile. Returns are then calculated over next one year. Panel A reports the equally weighted 5-factor alpha obtained as the intercept from the regression of the average monthly net fund returns in excess of their self-declared benchmark on Fama and French 3 factors, the Carhart momentum factor and 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 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 then on Active Share. Panel B presents the value weighted 5 factor alphas. Panel C, Panel D report the average value-weighted and equal-weighted net fund returns in excess of the benchmark index.

**Panel A**

<b>Equal Weighted 5 Factor Alpha of Benchmark-Adjusted Net Returns</b>							
<b>Fund Duration</b>	Uncond.	<b>Active Share</b>					<b>5-1</b>
		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	
Uncond.		<b>-0.98</b> <b>(4.49)</b>	<b>-1.45</b> <b>(3.97)</b>	<b>-1.44</b> <b>(3.64)</b>	-0.84 (1.74)	0.25 (0.45)	<b>1.22</b> <b>(2.47)</b>
<b>1</b>	<b>-1.96</b> <b>(3.87)</b>	<b>-2.46</b> <b>(5.52)</b>	<b>-2.00</b> <b>(4.01)</b>	<b>-1.64</b> <b>(2.57)</b>	<b>-1.75</b> <b>(2.13)</b>	<b>-1.94</b> <b>(2.45)</b>	0.44 (0.57)
<b>2</b>	<b>-1.20</b> <b>(3.20)</b>	<b>-1.46</b> <b>(4.39)</b>	<b>-1.84</b> <b>(3.84)</b>	<b>-1.70</b> <b>(3.37)</b>	-0.67 (1.20)	-0.34 (0.50)	1.09 (1.64)
<b>3</b>	<b>-0.96</b> <b>(2.39)</b>	<b>-1.52</b> <b>(5.39)</b>	<b>-1.14</b> <b>(2.47)</b>	<b>-1.54</b> <b>(3.33)</b>	-0.31 (0.49)	-0.27 (0.37)	1.20 (1.74)
<b>4</b>	<b>-0.67</b> <b>(1.96)</b>	<b>-0.91</b> <b>(3.17)</b>	<b>-1.48</b> <b>(3.94)</b>	-1.06 (1.20)	-0.55 (1.07)	0.65 (1.08)	<b>1.69</b> <b>(2.89)</b>
<b>5</b>	-0.37 (0.98)	<b>-1.06</b> <b>(4.44)</b>	<b>-1.11</b> <b>(2.84)</b>	<b>-1.54</b> <b>(3.09)</b>	-0.44 (0.75)	<b>2.30</b> <b>(3.14)</b>	<b>3.47</b> <b>(4.78)</b>
<b>5-1</b>	<b>1.68</b> <b>(3.46)</b>	<b>1.28</b> <b>(2.99)</b>	0.89 (1.83)	0.39 (0.57)	1.52 (1.80)	<b>4.32</b> <b>(5.18)</b>	

Panel B

Value Weighted 5 Factor Alpha of Benchmark-Adjusted Net Returns							
Fund Duration	Uncond.	Active Share					
		1	2	3	4	5	5-1
Uncond.		<b>-0.98</b> <b>(4.49)</b>	<b>-1.45</b> <b>(3.97)</b>	<b>-1.44</b> <b>(3.64)</b>	-0.84 (1.74)	0.25 (0.45)	<b>1.22</b> <b>(2.47)</b>
1	<b>-2.52</b> <b>(3.31)</b>	<b>-1.64</b> <b>(2.46)</b>	<b>-2.39</b> <b>(3.39)</b>	<b>-3.85</b> <b>(4.47)</b>	<b>-3.59</b> <b>(2.67)</b>	<b>-3.35</b> <b>(2.11)</b>	-1.55 (1.03)
2	<b>-1.49</b> <b>(2.79)</b>	<b>-1.36</b> <b>(2.39)</b>	<b>-1.75</b> <b>(2.36)</b>	<b>-2.14</b> <b>(3.13)</b>	-1.31 (1.58)	-1.66 (1.41)	-0.21 (0.17)
3	-0.78 (1.26)	<b>-2.10</b> <b>(4.29)</b>	-0.68 (0.80)	-1.10 (1.49)	-0.58 (0.67)	-0.40 (0.42)	1.50 (1.52)
4	-0.68 (1.25)	-0.48 (0.95)	-0.78 (1.36)	-1.48 (1.58)	-1.63 (2.30)	-0.71 (0.48)	-0.41 (0.27)
5	-0.04 (0.09)	-0.27 (0.60)	-1.34 (2.30)	-0.30 (0.38)	-0.73 (0.83)	1.85 (1.88)	<b>2.57</b> <b>(2.57)</b>
5-1	<b>2.30</b> <b>(3.15)</b>	1.10 (1.52)	0.97 (1.22)	<b>3.46</b> <b>(3.64)</b>	<b>2.76</b> <b>(2.20)</b>	<b>5.22</b> <b>(3.15)</b>	

Panel C

Equal Weighted Benchmark-Adjusted Net Return							
Fund Duration	Uncond.	Active Share					
		1	2	3	4	5	5-1
Uncond.		<b>-0.92</b> <b>(3.30)</b>	<b>-0.97</b> <b>(2.40)</b>	<b>-1.06</b> <b>(2.26)</b>	-0.49 (1.01)	0.05 (0.08)	0.96 (1.83)
1	-1.15 (1.67)	<b>-1.60</b> <b>(2.76)</b>	-0.97 (1.53)	-0.92 (1.02)	-1.09 (1.12)	-1.22 (1.31)	0.37 (0.45)
2	-0.81 (1.87)	<b>-0.83</b> <b>(2.22)</b>	<b>-1.34</b> <b>(2.66)</b>	<b>-1.22</b> <b>(2.09)</b>	-0.42 (0.73)	-0.26 (0.35)	0.58 (0.84)
3	-0.57 (1.40)	<b>-0.90</b> <b>(3.19)</b>	-0.61 (1.24)	<b>-1.01</b> <b>(2.06)</b>	0.27 (0.46)	-0.60 (0.81)	0.29 (0.40)
4	-0.48 (1.39)	-0.36 (1.39)	<b>-1.19</b> <b>(2.89)</b>	-0.84 (0.73)	-0.58 (1.07)	0.56 (0.90)	0.93 (1.42)
5	-0.38 (0.79)	<b>-0.90</b> <b>(4.40)</b>	-0.75 (1.85)	-1.33 (2.21)	-0.65 (0.90)	<b>1.92</b> <b>(2.08)</b>	<b>2.66</b> <b>(3.09)</b>
5-1	0.78 (0.92)	0.69 (1.28)	0.22 (0.35)	-0.42 (0.38)	0.44 (0.35)	<b>2.98</b> <b>(2.31)</b>	

Panel D

Value Weighted Benchmark-Adjusted Net Return							
Fund Duration	Uncond.	Active Share					
		1	2	3	4	5	5-1
Uncond.		-0.16 (0.37)	-0.43 (0.74)	-0.70 (1.19)	-0.44 (0.61)	-0.54 (0.63)	-0.38 (0.42)
1	-1.40 (1.60)	-0.60 (0.75)	<b>-1.74</b> <b>(2.18)</b>	<b>-2.30</b> <b>(2.13)</b>	-1.98 (1.36)	-1.70 (1.10)	-1.11 (0.76)
2	-0.82 (1.18)	-0.59 (1.00)	-0.66 (0.71)	<b>-1.68</b> <b>(2.13)</b>	-0.88 (0.99)	-1.57 (1.21)	-0.98 (0.76)
3	-0.24 (0.38)	-0.88 (1.56)	-0.53 (0.64)	-0.84 (1.09)	0.56 (0.71)	-0.76 (0.63)	0.12 (0.10)
4	-0.58 (0.93)	-0.58 (1.18)	-0.40 (0.56)	-1.32 (0.99)	-1.07 (1.61)	-0.52 (0.31)	0.07 (0.04)
5	0.25 (0.42)	-0.02 (0.04)	-0.38 (0.62)	0.15 (0.18)	-0.89 (1.00)	1.66 (1.53)	1.67 (1.53)
5-1	1.66 (1.79)	0.58 (0.71)	1.36 (1.51)	<b>2.46</b> <b>(2.03)</b>	1.08 (0.70)	3.36 (1.91)	

**Table 5. Fund Turnover and Active Share: 5 Factor Alpha of Benchmark-Adjusted Net Returns**

This table reports the average abnormal mutual fund returns conditional on Fund Turnover and Active Share. Average equally weighted returns for quintile portfolios obtained by sorting funds either on Active Share or on Turnover are presented in first row and column respectively. Average returns for 25 portfolios obtained by sorting funds into quintiles first on Turnover and then on Active Share are also reported. Panel A reports the abnormal returns conditional on fund's self-reported turnover ratio and Active Share. Panel B presents returns conditional on fund's average quarterly turnover ratio calculated from changes in fund's holdings over last 4 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 5 Factor Alpha of Benchmark-Adjusted Net Returns							
Fund Turnover		Active Share					
Ratio	Uncond.	1	2	3	4	5	5-1
Uncond.		<b>-0.98</b> (4.49)	<b>-1.45</b> (3.97)	<b>-1.44</b> (3.64)	-0.84 (1.74)	0.25 (0.45)	<b>1.22</b> (2.47)
<b>1</b>	-0.38 (1.05)	-0.42 (1.77)	<b>-0.98</b> (2.82)	-0.91 (1.95)	-0.47 (0.91)	0.90 (1.15)	1.32 (1.63)
<b>2</b>	-0.47 (1.40)	<b>-0.61</b> (2.44)	<b>-1.31</b> (3.22)	<b>-0.86</b> (2.05)	-0.62 (1.15)	1.07 (1.82)	<b>1.68</b> (3.10)
<b>3</b>	-0.61 (1.62)	<b>-0.91</b> (3.10)	<b>-1.25</b> (2.86)	<b>-1.50</b> (2.90)	-0.01 (0.02)	0.62 (0.94)	<b>1.52</b> (2.50)
<b>4</b>	<b>-1.43</b> (3.86)	<b>-1.85</b> (6.05)	<b>-1.57</b> (3.58)	-2.20 (1.15)	-1.17 (1.99)	-0.35 (0.54)	<b>1.50</b> (2.24)
<b>5</b>	<b>-1.58</b> (2.81)	<b>-1.48</b> (3.41)	<b>-1.40</b> (2.18)	-2.08 (3.30)	-1.28 (1.60)	-1.66 (1.92)	-0.17 (0.22)
<b>5-1</b>	<b>-1.20</b> (2.34)	<b>-1.06</b> (2.44)	-0.42 (0.70)	-1.17 (1.73)	-0.81 (1.00)	<b>-2.56</b> (2.75)	



Panel B

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Equal Weighted 5 Factor Alpha of Benchmark-Adjusted Net Returns

Fund Holdings Turnover	Active Share						
	Uncond.	1	2	3	4	5	5-1
Uncond.		<b>-0.98</b> <b>(4.49)</b>	<b>-1.45</b> <b>(3.97)</b>	<b>-1.44</b> <b>(3.64)</b>	-0.84 (1.74)	0.25 (0.45)	<b>1.22</b> <b>(2.47)</b>
1	-0.14 (0.39)	-0.24 (1.10)	<b>-0.73</b> <b>(2.19)</b>	<b>-1.01</b> <b>(2.14)</b>	-0.14 (0.27)	1.44 (1.91)	<b>1.68</b> <b>(2.28)</b>
2	-0.51 (1.49)	<b>-0.82</b> <b>(2.88)</b>	<b>-0.97</b> <b>(2.46)</b>	<b>-0.98</b> <b>(2.04)</b>	-0.63 (1.33)	0.83 (1.42)	<b>1.66</b> <b>(2.77)</b>
3	-0.64 (1.61)	<b>-1.28</b> <b>(4.18)</b>	<b>-1.37</b> <b>(3.00)</b>	<b>-1.44</b> <b>(3.00)</b>	-0.12 (0.20)	1.02 (1.45)	<b>2.30</b> <b>(3.55)</b>
4	<b>-1.21</b> <b>(2.89)</b>	<b>-1.38</b> <b>(4.32)</b>	<b>-1.57</b> <b>(3.23)</b>	-1.82 (1.33)	-1.08 (1.89)	-0.20 (0.25)	1.18 (1.50)
5	<b>-1.97</b> <b>(4.29)</b>	<b>-1.74</b> <b>(4.77)</b>	<b>-1.86</b> <b>(3.63)</b>	<b>-2.21</b> <b>(3.85)</b>	<b>-2.05</b> <b>(2.64)</b>	<b>-1.99</b> <b>(2.68)</b>	-0.25 (0.35)
5-1	<b>-1.84</b> <b>(3.82)</b>	<b>-1.50</b> <b>(4.28)</b>	<b>-1.14</b> <b>(2.34)</b>	-1.19 (1.94)	<b>-1.91</b> <b>(2.34)</b>	<b>-3.43</b> <b>(3.52)</b>	

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**Table 6. Mutual Fund Active Share and Fund Duration: Regression Evidence**

This table presents results of yearly Fama-MacBeth regressions of future one year benchmark-adjusted net fund return on lagged Fund Duration, dummies for High and Low Active Share quintiles, fund turnover ratio and interaction between Active Share dummies and Fund Duration. Tracking Error, Logarithm of Fund's Total Net Assets and expense ratio are also included as control variables. All independent variables are measured at the end of previous year. Significance at the 5% level is denoted in bold, and Newey-West (1987) adjusted t-statistics based on two lags are given in parentheses.

Independent Variable	Benchmark-Adjusted Net Yearly Return (%)			
	1	2	3	4
INTERCEPT	-0.794 (-0.95)	-0.720 (-0.97)	-0.896 (-1.07)	-0.997 (-1.11)
MFDURATION	0.179 (0.45)	0.072 (0.13)	0.196 (0.50)	0.189 (0.46)
HIGH ACTIVESHARE	0.785 (1.45)	-0.121 (-0.24)	<b>1.114</b> <b>(2.25)</b>	<b>1.691</b> <b>(2.84)</b>
LOW ACTIVESHARE	-0.042 (-0.10)	0.296 (0.60)	-0.073 (-0.18)	0.011 (0.01)
TURN_RATIO	0.005 (0.80)	0.003 (0.50)	0.011 (1.09)	0.004 (0.61)
TURNOVER_HOLDINGS	-0.214 (-0.34)	-0.078 (-0.14)	0.035 (0.06)	0.336 (0.42)
MFDURATION*HIGH ACTIVESHARE		<b>0.817</b> <b>(2.98)</b>		
MFDURATION*LOW ACTIVESHARE		-0.148 (-0.30)		
TURN_RATIO*HIGH ACTIVESHARE			<b>-0.424</b> <b>(-2.04)</b>	

TURN_RATIO*LOW ACTIVESHARE			0.018	
			(0.56)	
TURNOVER_HOLDINGS*HIGH ACTIVESHARE				<b>-2.179</b>
				<b>(-2.97)</b>
TURNOVER_HOLDINGS*LOW ACTIVESHARE				0.013
				(0.01)
TRACKING_ERROR	59.167	58.433	59.061	66.974
	(0.44)	(0.44)	(0.44)	(0.51)
LOG(TNA)	0.015	0.019	0.015	0.010
	(0.15)	(0.18)	(0.14)	(0.10)
EXP_RATIO	<b>-23.685</b>	<b>-26.848</b>	<b>-24.420</b>	<b>-26.276</b>
	<b>(-1.99)</b>	<b>(-2.16)</b>	<b>(-2.09)</b>	<b>(-2.16)</b>
Rsquare (%)	7.18	7.99	7.60	7.95
Nobs	16,896	16,896	16,896	16,896
Number of Years	19	19	19	19

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**Table 7. Mutual Fund Active Share and Fund Duration: Holdings-Based DGTW-adjusted Gross returns**

This table reports the 5-factor alphas of average DGTW-adjusted holdings-based abnormal returns for the mutual fund sample conditional on Fund Duration and Active Share. 5 factor alphas are obtained by regressing the average DGTW-adjusted returns on the Fama and French 3 factors, momentum factor and Pastor and Stambaugh traded liquidity factor. 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 sorting funds into quintiles first on Fund Duration and then on Active Share are also reported. All the returns are in yearly percentages. Significance at the 5% level is denoted in bold, and t-statistics are given in parentheses.

<b>Equal Weighted 5 Factor Alpha of DGTW-Adjusted Holdings Returns</b>							
<b>Fund Duration</b>	Uncond.	<b>Active Share</b>					
		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>5-1</b>
Uncond.		-0.15 (0.67)	-0.17 (0.56)	-0.27 (0.65)	-0.32 (0.61)	0.06 (0.11)	0.22 (0.40)
<b>1</b>	-0.89 (1.54)	-0.66 (1.71)	-0.67 (0.98)	-1.14 (1.46)	-0.81 (0.97)	-1.21 (1.54)	-0.48 (0.63)
<b>2</b>	-0.51 (1.12)	-0.27 (0.85)	-0.06 (0.14)	-1.08 (1.94)	-0.57 (0.86)	-0.55 (0.69)	-0.26 (0.35)
<b>3</b>	-0.32 (0.88)	-0.29 (1.10)	-0.69 (1.91)	-0.29 (0.68)	-0.27 (0.45)	-0.07 (0.11)	0.33 (0.53)
<b>4</b>	0.06 (0.19)	-0.08 (0.32)	-0.30 (0.95)	0.08 (0.86)	0.38 (0.71)	0.19 (0.34)	0.50 (0.82)
<b>5</b>	0.37 (1.33)	0.05 (0.25)	0.19 (0.74)	-0.05 (0.17)	0.38 (0.88)	1.26 (1.94)	<b>1.28</b> <b>(2.00)</b>
<b>5-1</b>	<b>1.21</b> <b>(2.31)</b>	0.60 (1.62)	0.74 (1.17)	1.11 (1.50)	1.24 (1.57)	<b>2.38</b> <b>(3.28)</b>	

**Table 8. Active Share and Fund Duration: Evidence from Institutional Investor Sample**

Panel A reports the 5-factor alphas of average equal-weighted DGTW-adjusted holdings-based abnormal returns for the institutional investor sample conditional on Fund Duration and Active Share. Panel B reports the equal-weighted average DGTW-adjusted holdings-based abnormal returns. 5 factor alphas are obtained by regressing the average DGTW-adjusted returns on the Fama and French 3 factors, momentum factor and Pastor and Stambaugh traded liquidity factor. 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 sorting funds into quintiles first on Fund Duration and then on Active Share are also reported. Panel C reports the 5-factor alphas of average equal-weighted DGTW-adjusted holdings-based abnormal 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 5 Factor Alpha of DGTW-Adjusted Holdings-Based Gross Returns							
Fund Duration	Uncond	Active Share					
		1	2	3	4	5	5-1
Uncond		-0.05 (-0.18)	0.07 (0.22)	0.41 (1.00)	<b>1.32</b> <b>(2.57)</b>	<b>2.10</b> <b>(2.75)</b>	<b>2.15</b> <b>(2.81)</b>
1	0.24 (0.62)	-0.25 (-0.82)	0.15 (0.37)	0.16 (0.34)	0.72 (1.34)	0.40 (0.50)	<b>0.65</b> <b>(0.84)</b>
2	0.08 (0.31)	-0.10 (-0.41)	-0.28 (-0.96)	-0.27 (-0.91)	0.14 (0.35)	0.94 (1.61)	<b>1.04</b> <b>(1.82)</b>
3	0.10 (0.41)	-0.21 (-0.93)	-0.08 (-0.29)	0.03 (0.11)	0.15 (0.48)	0.61 (1.18)	<b>0.82</b> <b>(1.57)</b>
4	0.43 (1.78)	-0.13 (-0.56)	0.19 (0.72)	0.20 (0.73)	0.24 (0.83)	<b>1.65</b> <b>(3.25)</b>	<b>1.78</b> <b>(3.49)</b>
5	<b>0.69</b> <b>(2.52)</b>	0.15 (0.61)	0.47 (1.49)	0.34 (1.08)	0.29 (0.89)	<b>2.22</b> <b>(4.10)</b>	<b>2.07</b> <b>(3.85)</b>
5-1	0.45 (0.99)	0.39 (1.48)	0.32 (0.63)	0.18 (0.31)	-0.42 (-0.68)	1.82 (1.95)	1.42 (1.61)

Panel B

Equal Weighted DGTW-Adjusted Holdings-Based Gross Returns							
Fund Duration	Uncond	Active Share					
		1	2	3	4	5	5-1
	<b>Uncond</b>	-0.03 (-0.12)	0.06 (0.26)	0.19 (0.81)	0.51 (1.64)	<b>1.15</b> <b>(2.36)</b>	<b>1.18</b> <b>(2.30)</b>
1	0.44 (1.02)	-0.06 (-0.19)	0.52 (1.19)	0.61 (1.07)	0.88 (1.47)	0.22 (0.26)	0.27 (0.34)
2	0.33 (1.11)	0.04 (0.18)	-0.09 (-0.29)	0.08 (0.26)	0.40 (0.91)	1.23 (1.98)	<b>1.19</b> <b>(1.98)</b>
3	0.18 (0.72)	-0.13 (-0.58)	-0.04 (-0.16)	0.08 (0.29)	0.39 (1.22)	0.61 (0.99)	0.74 (1.21)
4	0.41 (1.66)	-0.20 (-0.82)	0.11 (0.42)	0.17 (0.61)	0.34 (1.14)	<b>1.62</b> <b>(3.11)</b>	<b>1.82</b> <b>(3.48)</b>
5	0.53 (1.78)	0.10 (0.40)	0.20 (0.55)	0.21 (0.62)	0.25 (0.72)	<b>1.88</b> <b>(3.49)</b>	<b>1.78</b> <b>(3.37)</b>
5-1	0.09 (0.16)	0.16 (0.54)	-0.32 (-0.50)	-0.40 (-0.54)	-0.62 (-0.84)	1.67 (1.73)	1.51 (1.67)

Panel C

Equal Weighted 5 Factor Alpha of DGTW-Adjusted Holdings-Based Gross Returns							
Inst Turnover	Uncond	Active Share					
		1	2	3	4	5	5-1
1	0.52 (1.84)	0.21 (0.88)	0.37 (1.18)	0.44 (1.38)	0.18 (0.50)	<b>1.42</b> <b>(2.35)</b>	<b>1.22</b> <b>(2.05)</b>
2	0.30 (1.28)	-0.10 (-0.39)	0.25 (0.95)	0.05 (0.17)	0.41 (1.44)	<b>0.91</b> <b>(2.00)</b>	<b>1.01</b> <b>(2.22)</b>
3	0.34 (1.42)	-0.13 (-0.59)	-0.06 (-0.22)	0.07 (0.24)	0.14 (0.45)	<b>1.68</b> <b>(3.29)</b>	<b>1.82</b> <b>(3.57)</b>
4	0.01 (0.04)	-0.28 (-1.17)	-0.13 (-0.42)	-0.54 (-1.60)	0.08 (0.20)	0.93 (1.61)	<b>1.21</b> <b>(2.12)</b>
5	0.37 (0.95)	-0.26 (-0.88)	0.38 (0.98)	0.43 (0.88)	0.81 (1.48)	0.47 (0.59)	0.73 (0.95)
1-5	0.15 (0.34)	0.47 (1.87)	-0.01 (-0.03)	0.01 (0.02)	-0.64 (-1.00)	0.95 (1.04)	0.48 (0.54)

**Table 9. Active Share and Fund Duration: Evidence from Hedge Funds**

Panel A reports the 5-factor alphas of average equal-weighted DGTW-adjusted holdings-based abnormal returns for the Hedge Fund sample conditional on Fund Duration and Active Share. Panel B reports the equal-weighted average DGTW-adjusted holdings-based abnormal returns. 5 factor alphas are obtained by regressing the average DGTW-adjusted returns on the Fama and French 3 factors, momentum factor and Pastor and Stambaugh traded liquidity factor. 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 sorting funds into quintiles first on Fund Duration and then on Active Share are also reported. 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 5 Factor Alpha of DGTW-Adjusted Holdings-Based Gross Returns					
Fund Duration	Uncond	Active Share			
		1	2	3	3-1
Uncond		0.05 (0.15)	0.86 (1.72)	<b>1.52</b> <b>(2.08)</b>	<b>1.47</b> <b>(2.16)</b>
1	0.97 (1.27)	0.19 (0.28)	<b>1.72</b> <b>(2.02)</b>	0.98 (0.66)	0.78 (0.52)
2	1.16 (1.64)	-0.14 (-0.25)	1.40 (1.73)	2.18 (1.66)	2.33 (1.79)
3	0.57 (0.97)	0.28 (0.68)	0.11 (0.16)	1.34 (1.09)	1.06 (0.88)
4	-0.01 (-0.03)	-0.30 (-0.88)	0.54 (1.00)	-0.31 (-0.27)	-0.01 (-0.01)
5	<b>1.39</b> <b>(2.62)</b>	-0.02 (-0.06)	0.51 (1.12)	<b>3.64</b> <b>(3.04)</b>	<b>3.66</b> <b>(3.10)</b>
5-1	0.42 (0.48)	-0.22 (-0.29)	-1.21 (-1.32)	2.66 (1.43)	2.88 (1.48)

**Panel B**

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**Equal Weighted DGTW-Adjusted Holdings-Based Gross Returns**

Fund Duration	Uncond	Active Share			
		1	2	3	3-1
	<b>Uncond</b>	0.27 (0.84)	<b>1.22</b> <b>(2.21)</b>	<b>1.68</b> <b>(1.99)</b>	1.41 (1.80)
1	0.90 (1.17)	0.87 (1.21)	<b>1.94</b> <b>(2.26)</b>	-0.12 (-0.08)	-0.99 (-0.63)
2	<b>1.84</b> <b>(2.40)</b>	0.54 (0.90)	<b>2.02</b> <b>(2.23)</b>	<b>2.93</b> <b>(2.12)</b>	2.39 (1.83)
3	1.01 (1.65)	0.53 (1.26)	0.31 (0.40)	2.22 (1.79)	1.70 (1.40)
4	0.21 (0.39)	-0.09 (-0.25)	0.68 (1.27)	-0.01 (-0.01)	0.07 (0.06)
5	<b>1.34</b> <b>(2.31)</b>	-0.01 (-0.03)	0.48 (1.04)	<b>3.53</b> <b>(2.65)</b>	<b>3.55</b> <b>(2.69)</b>
5-1	0.44 (0.50)	-0.89 (-1.04)	-1.46 (-1.52)	<b>3.65</b> <b>(2.00)</b>	<b>4.54</b> <b>(2.32)</b>

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**Table 10. Institutional Investors' Active Share and Fund Duration: Fama MacBeth Regressions**

This table presents results of yearly Fama-MacBeth regressions of future one-year DGTW adjusted weighted holding returns on lagged Fund Duration, dummies for High and Low Active Share quintiles, fund turnover ratio and interaction between Active Share dummies and Fund Duration. Logarithm of Fund's Total Portfolio Value is also included as a control variable. Regressions are estimated separately for all Institutions and Hedge Fund samples. All independent variables are measured at the end of previous year. Significance at the 5% level is denoted in bold, and Newey-West (1987) adjusted t-statistics based on two lags are given in parentheses.

Fama MacBeth Regressions						
Independent Variable	All Institutions (1986-2012)			Hedge Funds (1995-2012)		
	DGTW-Adjusted Holdings-Based Gross Return (% per year)					
	1	2	3	4	5	6
INTERCEPT	0.158 (0.50)	0.554 (1.66)	-0.052 (-0.16)	-1.430 (-1.09)	-0.474 (-0.39)	-2.240 (-1.66)
INSTDURATION	0.112 (0.68)	-0.111 (-0.67)	0.125 (0.77)	0.183 (0.28)	-0.528 (-1.01)	0.354 (0.53)
HIGH ACTIVESHARE	<b>0.788</b> <b>(2.31)</b>	-0.126 (-0.27)	<b>1.643</b> <b>(4.55)</b>	0.963 (1.72)	-0.572 (-0.85)	2.363 (1.93)
LOW ACTIVESHARE	-0.282 (-1.68)	-0.491 (-1.35)	-0.028 (-0.13)	<b>-0.725</b> <b>(-3.03)</b>	<b>-0.937</b> <b>(-2.85)</b>	-0.469 (-1.43)
TURN_RATIO	0.226 (0.49)	0.107 (0.23)	<b>0.900</b> <b>(1.96)</b>	0.738 (0.56)	0.567 (0.45)	2.075 (1.74)
INSTDURATION*HIGH ACTIVESHARE		<b>0.640</b> <b>(3.16)</b>			<b>1.621</b> <b>(2.44)</b>	
INSTDURATION*LOW ACTIVESHARE		0.138 (0.69)			0.267 (1.40)	
TURN_RATIO*HIGH ACTIVESHARE			<b>-2.303</b> <b>(-4.19)</b>			-2.416 (-1.85)
TURN_RATIO*LOW ACTIVESHARE			-0.703 (-1.52)			-0.384 (-0.83)
LOG(PORT_VAL)	-0.020 (-0.40)	-0.027 (-0.53)	-0.029 (-0.58)	<b>0.298</b> <b>(2.45)</b>	<b>0.263</b> <b>(2.08)</b>	<b>0.279</b> <b>(2.43)</b>
Rsquare (%)	2.60	3.17	3.10	3.28	3.97	4.08
Nobs	37,247	37,247	37,247	7,435	7,435	7,435
Number of Years	27	27	27	18	18	18

**Table 11. Explaining the High Active Share and Long Fund Duration Mutual Fund Performance: Evidence from Factor Loadings**

This table reports the regression coefficients obtained by regressing the monthly returns of the top quintile Active Share and Fund Duration portfolios on seven different factors that are shown in literature to capture the cross-sectional variation in stock returns. The intercept is denoted by ALPHA. Panel A estimates the regressions for the mutual fund sample where the dependent variable is net benchmark-adjusted returns. Panel B estimates a similar set of regressions separately for all institutions and hedge funds. The dependent variable in Panel B is the holdings-based DGTW-adjusted returns. 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**

	Sample of Mutual Funds, 1995 - 2013											
	Dependent Variable: Net Benchmark-Adjusted Returns											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ALPHA	<b>1.92</b> <b>(2.08)</b>	<b>2.628</b> <b>(3.01)</b>	<b>2.148</b> <b>(2.38)</b>	1.356 (1.74)	<b>2.22</b> <b>(2.46)</b>	<b>1.956</b> <b>(2.09)</b>	0.918 (1.07)	1.1808 (1.38)	<b>2.304</b> <b>(3.14)</b>	<b>1.908</b> <b>(2.64)</b>	0.7992 (1.09)	0.594 (0.83)
MKTRF		<b>-0.0896</b> <b>(-5.71)</b>							<b>-0.0868</b> <b>(-6.05)</b>	<b>-0.0791</b> <b>(-5.62)</b>	-0.0209 (-1.20)	-0.0199 (-1.17)
SMB			<b>-0.0783</b> <b>(-3.67)</b>						0.00843 (0.46)	0.0162 (0.90)	<b>0.0782</b> <b>(3.76)</b>	<b>0.0789</b> <b>(3.87)</b>
HML				<b>0.190</b> <b>(9.84)</b>					<b>0.154</b> <b>(7.86)</b>	<b>0.113</b> <b>(5.17)</b>	<b>0.157</b> <b>(8.61)</b>	<b>0.124</b> <b>(6.02)</b>
UMD					<b>-0.0519</b> <b>(-3.76)</b>				<b>-0.0593</b> <b>(-5.06)</b>	<b>-0.0741</b> <b>(-6.17)</b>	<b>-0.0796</b> <b>(-6.96)</b>	<b>-0.0898</b> <b>(-7.71)</b>
PS_VWF						-0.00405			0.0214	0.0130	0.0199	0.0132

						(-0.21)			(1.45)	(0.90)	(1.45)	(0.97)
BAB							<b>0.114</b>			<b>0.0666</b>		<b>0.0533</b>
							<b>(6.80)</b>			<b>(3.81)</b>		<b>(3.21)</b>
QMJ								<b>0.147</b>			<b>0.180</b>	<b>0.166</b>
								<b>(6.49)</b>			<b>(5.89)</b>	<b>(5.47)</b>
N	227	227	227	227	227	227	227	227	227	227	227	227
R-sq	0.000	0.126	0.057	0.301	0.059	0.000	0.170	0.158	0.426	0.462	0.504	0.527

**Panel B**

	All Institutions			Hedge Funds		
Dependent Variable: DGTW Adjusted Holdings-Based Gross Return						
	(1)	(2)	(3)	(4)	(5)	(6)
ALPHA	<b>1.884</b> <b>(3.49)</b>	<b>2.22</b> <b>(4.10)</b>	<b>1.728</b> <b>(3.06)</b>	<b>3.528</b> <b>(2.65)</b>	<b>3.636</b> <b>(3.04)</b>	2.352 (1.88)
MKTRF		<b>-0.0286</b> <b>(-2.80)</b>	-0.0115 (-0.92)		0.0243 (1.04)	<b>0.0784</b> <b>(2.62)</b>
SMB		0.0115 (0.80)	<b>0.0349</b> <b>(2.01)</b>		-0.0276 (-0.94)	0.0285 (0.81)
HML		<b>0.0366</b> <b>(2.34)</b>	0.0345 (1.89)		<b>0.128</b> <b>(4.08)</b>	<b>0.108</b> <b>(3.04)</b>
UMD		-0.0180 (-1.92)	<b>-0.0281</b> <b>(-2.75)</b>		<b>-0.109</b> <b>(-5.83)</b>	<b>-0.132</b> <b>(-6.58)</b>
PS_VWF		<b>-0.0258</b> <b>(-2.28)</b>	<b>-0.0251</b> <b>(-2.21)</b>		0.00209 (0.09)	-0.00445 (-0.19)
BAB			0.0123 (0.90)			0.0367 (1.27)
QMJ			<b>0.0576</b> <b>(2.33)</b>			<b>0.133</b> <b>(2.53)</b>
N	324	324	324	216	216	216
R-sq	0.000	0.081	0.101	0.000	0.266	0.297

## Appendix 1. Institutional Investor Fund Duration: Summary Statistics

### Panel A

Fund Duration(years)	Number of Institutions									
	All	Hedge Funds	BNK	INS	INV	IIA	CPS	PPS	UFE	MSC
0-0.5	417	239	4		2	347		1	1	62
0.5-1	460	187	9	5	4	392	4	2	1	43
1-1.5	510	129	29	10	12	413	5	5	1	35
1.5-2	415	58	33	10	5	327	7	4	2	27
2-2.5	341	47	41	6	6	240	11	7	1	29
2.5-3	211	32	35	5	4	144	4	2		17
3-3.5	104	11	13	4	3	65	3	3		13
3.5-4	26	2	2	3		14		1		6
4-4.5	6	2	2	1		2				1
4.5-5	1	0								1
<b>Total</b>	<b>2491</b>	<b>707</b>	<b>168</b>	<b>44</b>	<b>36</b>	<b>1944</b>	<b>34</b>	<b>25</b>	<b>6</b>	<b>234</b>

### Panel B

Fund Duration(years)	Total Assets (\$ billion)									
	All	Hedge Funds	BNK	INS	INV	IIA	CPS	PPS	UFE	MSC
0-0.5	277.0	134.2	25.9		2.4	153.6		1.8	0.2	93.1
0.5-1	431.9	184.9	32.5	2.8	4.7	351.0	2.9	8.5	0.1	29.6
1-1.5	1933.9	557.7	320.4	100.3	165.5	1272.4	6.8	26.0	3.1	39.4
1.5-2	1633.9	238.7	181.7	21.9	352.7	930.1	5.0	15.4	11.3	115.9
2-2.5	802.2	66.6	22.6	95.4	101.5	467.5	22.5	77.3	0.9	14.5
2.5-3	317.5	28.7	24.4	6.2	29.6	228.5	3.0	18.3		7.6
3-3.5	1183.9	64.1	497.0	41.4	392.5	61.4	7.8	66.2		117.7
3.5-4	17.0	1.1	0.1	2.1		7.1		6.0		1.7
4-4.5	41.2	0.1	1.4	37.2		0.1				2.6
4.5-5	5.6	0.0								5.6
<b>Total</b>	<b>6644.3</b>	<b>1276.2</b>	<b>1105.9</b>	<b>307.2</b>	<b>1048.8</b>	<b>3471.7</b>	<b>48.0</b>	<b>219.4</b>	<b>15.5</b>	<b>427.7</b>

Figure 1. Panel A. Percentage of TNA in Mutual Funds by Active Share Range

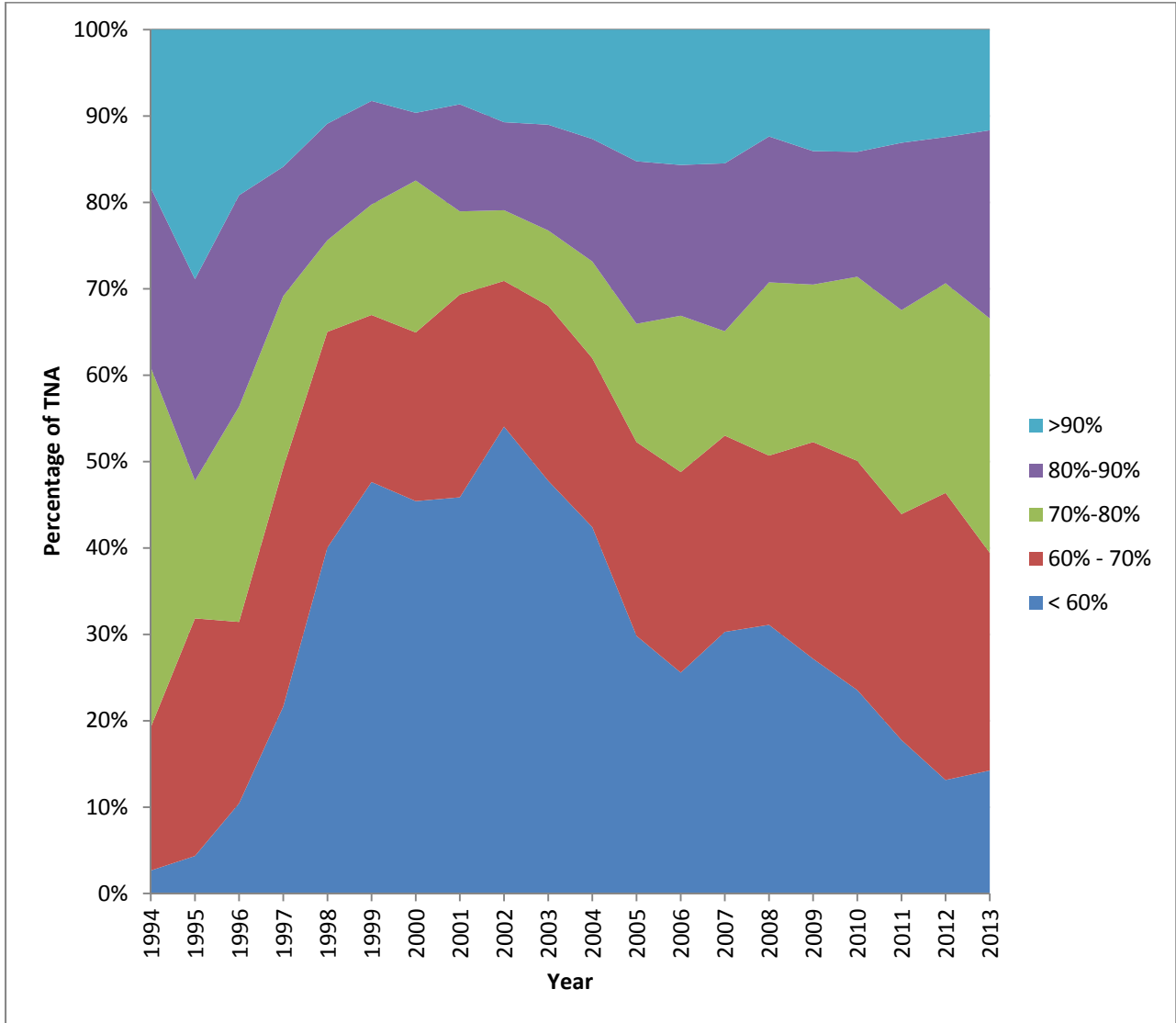


Figure 1. Panel B. Percentage of Mutual Funds by Active Share Range

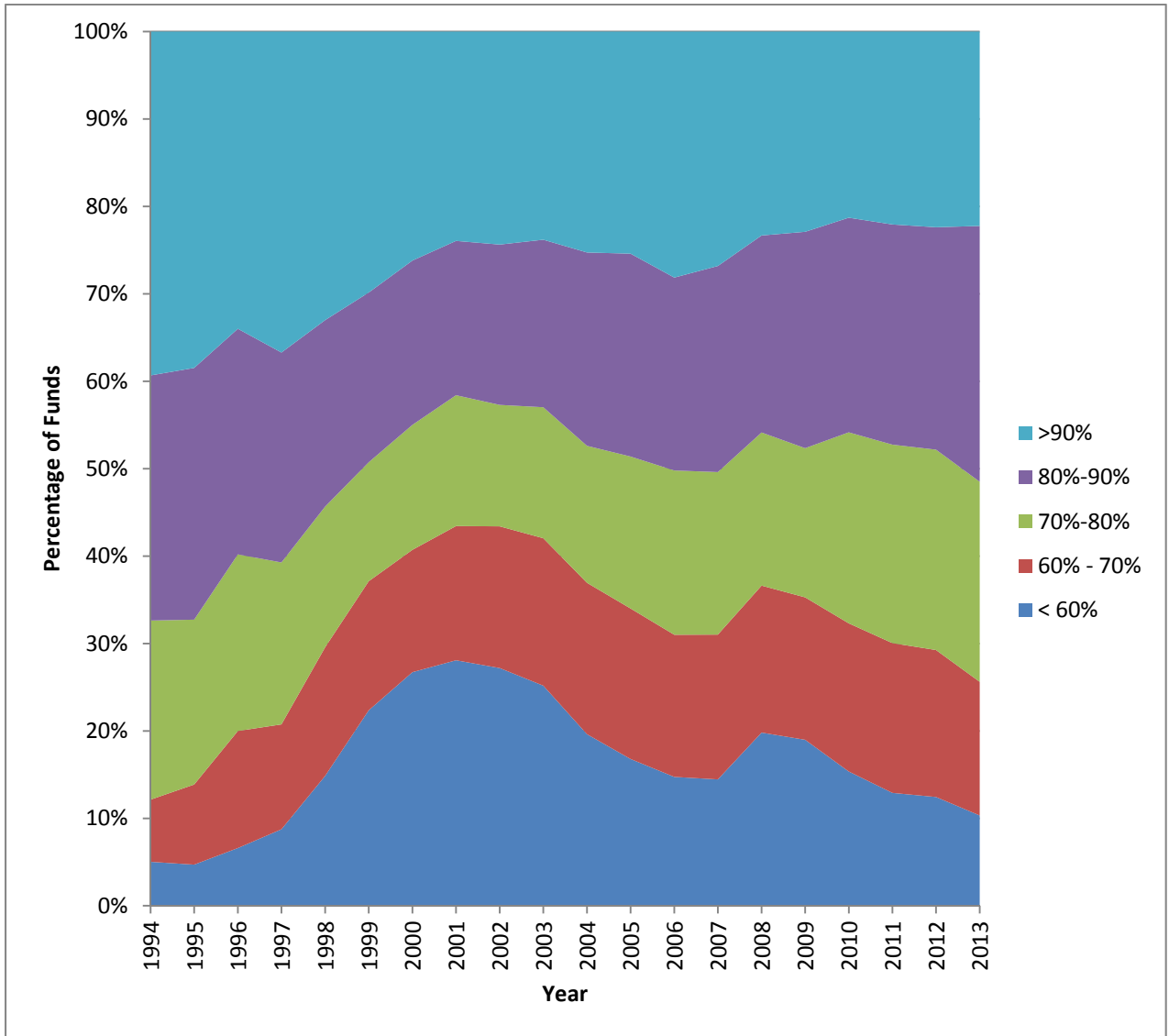


Figure 2. Panel A. Percentage of Assets in Institutions by Active Share Range

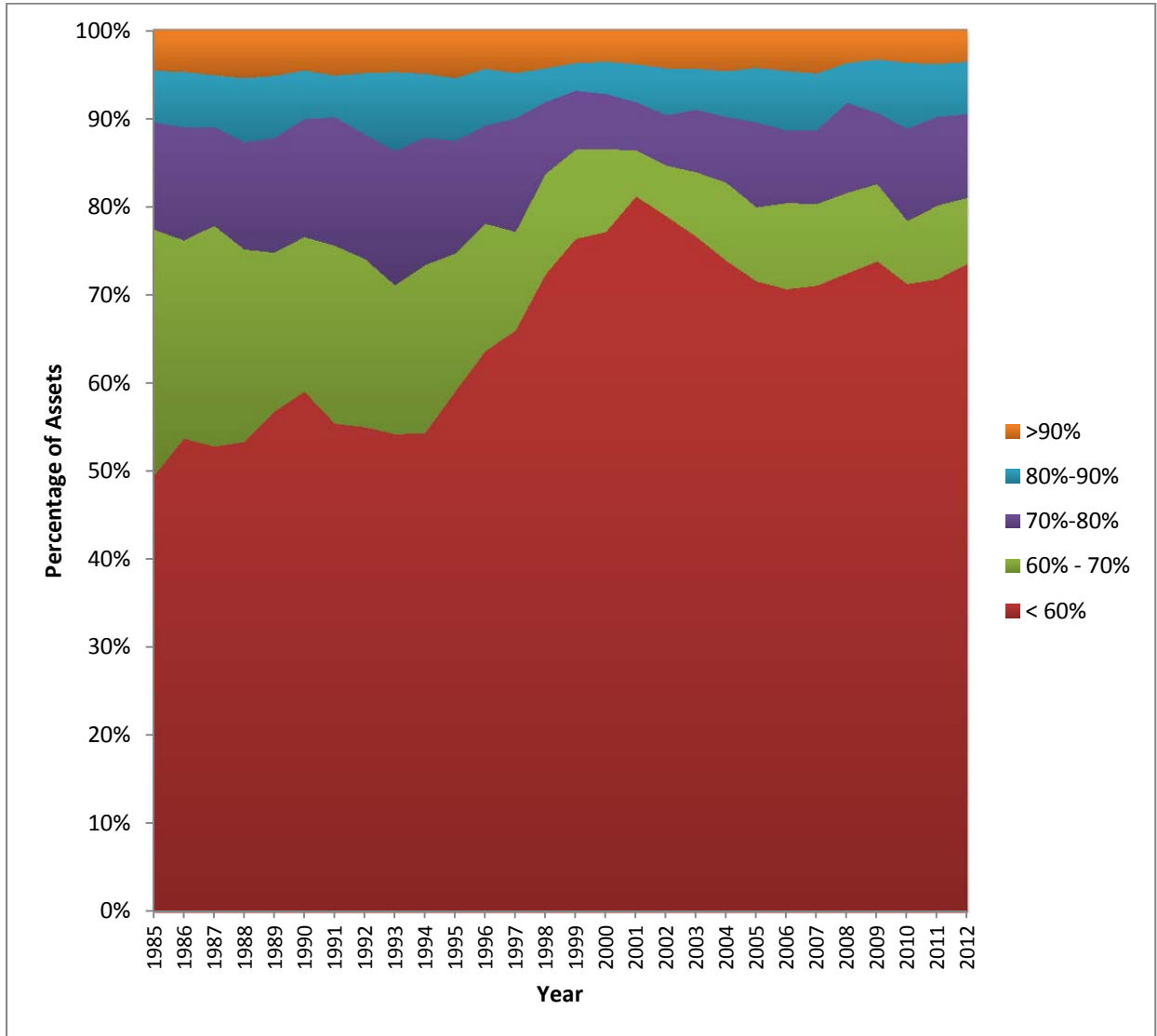




Figure 2. Panel B. Percentage of Number of Institutions by Active Share Range

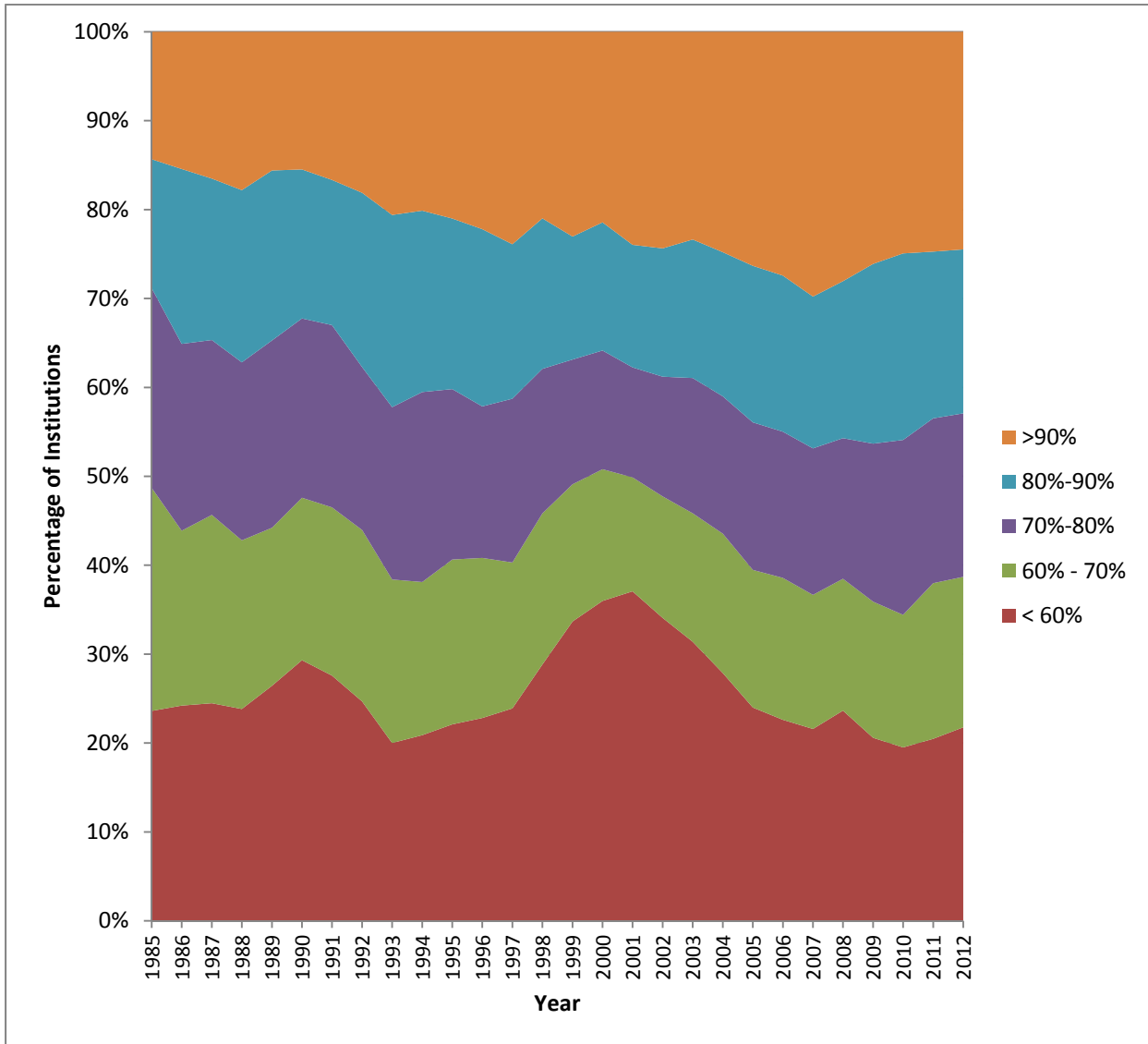


Figure 3. Panel A. Examples of Mutual Funds with High/Low Active Share and Fund Duration

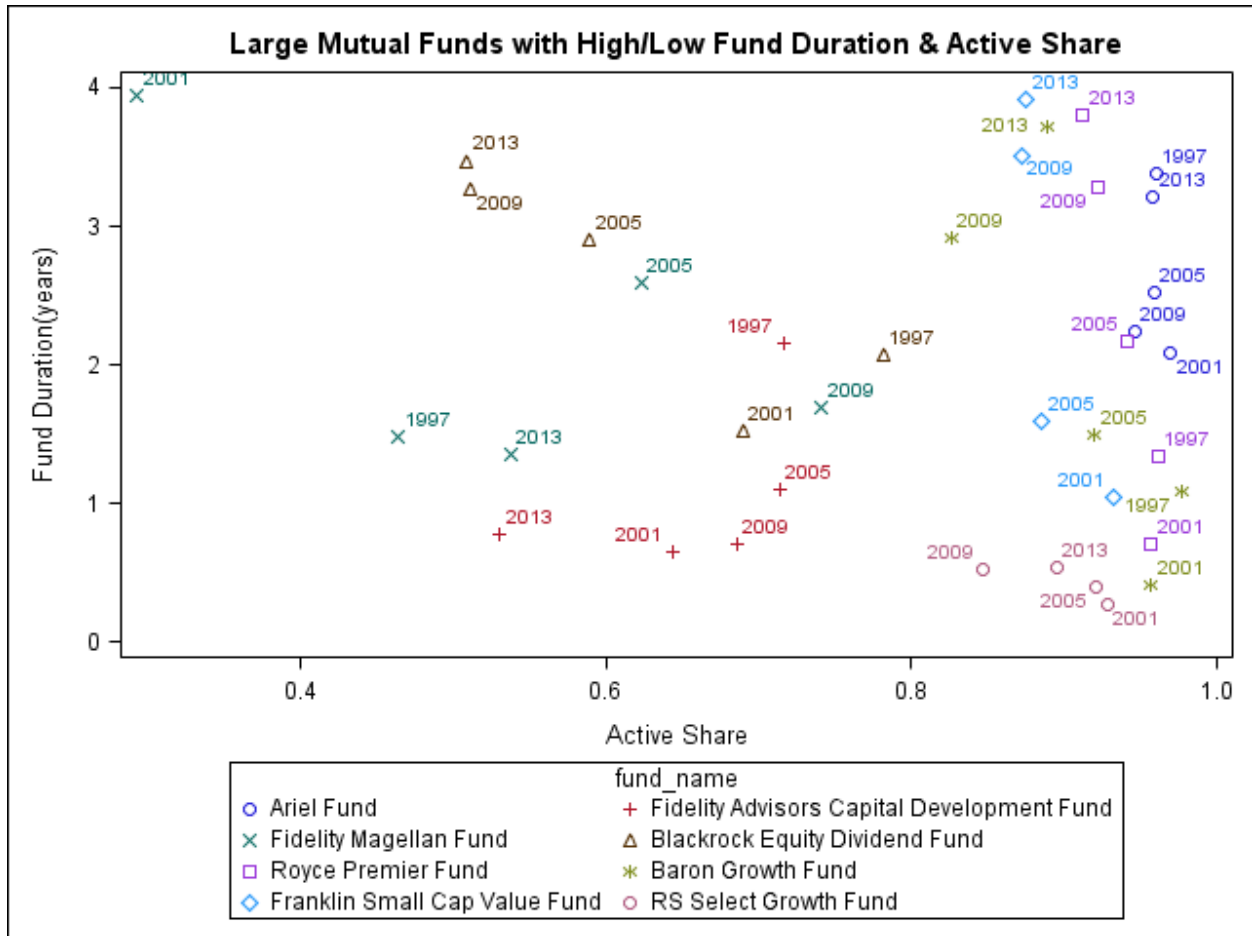


Figure 3. Panel B. Examples of Institutional Portfolios with High/Low Active Share and Fund Duration

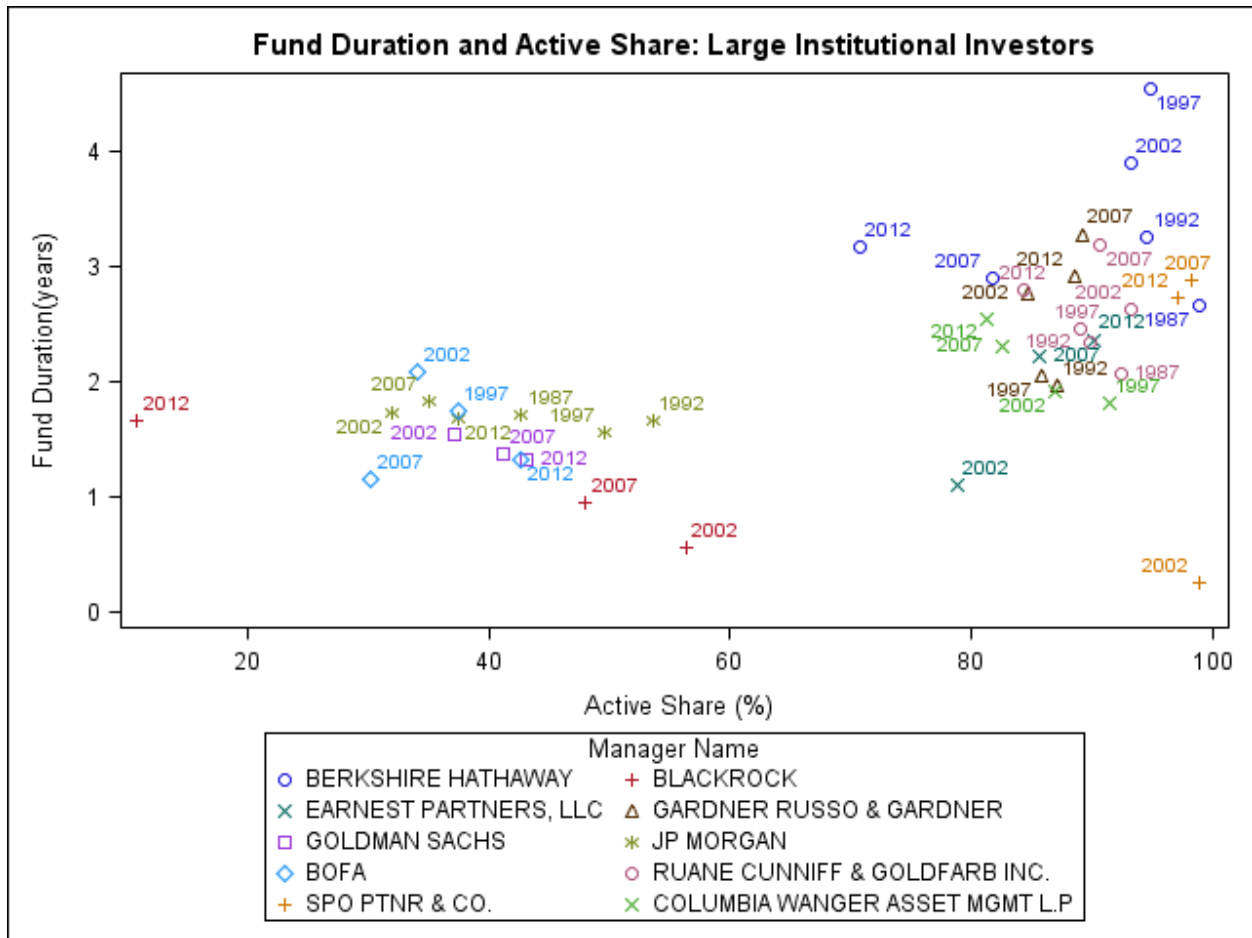
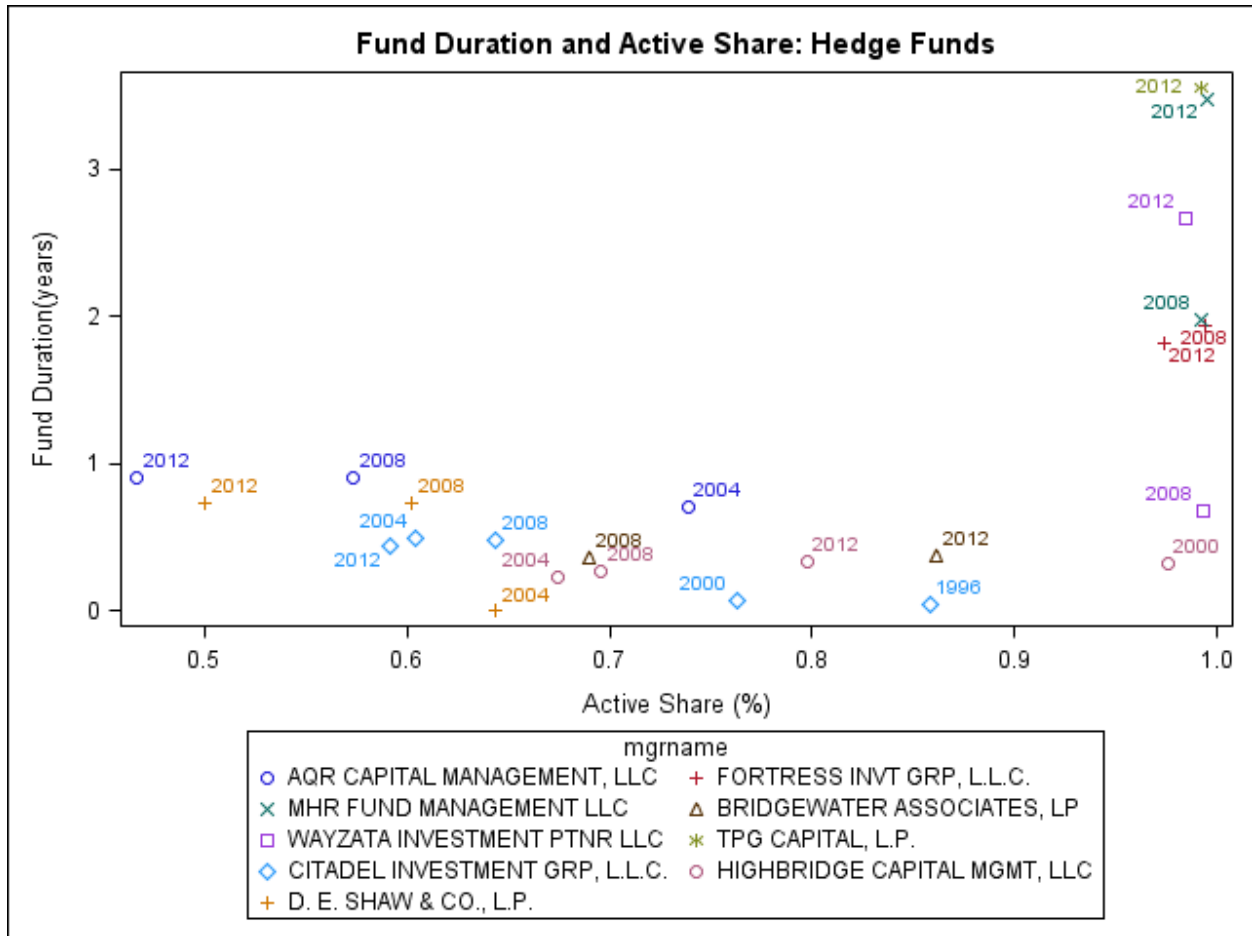
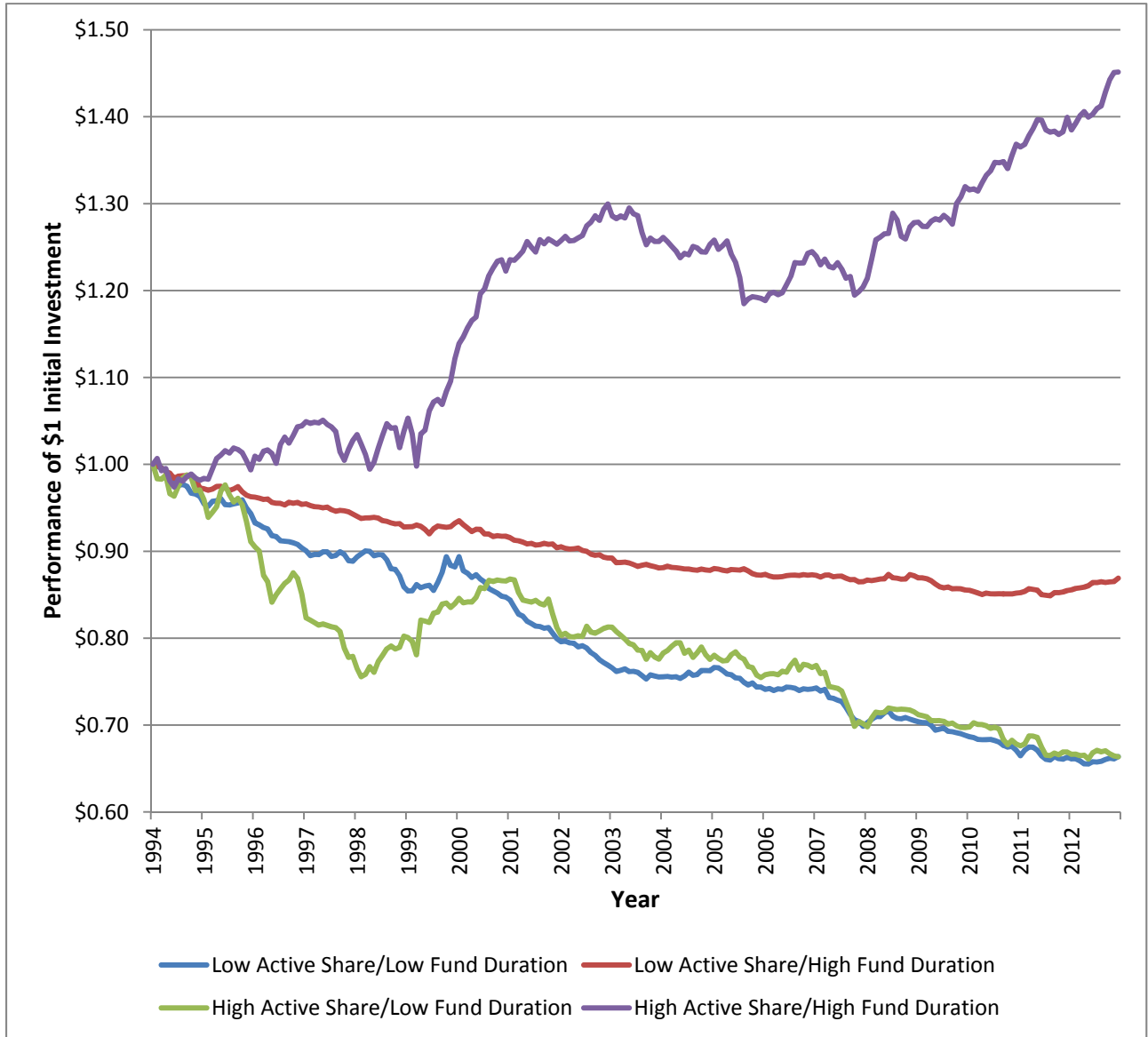


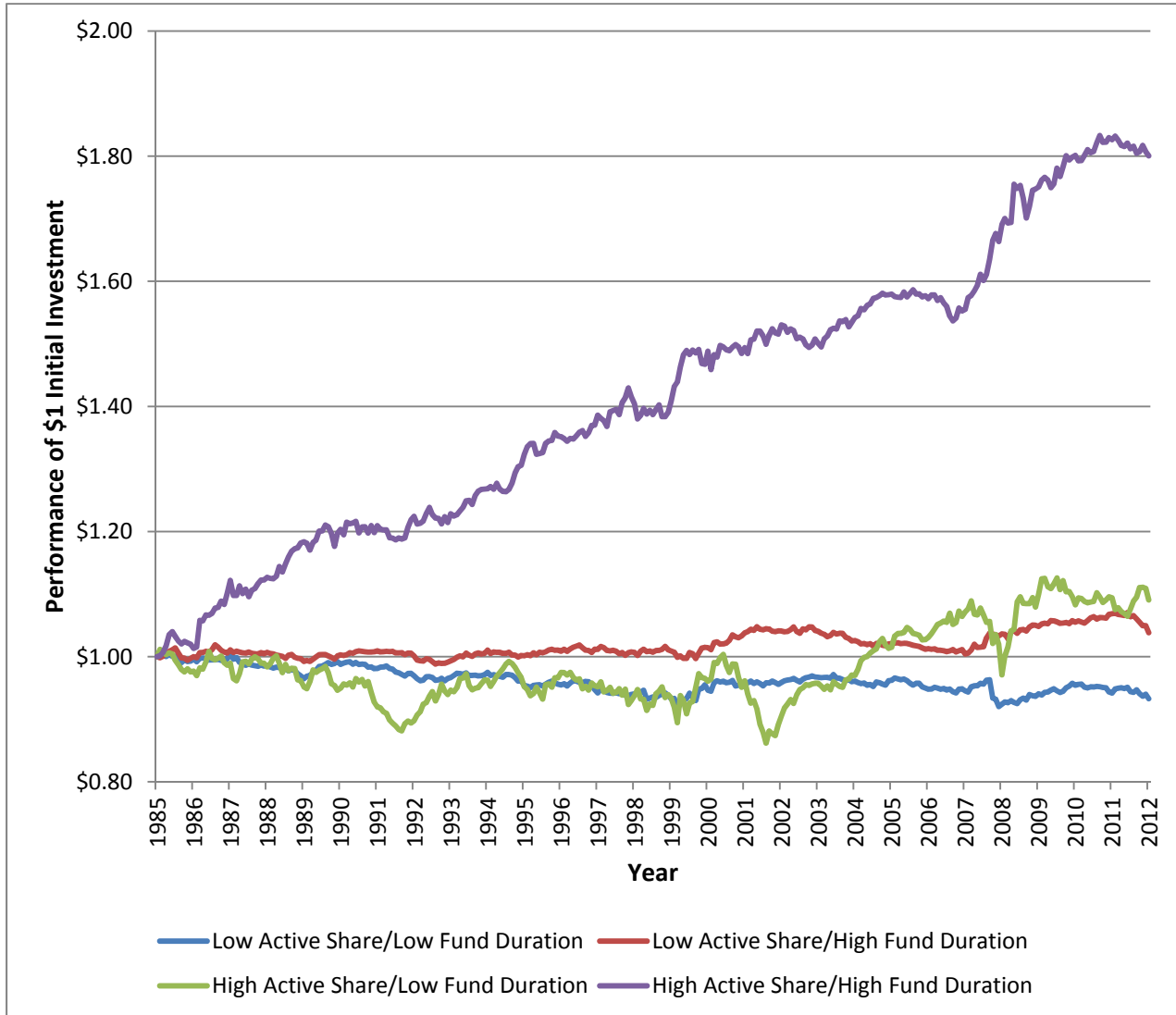
Figure 3. Panel C. Examples of Hedge Fund Portfolios with High/Low Active Share and Fund Duration



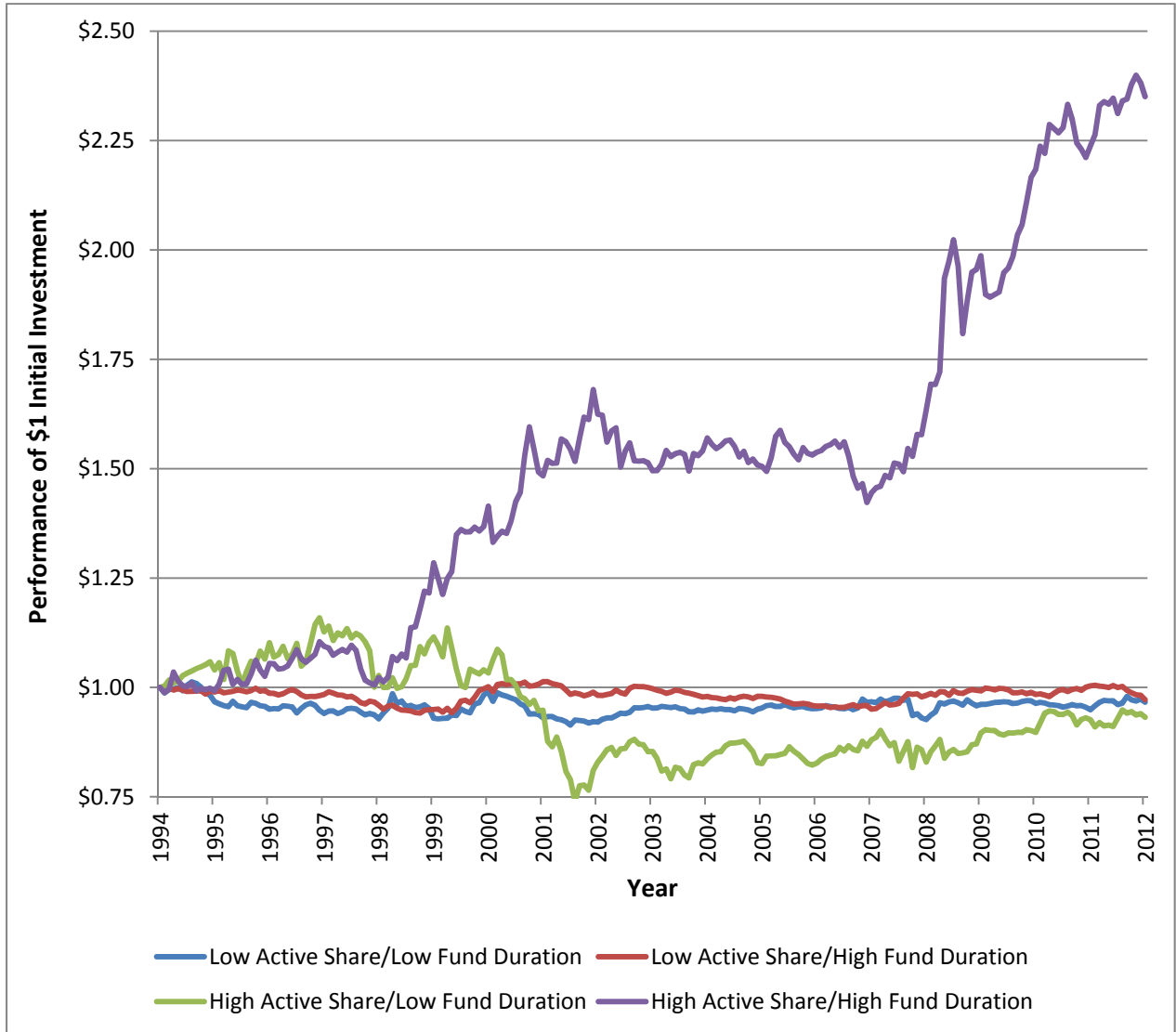
**Figure 4. Panel A. Average Cumulative Abnormal Net Returns for \$1 Investment in Portfolios of Mutual Funds**



**Figure 4. Panel B. Average Cumulative Abnormal Holdings-based Returns for \$1 Investment in Portfolios of Institutional Holdings**



**Figure 4. Panel C. Average Cumulative Abnormal Holdings-based Returns for \$1 Investment in Portfolios of Hedge Funds Holdings**



**Figure 4. Panel D. Cumulative Abnormal Holdings-based Returns for \$1 Investment in Portfolios of the Holdings of Active and Long-term Institutions**

