

## PERSPECTIVES

## Deactivating Active Share

Andrea Frazzini, Jacques Friedman, and Lukasz Pomorski

*The authors investigated “active share,” a measure meant to determine the level of active management in investment portfolios. Using the same sample that was used in the original research on this topic, they found that active share correlates with benchmark returns but does not predict actual fund returns; within individual benchmarks, it is as likely to correlate positively with performance as it is to correlate negatively. Their findings do not support an emphasis on active share as a manager selection tool or an appropriate guideline for institutional portfolios.*

Active share is a metric proposed by Cremers and Petajisto (2009) and Petajisto (2013) to measure the distance between a given portfolio and its benchmark and identify where an investment manager lies in the passive-to-active spectrum. It ranges from 0, when the portfolio is identical to its benchmark, to 1, when the portfolio holds only nonbenchmark securities. Technically, active share is defined as one-half the sum of the absolute value of active weights:

$$\text{Active share} = \frac{1}{2} \sum_{j=1}^N |w_j|,$$

where  $w_j = w_{j,\text{fund}} - w_{j,\text{benchmark}}$  is the active weight of stock  $j$ , defined as the difference between the weight of the stock in the portfolio and the weight of the stock in the benchmark index. Using holdings data (from Thomson Reuters) and performance data (from the CRSP database) of actively managed domestic mutual funds, Cremers and Petajisto (2009) and Petajisto (2013) reported the following:

1. Historically, high-active-share funds outperform their reported benchmarks.
2. The benchmark-adjusted returns of high-active-share funds are higher than the benchmark-adjusted returns of low-active-share funds.

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The authors also suggested a simple rule of thumb to investors: Funds with active share results below 60% should be avoided because they are “closet indexers” that charge high fees for merely providing index-like returns.

Not surprisingly, these results have attracted considerable attention in the investment community. In response, more and more active mutual funds and institutional money managers have been touting their active share results, several leading investment consultants now strongly emphasize the measure, and online tools are now available to allow investors to screen managers on the basis of active share.<sup>1</sup> Institutional investors have become more focused on asset managers with high active share, and some have even embedded a high-active-share requirement in their investment guidelines. For example, a recent request for proposals from a large public pension plan included the following:

The firm and/or portfolio manager must...have a high active share in the small-cap strategy, preferably greater than 75% in the last three years;...if the active share is lower than 75%, please clearly state that in the RFP response and explain why the active share is low and why it is beneficial.

These observations suggest that active share is influencing capital allocation decisions among retail and institutional investors, with a potential large impact. Investors may prefer or require managers to maintain a high active share for a variety of reasons, but a plausible hypothesis is that some investment professionals have interpreted these findings as evidence that investors have historically been better off by selecting managers with high active share. In

particular, when selecting managers within a specific capitalization spectrum or benchmark (for example, a US small-cap benchmark in the request for proposals cited), the implicit assumption in requiring a high active share is that high-active-share managers have a greater chance of outperforming that benchmark.

In this article, we address the question of whether investors have been better off by selecting managers with high active share. Using the same sample and methodology of Cremers and Petajisto (2009) and Petajisto (2013), we show that the reported relationship between active share and mutual fund returns in excess of their benchmarks is driven by the correlation between active share and benchmark. Controlling for differences in benchmark returns, we found no significant relationship between the active share measure and fund returns. We show that, statistically, no difference in total return is discernible between high-active-share funds (“Stock Pickers”) and low-active-share funds (“Closet Indexers”). High-active-share funds have benchmarks, however, that have consistently underperformed the benchmarks of funds with low active share.

To be clear, we repeat: Our data and baseline results are the same as those of Cremers and Petajisto (2009) and Petajisto (2013), and our finding that the difference in active returns between high-active-share funds and low-active-share funds is the result of their benchmarks is clearly mentioned in Cremers and Petajisto (2009):

The standard non-benchmark-adjusted Carhart alphas show no significant relationship with active share. The reason behind this is that the benchmark indexes of the highest active share funds have large negative Carhart alphas, while the benchmarks of the lowest active share funds have large positive alphas.<sup>2</sup>

In this study, we closely replicated the findings produced in Cremers and Petajisto (2009) and Petajisto (2013), but we believe that their conclusions are subject to misinterpretation.<sup>3</sup> We have three main results:

1. High-active-share funds tend to have small-cap benchmarks, whereas low-active-share funds tend to have large-cap benchmarks. Sorting funds on active share is equivalent to sorting on benchmark type.
2. There is no reliable statistical evidence that high-active-share and low-active-share funds have returns that are different from each other.
3. For a given benchmark, there is no reliable statistical evidence that high-active-share funds outperform low-active-share funds.

Overall, our conclusions do not support an emphasis on active share as a tool for selecting managers or as an appropriate guideline for institutional portfolios.

Our results should not be too surprising. Active share is a measure of active risk, and simply taking on more risk is unlikely, by itself, to lead to outperformance. Moreover, if one argues that active share can predict performance, what about other measures of concentration? For example, tracking error captures similar dimensions as active share, yet high-tracking-error funds do not outperform low-tracking-error funds (see, e.g., Cremers and Petajisto 2009). Schlanger, Philips, and Peterson LaBarge (2012) examined five measures of active management and found no evidence that they predict performance.<sup>4</sup>

Another example of research on other measures of concentration is a study by Amihud and Goyenko (2013), who found that distance from an index (which they measured by regression  $R^2$ ) does not by itself correlate significantly with outperformance. Managers who are more likely to be skilled (e.g., those with exceptional past performance), however, are more likely to outperform in the future if they take on more risk. Thus, simply taking on risk is not a good measure of skill; possibly, however, managers who have skill may be able to earn higher returns by taking on more risk.

In general, if the universe of mutual fund managers holds the market portfolio, we know that the market clears: Before fees, every dollar of outperformance must be offset by a dollar of underperformance. Low-active-share investors who simply track the market (Closet Indexers) will match market returns before fees and underperform after fees. As a result, investors who take large bets (and have high-active-share results) will also match market returns before fees and underperform after fees (Sharpe 1991). Among the high-active-share investors will be winners and losers, but as a group, they cannot systematically outperform the Closet Indexers.

This assertion is, of course, an approximation because the aggregate portfolio of actively managed funds and the market portfolio are not identical. If the aggregate mutual fund sector outperforms the market portfolio, some groups of funds may outperform, in aggregate. However, the evidence pertaining to aggregate holdings of mutual funds is mixed. Fama and French (2010) found that the aggregate portfolio of actively managed US equity mutual funds underperforms the market gross of fees. Wermers (2000) found evidence of aggregate outperformance, whereas Chen, Jegadeesh, and Wermers (2000) found no evidence of either under- or outperformance.

Of course, our central message—that active share is not a valuable measure of skill—does not mean that active share is not useful. Active share may be useful, for example, in evaluating fees. In general, fees should be commensurate with the active risk the fund takes: If you deliver index-like returns, you should charge index-fund-like fees. Active share is

one possible measure of the degree of “activity” in a portfolio; additional measures are predicted and realized tracking error, as well as other concentration measures. A prudent investor will use multiple measures to determine whether a manager is taking risks commensurate with fees.<sup>5</sup>

### Active Share and Mutual Fund Benchmarks

Our methodology and sample are the same as those of Petajisto (2013) and Cremers and Petajisto (2009), and our sample includes data on active share and benchmark assignment for all actively managed US domestic mutual funds from 1990 to 2009.<sup>6</sup>

Before evaluating manager performance, we will examine the composition of the manager universe with regard to managers’ active share results.

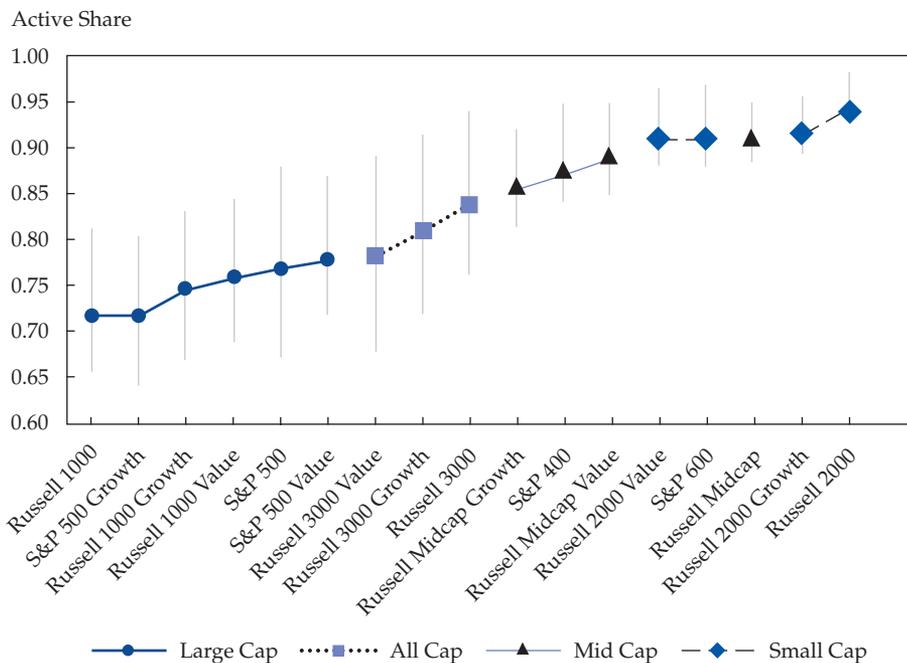
Figure 1 plots the average, 25th percentile, and 75th percentile of the funds’ active share results within each benchmark in our sample.<sup>7</sup> Figure 1 shows that sorting managers on the basis of their active share is equivalent to sorting on their benchmark type. Large-cap funds (clustered to the left) have lower average active share; small-cap funds (clustered to the right) have higher average active share. The difference in active share between large- and small-cap funds is substantial: The top quartile of active share of large-cap funds is below the bottom quartile of active share of small-cap funds. In other words, investors

selecting high-active-share managers will tilt toward small- and midcap managers and will avoid large-cap funds. In reality, few investors would evaluate all equity managers on a particular dimension and then accept whichever benchmark fell out of that selection. In practice, investors are likely to start with a benchmark (for example, a small-cap benchmark as in the sample request for proposals discussed in the introduction) and select managers within that benchmark. We follow this approach later in our empirical analysis.

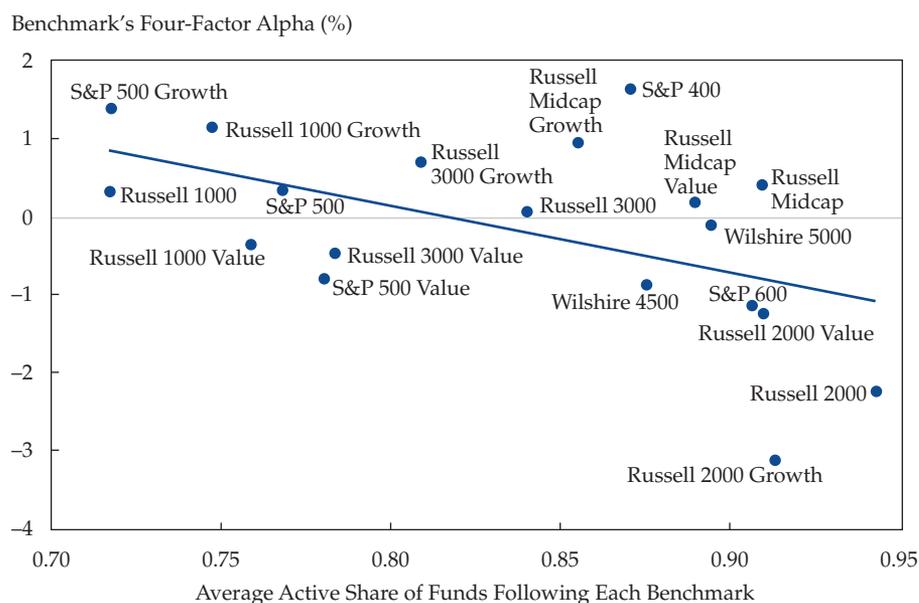
Figure 2 compares performance for the benchmarks in our sample. We estimated four-factor alphas—controlling for each benchmark’s market beta and its exposures to size, value, and momentum. Alphas were computed as the intercept in a time-series regression of benchmark returns over the risk-free rate on market, size, value, and momentum factors. Importantly, we did not use any actual fund returns for this analysis—only the returns of benchmark indices.

Figure 2 shows that over our sample period, small-cap indices (which tend to be the benchmark of high-active-share funds) underperformed large-cap indices (which tend to be the benchmark of low-active-share funds). The differences are large, with annualized alphas ranging from -3.35% for the Russell 2000 Growth Index to +1.44% for the S&P 500 Growth Index. The fitted regression line implies an approximate 2% difference between the extremes, and the slope is significant at the 1% level, with a *t*-statistic of 2.92. The results shown in Figure 2 are consistent

Figure 1. Active Share Statistics by Benchmark, 1990–2009



Notes: For each benchmark, we present the average (dots, squares, triangles, and diamonds) and the 25th and 75th percentiles (whiskers) of the active share of funds following that benchmark. Benchmarks are sorted by the average active share.

**Figure 2. Active Share Correlation with Benchmark Type and Benchmark Alpha, 1990–2009**

Note: For each benchmark index, we computed the four-factor alpha and plotted it against the average active share of all funds that followed that benchmark.

with those of Cremers, Petajisto, and Zitzewitz (2013), who also found underperformance of small-cap benchmarks over this sample period. They are also consistent with the findings of other studies that have observed that active share's performance predictability can be explained by a bias toward the small-cap sector (e.g., Schlanger et al. 2012; Cohen, Leite, Nelson, and Browder 2014).

To summarize, in the universe of US domestic funds between 1990 and 2009, high-active-share funds tended to have small-cap benchmarks whereas low-active-share funds tended to have large-cap benchmarks. Over the same period, small-cap indices underperformed large-cap indices.

Next, we turn to the implications of these findings for the relationship between active share and performance.

### Active Share and Mutual Fund Performance: Benchmark vs. Fund

Following Petajisto (2013), we sorted mutual funds into groups on the basis of their active share results and realized tracking errors. We relied on the same portfolio assignments as Petajisto (2013), so our analysis provides an apples-to-apples comparison with the original studies. That is, the Stock Pickers comprise the managers who are in the highest quintile of active share intersected with all but the highest quintile of tracking error. The Closet Indexers consist of the lowest

quintile of active share intersected with all but the highest quintile of tracking error.

First, we confirmed that, on the basis of the groupings' active share and tracking error results, the benchmark-selection bias noted in the previous section pervades these fund groupings. In the Closet Indexer group of funds, more than 91% of the sample (fund-month observations) came from large-cap funds in the S&P 500 and the Russell 1000 families of benchmarks. Among the Stock Picker funds, 56% were benchmarked to the Russell 2000 Index alone and 75%, to small- and midcap benchmarks.

**Table 1** replicates the main result of Petajisto (2013). Why active share generates so much interest is obvious: Stock Pickers (Portfolio 5, or P5) outperformed Closet Indexers (Portfolio 1, or P1) by more than 2% per year, a figure that is statistically and economically significant.<sup>8</sup> The result is compelling for comparisons of both benchmark-adjusted returns and four-factor alphas.

Many in the investment community have interpreted this result as evidence that mutual fund investors are better off selecting high-active-share managers. Note, however, to correctly study performance, a key feature of our analysis is the focus on benchmark-adjusted returns:  $R_{fund} - R_{benchmark}$ .

Specifically, the left column of Table 1 reports the average benchmark-adjusted returns to each active share grouping, and the right column of Table 1 reports benchmark-adjusted returns regressed on academic factors to calculate alphas. Benchmark-adjusted returns

**Table 1. Active Share Performance Results, 1990–2009**  
(*t*-statistics in parentheses)

Portfolio	Benchmark-Adjusted Return (%)	Benchmark-Adjusted Four-Factor Alpha (%)
Closet Indexers (P1)	−0.93*** (−3.48)	−1.05*** (−4.66)
Moderately active (P2)	−0.53 (−1.19)	−0.76* (−1.89)
Factor bets (P3)	−1.27 (−1.32)	−2.12*** (−3.13)
Concentrated (P4)	−0.49 (−0.32)	−1.04 (−0.88)
Stock Pickers (P5)	1.21* (1.81)	1.37** (2.04)
P5 minus P1	2.14*** (3.33)	2.42*** (3.81)

Notes: We replicated Table 5 from Petajisto (2013) and report here the net-of-fee annualized performance of the five mutual fund portfolios highlighted in Cremers and Petajisto (2009) and Petajisto (2013). The portfolios are based on a two-way sort on active share and tracking error—the same approach used in Petajisto (2013). We computed alphas as the intercept in the regression of benchmark-adjusted fund returns on market, size, value, and momentum.

\*Significant at the 10% level.

\*\*Significant at the 5% level.

\*\*\*Significant at the 1% level.

surely are important; after all, managers are tasked with outperforming their benchmarks, and differences in benchmark-adjusted performance may capture skill better than differences in funds' raw returns. Benchmark-adjusted returns should not be the only metric one looks at, however, particularly when comparing funds with various benchmarks. Using this metric confounds differences between funds and differences between benchmark indices (recall the pattern from Figure 2). In other words, the active share measure may look attractive when the fund return,  $R_{fund}$ , is high in comparison with other funds, but it also may look attractive when the benchmark return,  $R_{benchmark}$ , is low relative to other benchmarks.

To clarify the role the benchmarks play in the significance of the results, we show in Table 2 a decomposition of the average returns and the alphas of the five portfolios into the contribution from fund returns and the contribution from each fund's benchmark. The "Fund" column in the left panel of Table 2 shows that Stock Pickers have higher fund returns than Closet Indexers (10.99% versus 8.28%). The 2.7% difference is economically large but is not statistically significant (*t*-statistic of 1.62). The alphas in the right panel reveal a similar pattern: The benchmark-adjusted alpha difference between Stock Pickers and Closet Indexers is large, 2.42% (*t*-statistic of 3.81). The two rightmost columns show, however, that the difference in fund alphas is an insignificant 0.93% (*t*-statistic of 1.08); the remaining 1.48% is the result of a significant difference

**Table 2. Active Share Prediction, 1990–2009**  
(*t*-statistics in parentheses)

Dependent Variable	Decomposing Benchmark-Adjusted Return (returns in %)			Decomposing Alpha (alphas in %)		
	Fund minus Benchmark	Fund	Benchmark	Fund minus Benchmark	Fund	Benchmark
Closet Indexers (P1)	−0.93*** (−3.48)	= 8.28** (2.48)	− 9.21*** (2.68)	−1.05*** (−4.66)	= −0.75*** (−2.62)	− 0.29 (1.03)
Moderately active (P2)	−0.53 (−1.19)	= 9.20*** (2.64)	− 9.74*** (2.73)	−0.76* (−1.89)	= −0.74 (−1.37)	− 0.02 (0.06)
Factor bets (P3)	−1.27 (−1.32)	= 7.85** (2.00)	− 9.12** (2.47)	−2.12*** (−3.13)	= −1.84** (−2.54)	− 0.28 (0.65)
Concentrated (P4)	−0.49 (−0.32)	= 9.20** (1.99)	− 9.66** (2.49)	−1.04 (−0.88)	= −1.66 (−1.36)	− −0.64 (−1.21)
Stock Pickers (P5)	1.21* (1.81)	= 10.99*** (2.89)	− 9.78** (2.53)	1.37** (2.04)	= 0.18 (0.21)	− −1.19** (−2.00)
P5 minus P1	2.14*** (3.33)	= 2.71 (1.62)	− 0.57 (0.34)	2.42*** (3.81)	= 0.93 (1.08)	− −1.48** (−2.16)

Notes: We decomposed annualized net-of-fee returns and alphas of the five active share portfolios in Table 1 into the contribution from fund return and alpha and the contribution from the benchmark return and alpha. We computed alphas as the intercept in the regression of benchmark-adjusted fund returns on market, size, value, and momentum.

\*Significant at the 10% level.

\*\*Significant at the 5% level.

\*\*\*Significant at the 1% level.

in alphas between the benchmark indices of the two groups ( $t$ -statistic of 2.16).

To summarize, we did not find reliable statistical evidence that high-active-share funds have achieved higher returns or alphas than low-active-share funds. Benchmarks drive the difference in benchmark-adjusted performance between low- and high-active-share funds.

## Does Active Share Predict Performance?

As shown in Figure 1, active share data effectively rank funds by their benchmarks. We believe it is more reasonable to rank funds separately within each benchmark; this way, we are directly comparing high- and low-active-share funds that share the same benchmark universe. With this methodology, we can recalculate returns and alphas for the five active share groupings. We present the results in Table 3 using the same fund and return data as in Tables 1 and 2. For ease of reference, Table 3 restates the original results from Table 1 side by side with our newly calculated returns for which all comparisons are within benchmark.

After controlling for benchmarks, the performance difference between Stock Pickers and Closet

Indexers (raw or benchmark-adjusted performance or alphas), although positive, is not statistically different from zero. Benchmark-adjusted returns are nearly halved, from 2.14% to 1.16%, with the  $t$ -statistic dropping from 3.33 to 1.48. Benchmark-adjusted alphas drop from 2.42% to 0.88%, with the  $t$ -statistic dropping from 3.81 to an insignificant level of 1.48. This result is consistent with our earlier finding that the performance improvements associated with active share are driven by the correlation between active share and benchmark.

Figure 3 breaks out the difference in alpha between the Stock Picker and the Closet Indexer groups benchmark by benchmark. The figure shows that Stock Pickers earn higher returns than Closet Indexers in about half of benchmark indices (8 out of 17), but the relationship is statistically significant in only 1 (we denote significance with a red border). In each of the remaining nine benchmarks, higher active share predicts lower performance (in one benchmark, significantly so).

Figure 3 shows that the lack of robustness is not a result of less popular or less used indices; on the contrary, the lack of robustness is apparent also for the most popular and widely followed benchmarks. For example, for funds benchmarked to the S&P 500 (356 funds, on average—the most

**Table 3. Active Share Performance Results: Funds Ranked Separately within Each Benchmark, 1990–2009**  
( $t$ -statistics in parentheses)

Dependent Variable	Sorting on Active Share across All Benchmarks, as in Cremers and Petajisto (2009)		Sorting on Active Share Separately within Each Benchmark	
	Benchmark-Adjusted Return (%)	Benchmark-Adjusted Alpha (%)	Benchmark-Adjusted Return (%)	Benchmark-Adjusted Alpha (%)
Closet Indexers (P1)	−0.93*** (−3.48)	−1.05*** (−4.66)	−0.71** (−2.53)	−0.88*** (−3.76)
Moderately active (P2)	−0.53 (−1.19)	−0.76* (−1.89)	−0.41 (−0.95)	−0.58 (−1.46)
Factor bets (P3)	−1.27 (−1.32)	−2.12*** (−3.13)	−1.15 (−1.48)	−1.47*** (−2.64)
Concentrated (P4)	−0.49 (−0.32)	−1.04 (−0.88)	−0.71 (−0.40)	−1.46 (−1.25)
Stock Pickers (P5)	1.21* (1.81)	1.37** (2.04)	0.45 (0.53)	−0.004 (−0.01)
P5 minus P1	2.14*** (3.33)	2.42*** (3.81)	1.16 (1.48)	0.88 (1.48)

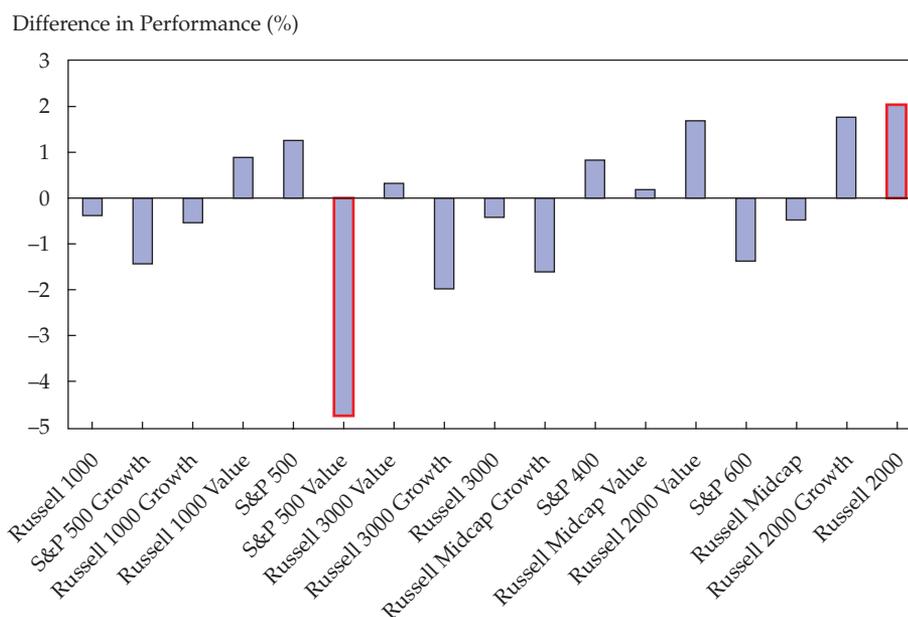
Notes: In the two leftmost columns, we report net-of-fee annualized performance of the five mutual fund portfolios in Table 1. These portfolios are based on a sort on active share across the whole universe of funds. In the two rightmost columns, we present performance of analogous portfolios based on a sort on active share within each benchmark separately. We evaluated performance of these portfolios by computing their average benchmark-adjusted returns and alphas. We computed alphas as the intercept in the regression of benchmark-adjusted fund returns on market, size, value, and momentum.

\*Significant at the 10% level.

\*\*Significant at the 5% level.

\*\*\*Significant at the 1% level.

**Figure 3. Annualized Difference in Performance between High- and Low-Active-Share Funds by Benchmark, 1990–2009**



*Notes:* This figure shows the difference in alpha between Stock Pickers and Closet Indexers, estimated separately for each benchmark. The alpha measures outperformance after controlling for market, size, value, and momentum. Alphas are computed as the intercept in the regression of benchmark-adjusted fund returns on market, size, value, and momentum factors; 5% statistical significance is indicated by a red border.

popular benchmark in our sample), Stock Pickers earned (statistically insignificantly) higher returns than Closet Indexers, but for funds benchmarked to the Russell 1000 Growth Index (123 funds, on average—the second most popular benchmark), Stock Pickers earned (statistically insignificantly) lower returns than Closet Indexers.

To summarize, for a given benchmark, we did not find reliable evidence that high-active-share funds earn higher returns than low-active-share funds.

## Conclusion

Using the same sample as Cremers and Petajisto (2009) and Petajisto (2013), we reevaluated the empirical evidence of active share's return predictability. We showed that high-active-share funds are predominantly funds benchmarked to small-cap and midcap indices and that these benchmarks did poorly in the 1990–2009 sample period. We found no statistically significant evidence that high- and low-active-share funds have returns that are different from each other. We conclude that active share does not reliably predict performance and that investors who rely on it to identify skilled managers may reach erroneous conclusions.

Nevertheless, although active share may not be useful for predicting outperformance, it may well

be useful for evaluating costs. Fees matter, and we believe they should be in line with the active risk taken. Active share is one measure to assess the degree of active management, and a prudent investor may choose to use it in conjunction with such measures as predicted (*ex ante*) tracking error. To the extent that these measures capture different aspects of active management (as Cremers and Petajisto 2009 and Petajisto 2013 argued), using them in tandem could help investors identify managers who might be overcharging for the active risk they deliver. Moreover, although active share may not capture all dimensions that tracking error accounts for, it is a relatively simpler measure to explain, which may be beneficial for some investors and portfolio overseers.

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## Notes

1. See, for example, [http://online.wsj.com/public/resources/documents/st\\_FUNDS20140117.html](http://online.wsj.com/public/resources/documents/st_FUNDS20140117.html).
2. Cremers and Petajisto (2009), p. 3333. Moreover, Cremers, Petajisto, and Zitzewitz (2013) discussed methodological choices that can lead to positive estimated alphas of large-cap benchmarks and large negative alphas of small-cap indices.
3. For example, “US mutual funds with higher active share significantly outperformed those with lower active share” (Ely 2014, p. 4); “empirically, higher active share means higher returns” (Allianz Global Investors 2014, p. 7); and “portfolios with high active share tend to outperform others” (Flaherty and Chiu 2014, p. 1). As we show in our following discussions, these accounts overstate the evidence in Cremers and Petajisto (2009).
4. Cremers and Petajisto (2009, Section 1.3) and Petajisto (2013, pp. 74–77) suggested that active share captures stock selection whereas tracking error captures factor timing. This conjecture is debatable, but it does not help explain why one of these types of active management leads to outperformance but the other one does not.
5. The idea that some fees are too high is not new and is not limited to Closet Indexers. For example, Elton, Gruber, and Busse (2004) studied 52 S&P 500 Index funds (proper indexers, not Closet Indexers). All the funds in their sample delivered the same portfolio, but they charged fees that ranged from 6 bps to 135 bps per year.
6. The data are available on Antti Petajisto’s website: <http://petajisto.net/data.html>. We complemented those data with mutual fund returns from the CRSP mutual fund database, academic factor returns from Kenneth French’s website ([http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data\\_library.html](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html)), and benchmark index returns obtained from the eVestment database.
7. Data cover 1990 through 2009. We excluded from our analysis 2 of the 19 benchmarks used in Cremers and Petajisto (2009) and Petajisto (2013)—the Wilshire 4500 and the Wilshire 5000—because they had only two and five funds, respectively, in the average month.
8. See Petajisto (2013, Table 5). We computed alphas by using the entire sample period, 1990–2009. Our results are within 5 bps/year of the performance of the most relevant portfolios, P1 (Closet Indexers) and P5 (Stock Pickers), as well as the difference between them. The small differences may be driven by CRSP revising historical mutual return data or other technical factors.

## References

- Allianz Global Investors. 2014. “The Changing Nature of Equity Markets and the Need for More Active Management.” White paper.
- Amihud, Yakov, and Ruslan Goyenko. 2013. “Mutual Fund’s  $R^2$  as Predictor of Performance.” *Review of Financial Studies*, vol. 26, no. 3 (March): 667–694.
- Chen, Hsiu-Lang, Narasimhan Jegadeesh, and Russ Wermers. 2000. “The Value of Active Fund Management: An Examination of the Stockholdings and Trades of Fund Managers.” *Journal of Financial and Quantitative Analysis*, vol. 35, no. 3 (September): 343–368.
- Cohen, Tim, Brian Leite, Darby Nelson, and Andy Browder. 2014. “Active Share: A Misunderstood Measure in Manager Selection.” Fidelity Leadership Series Investment Insights (February).
- Cremers, Martijn, and Antti Petajisto. 2009. “How Active Is Your Fund Manager? A New Measure That Predicts Performance.” *Review of Financial Studies*, vol. 22, no. 9 (September): 3329–3365.
- Cremers, Martijn, Antti Petajisto, and Eric Zitzewitz. 2013. “Should Benchmark Indices Have Alpha? Revisiting Performance Evaluation.” *Critical Finance Review*, vol. 2, no. 1: 1–48.
- Elton, Edwin J., Martin J. Gruber, and Jeffrey A. Busse. 2004. “Are Investors Rational? Choices among Index Funds.” *Journal of Finance*, vol. 59, no. 1 (February): 261–288.
- Ely, Kevin. 2014. “Hallmarks of Successful Active Equity Managers.” White paper, Cambridge Associates.
- Fama, Eugene F., and Kenneth R. French. 2010. “Luck versus Skill in the Cross-Section of Mutual Fund Returns.” *Journal of Finance*, vol. 65, no. 5 (October): 1915–1947.
- Flaherty, Joseph C., and Richard Chiu. 2014. “Active Share: A Key to Identifying Stock Pickers.” White paper, MFS.
- Petajisto, Antti. 2013. “Active Share and Mutual Fund Performance.” *Financial Analysts Journal*, vol. 69, no. 4 (July/August): 73–93.
- Schlanger, Todd, Christopher B. Philips, and Karin Peterson LaBarge. 2012. “The Search for Outperformance: Evaluating ‘Active Share.’” Vanguard (May).
- Sharpe, William F. 1991. “The Arithmetic of Active Management.” *Financial Analysts Journal*, vol. 47, no. 1 (January/February): 7–9.
- Wermers, Russ. 2000. “Mutual Fund Performance: An Empirical Decomposition into Stock-Picking Talent, Style, Transactions Costs, and Expenses.” *Journal of Finance*, vol. 55, no. 4 (August): 1655–1703.