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# Equal-Weight Benchmarking: Raising the Monkey Bars

## INTRODUCTION

Indices serve both as templates for passive investment vehicles and as benchmarks for the evaluation of active managers. Over the past 50 years, the nature of passive investing has changed dramatically, as index-based funds have become a prominent feature of the investment landscape. The nature of benchmarking, on the other hand, has not evolved at the same pace.

The central goal of this paper is to advance the discussion of indices as benchmarks. Specifically, we summarize the case for equally weighted indices as complementary benchmarks, particularly in periods of markedly different performance from their capitalization-weighted counterparts.

- We relate equally weighted index performance to that of the average stock and to the expected performance from random portfolios.
- We provide contrasting examples for when equal- or cap-weighted benchmarks may be more appropriate, and discuss their combination in the context of active management.
- We quantify and partially refute a recently popularized notion that the aggressiveness of active managers is positively correlated with excess return expectations.
- We discuss the returns from other alternatively weighted (factor) indices and active U.S. managers in the context of a period of equal-weight outperformance, particularly over the past few years.

It should be noted that, while we have much to say about the performance of equally weighted indices, we do not discuss equal-weight *investing* in any great detail.<sup>1</sup> Investments linked to equal-weight indices are available, have proved reasonably popular, and have performed admirably in some cases. But there are multiple considerations qualifying the use of equally weighted portfolios as investments which are beyond the scope of this paper.

<sup>1</sup> It is not possible to invest directly in an index. See Zeng, Liyu and Frank Luo, "[10 Years Later: Where in the World is Equal Weight Indexing Now?](#)" (2013).

## SECTION 1: THE ROLE OF MARKET CAP BENCHMARKS

Why are capitalization-weighted indices so important? Sharpe famously called it “the arithmetic of active management:” if you add up the profit and loss of every participant in the market, you get the performance of the (capitalization-weighted) market portfolio. For some investors to outperform, others must underperform, and to precisely the same extent (before costs).<sup>2</sup> As a consequence of its definition, three qualities uniquely position the market portfolio as a reference point for investment performance:

1. The market portfolio represents the performance of the average investor, weighted by the amount of capital invested.
2. **All investors can hold the market portfolio.** Of no other portfolio can this be said, since one investor’s ability to deviate from the market portfolio depends on the willingness of other investors to own offsetting positions.
3. From a practical standpoint, the market portfolio (and, by extension, any cap-weighted portfolio) is **relatively easy and inexpensive to maintain.** Moreover, it is also scaled in approximate proportion to the liquidity of its components. Rebalancing needs, and consequent transactions costs, are accordingly minimal.

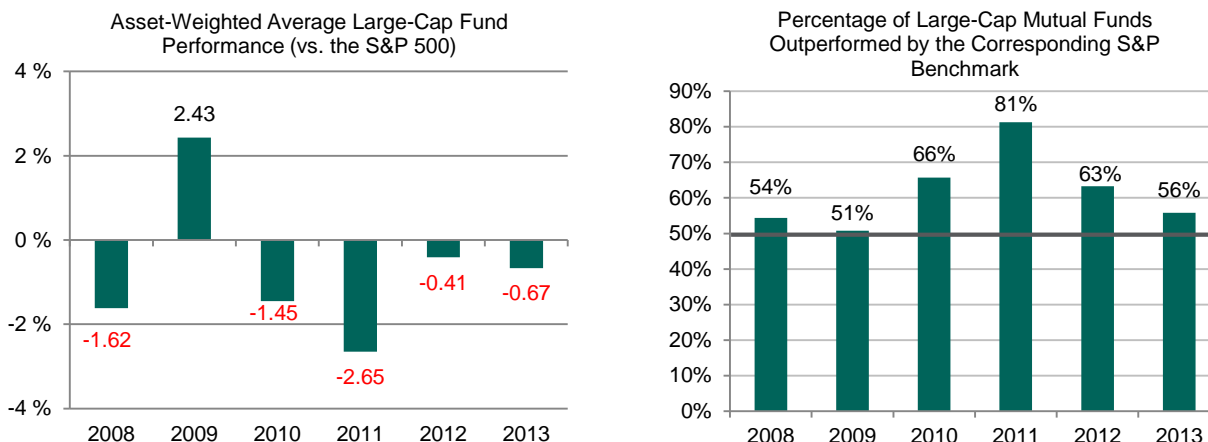
Thus described, the market portfolio can be replicated at very low cost, is unconstrained by capacity, and should achieve returns that are better than average because of those low costs. This combination of practical and theoretical arguments in favor of market portfolio investing has been supported by extensive empirical evidence.

Exhibit 1 summarizes the most recent results from the S&P Indices Versus Active (SPIVA<sup>®</sup>) Scorecards. These reports measure the performance of actively managed funds against relevant benchmarks, and they have consistently shown<sup>3</sup> that the longer-term performance of active mutual funds is, more often than not, worse than the performance of their benchmarks. As Exhibit 1 demonstrates, the trend has been maintained in recent years; the majority of funds underperformed their benchmark in every year since the financial crisis, while average fund performance was typically lower than that of the cap-weighted S&P 500<sup>®</sup>.

<sup>2</sup> Sharpe, William F., “[The Arithmetic of Active Management](#),” *Financial Analysts Journal*, January/February 1991, pp. 7-9.

<sup>3</sup> SPIVA Scorecards are issued a semiannual basis for the U.S. and have also been issued for Canada, Australia and India. More details are available at [www.spindices.com/resource-center/thought-leadership/spiva/](http://www.spindices.com/resource-center/thought-leadership/spiva/). Historical data go back to 2002 for the U.S.

**Exhibit 1: SPIVA Scorecards for Large-Cap U.S. Mutual Funds**



Source: S&P Dow Jones Index Versus Active (“SPIVA”) scorecards. Data from 2008 to 2013. Charts and tables are provided for illustrative purposes. Past performance is no guarantee of future results.

The SPIVA Scorecards are only the most recent indication that cap-weighted indices are “hard to beat.” Over 40 years of academic papers outlining the theory behind passive investing, industry studies, and real world experience have changed the perceptions of the investing public. Currently, it appears that fewer and fewer investors remain willing to pay high fees in return for an active manager’s execution capabilities and putative skill. In parallel, cap-weighted equity indices have attracted a considerable following; S&P Dow Jones Indices’ most recent estimate is that roughly 12% of the total market capitalization of the S&P 500 is held in funds explicitly tracking that index alone.<sup>4</sup>

There have been significant changes since the day in 1969 when a young William Sharpe shocked an asset manager by asking how his performance compared to that of “the market.”<sup>5</sup> Yet, long-term evidence for passive investing notwithstanding, the majority of the investment landscape remains actively managed. To those for whom Keynes’ aphorism that “in the long run, we are all dead” resonates, or for those unwilling to settle for the “mediocrity” of the “average” return, active management can seem almost a matter of moral obligation. As Exhibit 2 shows, competition remains robust.<sup>6</sup>

**Exhibit 2: Global Assets Under Management Within Various Categories**

CATEGORY	MUTUAL FUNDS (INCL. ETFs) (USD TRILLIONS)	INSTITUTIONAL MANDATES (USD TRILLIONS)	HEDGE FUNDS AND PRIVATE EQUITY (USD TRILLIONS)	TOTAL (USD TRILLIONS)
Active	23.6	26.6	6.4	56.6
Passive	3.4	3.9	0.0	7.3
% Active	87%	87%	100%	89%

Source: PWC, [Asset Management 2020 - A Brave New World](#). Data as of year-end 2012. Charts and tables are provided for illustrative purposes.

<sup>4</sup> The 12% figure is from S&P DJI’s [Annual Survey of Indexed Assets](#). As of this writing, the most recent survey available is for year-end 2012. The total market capitalization of the S&P 500 as of Dec. 31, 2012, was USD 12.7 trillion, of which USD 1.6 trillion was estimated to be held in S&P 500 index funds.

<sup>5</sup> Bernstein, Peter L., *Capital Ideas*, The Free Press, 1992, p. 75. “No one had ever asked me that question before.”

<sup>6</sup> See also: Authers, John, “[Active management industry in bafflingly good health](#),” *Financial Times*, May 5, 2014.

Of course, not all indices are created equal. Our SPIVA Scorecards compare the performance of actively managed funds to cap-weighted indices such as the S&P 500—not to alternatively weighted or strategy indices designed to exploit particular factors.<sup>7</sup> No theology says that the market will always outperform every strategy, especially if not (at the very least) normalized by risk. There are well-founded reasons to expect long-term outperformance from certain factors, most notably from small-cap and value strategies, yet the applications of such factor-based benchmarks are necessarily limited. For example, **investors in aggregate cannot maintain a value bias, simply because my value bias requires someone else to have a growth bias, and by definition the sum of all investors' positions aggregates to the market portfolio.** Nonetheless, given that factor strategies generally seem to outperform in many markets, they are highly important in terms of benchmarking. In the next section, we turn to one of the seemingly more robust challenges to cap-weighted strategies: the performance of many alternatively weighted indices.

## SECTION 2: FACTORS, RANDOM PORTFOLIOS AND EQUAL-WEIGHT INDICES

Exhibit 3 shows the returns for a number of factor indices over the past 15 years. Given the disappointing performance of active managers, it is particularly surprising how many alternatively weighted indices outperformed the cap-weighted S&P 500.<sup>8</sup> Only the high beta strategy fell short; the remainder of the strategies outperformed over the period.

INDEX	ANNUALIZED TOTAL RETURN (%)	RELATIVE PERFORMANCE TO THE S&P 500 (%)
S&P 500 Pure Value	10.9	6.5
S&P 500 Low Volatility Index	9.1	4.6
S&P 500 Dividend Aristocrats®	9.1	4.6
S&P 500 Equal Weight Index	9.1	4.6
S&P 500 Pure Growth	7.8	3.3
S&P 500 High Beta Index	1.1	-3.4
S&P 500	4.5	0.0

Source: S&P Dow Jones Indices LLC. Total returns from March 1999 to March 2014. Charts and tables are provided for illustrative purposes. Past performance is no guarantee of future results.

Of course, there is a potentially infinite number of ways to combine the stocks in the S&P 500 to produce an alternative index. One might suspect that we have cherry-picked a few indices to make our point. A more comprehensive critique conducted by the Cass Business School showed that "...equity indices constructed randomly by 'monkeys' would have produced higher risk-adjusted returns than an equivalent market capitalisation-weighted index over the last 40 years. A study based on monthly U.S. share data from 1968 to 2011 found nearly all 10 million indices weighted by chance delivered vastly superior returns."<sup>9</sup> This counterintuitive and remarkable result deserves specific emphasis. According

<sup>7</sup> Think of a "factor" as an attribute or quality with which excess returns are thought to be associated. See, e.g., Fama, Eugene F. and Kenneth R. French, "[The Cross-Section of Expected Stock Returns](#)," *Journal of Finance*, June 1992.

<sup>8</sup> In what follows, we shall see that the clustering of performances around that of the equal-weight index is not entirely coincidental.

<sup>9</sup> Cass Business School, "[Monkeys beat market cap indices](#)," April 4, 2013. See also Clare, Andrew, Nick Motson and Steve Thomas, "[An evaluation of alternative equity indices](#), Part 1: Heuristic and optimised weighting schemes," Cass Consulting, March 2013. The portfolios were constructed in each year by making 1,000 different random selections of stocks and weighting the results equally (allowing for double-counting).

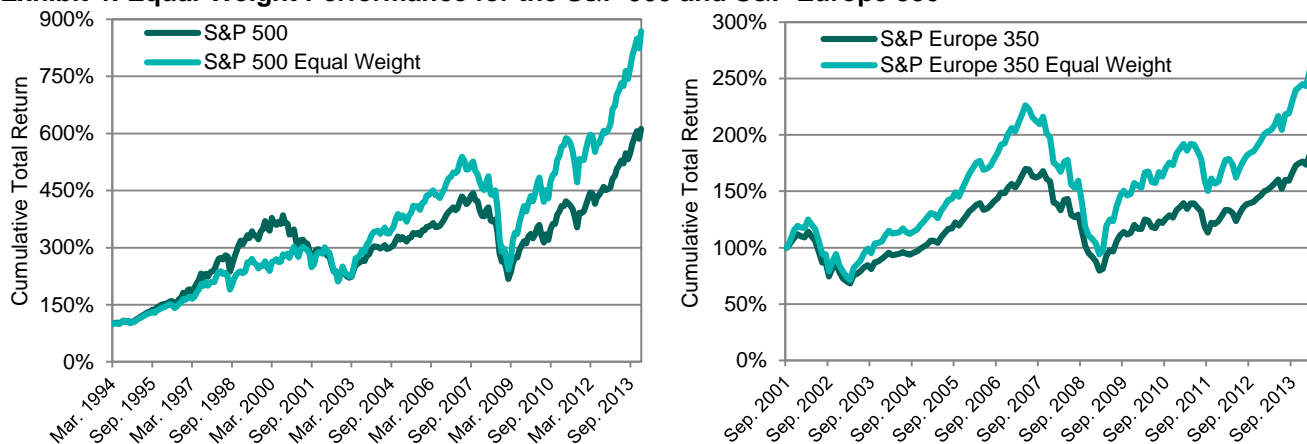
to these results, in the period from 1969 to 2011, **if you had picked stocks at random, there is a 99.9% chance you would have beaten the market.**

This appears discordant with S&P Dow Jones Indices' regularly published SPIVA Scorecards; it is certainly remarkable that, at a time when the vast majority of hypothetical monkeys flinging darts at the financial pages outperformed, less than half of active managers managed to do so. In fact, while the Cass study garnered a remarkable amount of attention, it was also notable for the degree to which its conclusions were misinterpreted. (It is certainly easy to do so.) In fact, there is a rationale for this seemingly paradoxical combination of results. We'll need to understand first why random portfolios generally outperformed the market, and second why active managers typically didn't.

**The key to understanding random portfolio performance lies with equally weighted indices.**

While cap-weighted indices measure many things, there is (at least) one important thing that they do *not* measure. The return of a cap-weighted index represents the performance of the average invested dollar, *not* the performance of the average stock. What is the average stock's performance? The process of adding each stock's return and dividing by the total number of stocks is precisely how the return of an equally-weighted index is calculated. Exhibit 4 shows the relative performance of equal-weight indices within the U.S. and European large-cap equity markets.

**Exhibit 4: Equal-Weight Performance for the S&P 500 and S&P Europe 350®**



Source: S&P Dow Jones Indices LLC. Charts and tables are provided for illustrative purposes. Data shown is from March 1994 to March 2014 for the S&P 500; from September 2001 to March 2014 for the S&P Europe 350. Past performance is no guarantee of future results.

The results shown in Exhibit 4 can explain in part why the strategies in the Cass study performed so well. The key lies in picking stocks at random, which produces an equal likelihood of picking each stock in the universe. **The expected return of such a random strategy is the performance of the average stock—the equal-weight index performance.**<sup>10</sup> In periods when equal-weight indices outperform, as in the study, *a fortiori*, random strategies are expected to outperform. While 1,000 stock selections is not an astronomically large number, making this many selections for each portfolio in the simulation (as per the study) suggests that the law of averages<sup>11</sup> will play its inevitable role; *most* such portfolios will look rather similar to an equal-weight construction from the same universe. If the equal-

<sup>10</sup> We note in passing if the stocks were picked at random but with a probability scaled to their market capitalization, then *exactly* 50% of such randomly selected portfolios would be expected to outperform the market-cap-weighted market index.

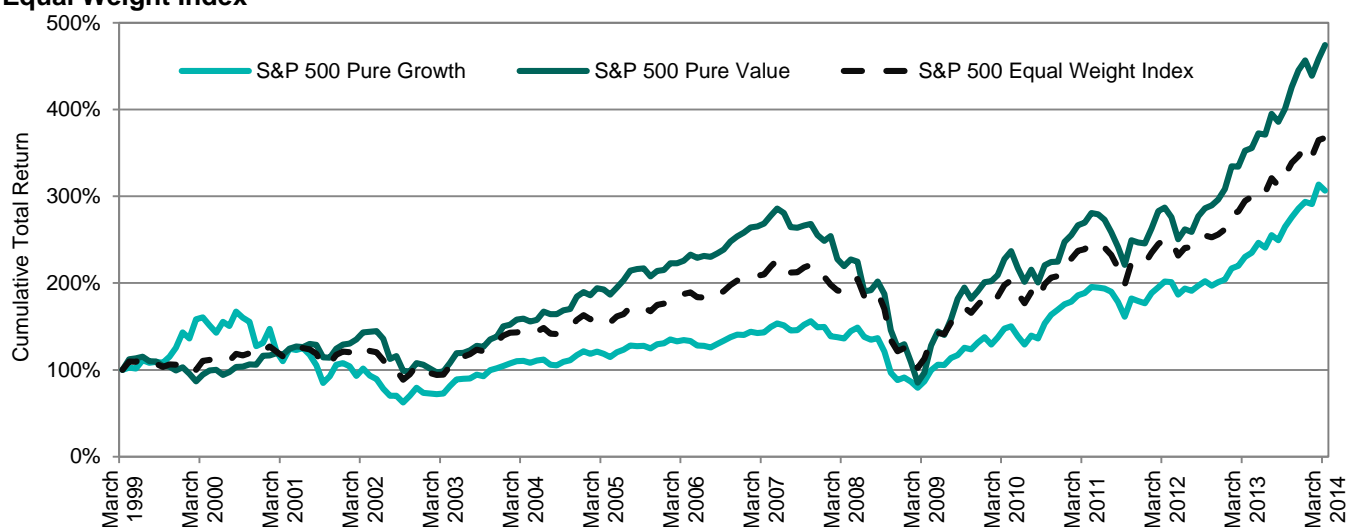
<sup>11</sup> We are referring specifically to the central limit theorem, which implies that the performance outcome of the annual results sampled in this way will be approximately normally distributed, with variance proportional to the inverse square of the sample size (i.e. 1/1,000,000).

weight index outperforms its cap-weighted counterpart, so will most of the simulated portfolios. Viewed in this context, the performance of such random strategies is no longer a great mystery. To counterpoint our earlier emphasis: **randomly selected portfolios are expected to outperform when the equally weighted index outperforms.**

Returning to our discussion of benchmarking; since equal-weight benchmarks reveal what can be achieved by a random, meaningless selection and weighting process, **any genuinely alpha-generating process should beat such a benchmark.**

Equal-weight performance also explains an otherwise-surprising result that was highlighted in Exhibit 3: the outperformance of two seemingly opposite strategies, growth and value. Both indices use the same accounting measures to provide each stock with a score defined on a growth and value axis, and both indices weight the selected stocks in proportion to that score.<sup>12</sup> However, the comparison to a cap-weighted benchmark is biased in both cases, since the constraint of scaling the investment according to market cap is removed. As Exhibit 5 shows, only by making a comparison to an equal-weight benchmark do the relative strengths of the pure value and pure growth strategies become apparent.

**Exhibit 5: S&P 500 Pure Growth and S&P 500 Pure Value Performance Benchmarked to the S&P 500 Equal Weight Index**



Source: S&P Dow Jones Indices LLC. Charts and tables are provided for illustrative purposes. Total returns shown for the period from March 1999 to March 2014. Past performance is no guarantee of future results.

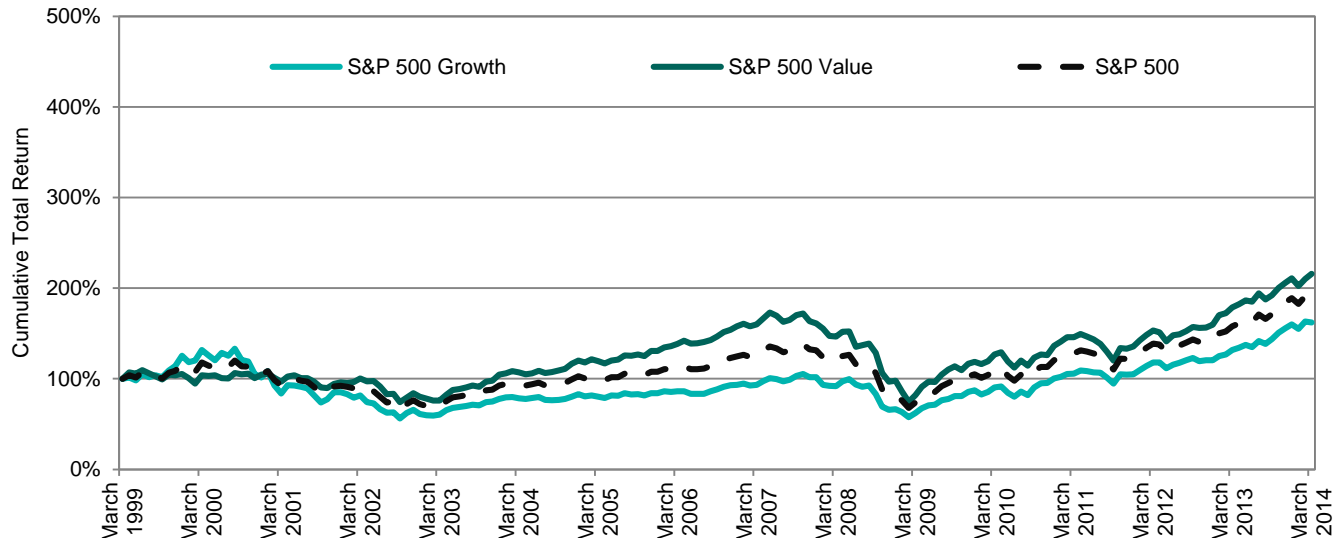
Once the possibility and value of equal-weight benchmarking is understood, we can qualify its applicability with a simple example. S&P Dow Jones Indices provides two distinct sets of style benchmarks set within the S&P 500 universe.<sup>13</sup> Both use the same accounting mechanisms to compute growth and value scores. The “pure” style series (already shown in Exhibits 3 and 5) weights securities according to the strength of those scores. The original series uses the same mechanism to identify growth or value stocks, but then weights those stocks by market cap. Exhibit 6 compares the performance of the original growth and value indices to that of the S&P 500, retaining the scale of Exhibit 5 for purposes of comparison. It seems natural that the cap-weighted benchmark be the

<sup>12</sup> See S&P Dow Jones Indices, “Pure Style Indices: How Different Are They?,” 2012.

<sup>13</sup> See [www.spindices.com/documents/methodologies/methodology-sp-us-style.pdf](http://www.spindices.com/documents/methodologies/methodology-sp-us-style.pdf) for precise definitions.

appropriate measure of the value added by the original series, and the equal-weight benchmark be the more appropriate measure for the pure versions.

**Exhibit 6: S&P 500 Growth and S&P 500 Value Performance Benchmarked to the S&P 500**



Source: S&P Dow Jones Indices LLC. Charts and tables are provided for illustrative purposes. Total returns shown for the period from March 1999 to March 2014. Past performance is no guarantee of future results.

Although it seems clear in these examples, in general the appropriate benchmark for any given strategy might not be so easily discerned. It may be best to compare some strategies to a combination of equal- and cap-weighted indices. With this principle in mind, we return to the subject of active managers.

### SECTION 3: ACTIVE MANAGERS, ACTIVE SHARE AND NOT-SO-ACTIVE MANAGERS

Why, in an environment in which simple factor indices have generally outperformed the S&P 500, have most active managers failed? The outperformance from equal-weight indices makes this question decidedly non-trivial, since we must therefore account for active management's apparent inability to capture even the benefits available from random stock selection.

We have written previously about the market's potential to provide alpha to active managers in the context of dispersion.<sup>14</sup> However, as we've previously suggested, there appears to be little connection between the amount of alpha available and the amount that managers capture. This may be because **it is important to consider not only how much alpha is available and what skills are required to capture it, but also how much is pursued.**

Intuitively, if active managers are not very active—that is to say, if they deviate only slightly from their cap-weighted benchmark—fees alone would dominate aggregate and relative performance. Validating such intuition would require both a measure and a time series explaining how active the community of active managers was during the period. Such an analysis is already completed; the crucial concept is that of *active share*.<sup>15</sup>

<sup>14</sup> Edwards, Tim and Craig J. Lazzara, "[Dispersion: Measuring Market Opportunity](#)," December 2013.

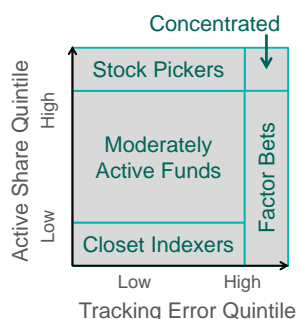
<sup>15</sup> Petajisto, Antti, "[Active Share and Mutual Fund Performance](#)," *Financial Analysts Journal*, July/August 2013, pp. 73-93.

Conceptually, active share measures the degree to which a particular portfolio of stocks differs from its benchmark. From a practical perspective, it can be thought of as measuring what percentage of the portfolio would need to be traded to rebalance the position back to the benchmark. Formally, it is calculated by summing the absolute values of the differences in weights for each benchmark stock in the two portfolios, divided by two.

$$Active\ Share = \frac{1}{2} \sum_{i=1}^N |weight_{i,portfolio} - weight_{i,benchmark}|$$

Active share can arguably provide a more meaningful classification of active managers than tracking error alone. Measuring both active share and tracking error leads to the two-dimensional categorization of active managers displayed in Exhibit 7 together with the long-term returns from each category.

**Exhibit 7: The Two-Dimensional Classification of Active Management and Fund Performance by Category**



GROUP	AVERAGE FUND PERFORMANCE VS. FUND'S BENCHMARK (%)	AVERAGE EXPENSE RATIO (%)
Stock Pickers	+1.26	1.41
Concentrated	-0.25	1.60
Factor Bets	-1.28	1.34
Moderately Active	-0.52	1.25
Closet Indexers	-0.91	1.05
ALL	-0.41	1.27

Source: Petajisto; Active Share and Mutual Fund Performance (2013). Data from 1990 to 2009.

“Closet Indexers”—unsurprisingly—underperformed their benchmarks by an amount not vastly dissimilar to their average fee. “Factor Bets” managers tended to perform worse, with “Moderately Active” managers performing slightly better than either, having likely outperformed before fees. “Concentrated” funds managed an overall net performance very close to the benchmark, suggesting reasonable outperformance before fees. **Only one category, the so-called “Stock Pickers,” outperformed their benchmark in aggregate.**

Petajisto also provides data on the proportions of funds in each category and the evolution of the average active share among mutual funds over time, concluding first that the active share of the average manager has been decreasing over time, and second that the relative sizes of Closet Indexers and Moderately Active funds have been growing. Otherwise said, not many of the mutual funds studied were particularly active.

These two hypotheses—that perhaps only the true Stock Pickers outperformed, and that there were not enough of them to overwhelm the mediocre returns of their less adventurous peers—may go a long way to explain the continued underperformance seen in SPIVA Scorecards over these (and other) periods. Additionally, in light of our earlier comments, the evidence of skill demonstrated by the Stock Pickers appears less convincing. Over the period covered by Petajisto’s study, the annualized performance of the S&P 500 was 1.8% less than its equally weighted equivalent;<sup>16</sup> therefore, any

<sup>16</sup> Total return in U.S. dollars for the period from January 1990 to December 2009. Source: S&P Dow Jones Indices.



randomly selected stock strategy choosing from the S&P 500’s constituents might be expected to perform similarly. **The Stock Pickers did little better.**<sup>17</sup>

However, as with the Cass result, the evidence for these two hypotheses is at serious risk of misinterpretation. Petajisto found that the best-performing managers had high active share. The misinterpretation would be to say that the relationship is causal. For a particular fund, a high active share does not lead to outperformance. If a particular fund does, in fact, outperform, that fund’s particular stock selection (not its active share) is the cause.<sup>18</sup> It is only on average that the force of equal-weight comparisons becomes apparent. High active share implies higher *expected* performance during periods in which equal-weight indices outperform, and *even then* only assuming that the manager picks stocks randomly. What we propose is less controversial: that **the performance of “stock picking” is linked to (and well benchmarked by) the performance of the average stock.**

## SECTION 4: CONCLUSIONS

We have previously considered whether, as the echoes of the financial crisis diminish in magnitude, we are entering a so-called “stock-pickers’ market.”<sup>19</sup> This refrain is frequently heard (typically without benefit of precise definition) from those with stock-picking strategies to sell. An intriguing definition of a “stock-pickers’ market” is a market in which equal weighting comprehensively beats cap weighting. (After all, in such an environment picking stocks at random should outperform.) Exhibit 8 shows the relative annual performance of the equal-weight equivalents to the S&P 500 and the S&P Europe 350 indices.

**Exhibit 8: Annualized Total Return Outperformance by Equal Weight Indices**

EQUAL WEIGHT OUTPERFORMANCE (%)	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014 (YTD)
S&P 500	3.9	12.3	6.1	3.1	0.0	-4.0	-2.7	19.8	6.8	-2.2	1.7	3.8	1.2
S&P Europe 350	0.6	10.1	4.8	2.7	6.5	-5.4	-3.3	15.1	5.9	-6.5	5.1	4.8	2.0

Source: S&P Dow Jones Indices LLC. Charts and tables are provided for illustrative purposes. Total returns from Jan. 1, 2002, to March 31, 2014. Past performance is no guarantee of future results.

One interpretation of Exhibit 8 is that we have been in a “stock-pickers’ market” for some time; however, a combination of high fees and relatively small active bets (embodied in low active share) erased the advantage that a “stock-pickers’ market” might have given most active managers.

Of course, if such statements have any greater truth, one would expect to see some degree of congruence between the excess returns from active management and the changing magnitudes of equal-weight performance. In order to provide an exploratory framework, one might estimate the expected returns from active investing as follows:

- We might expect the average fund’s stock-picking performance to be related each year to the excess returns shown in Exhibit 8.

<sup>17</sup> One may object that not all of the funds studied should be compared to the S&P 500. The objection is entirely valid, and indeed the use of equal-weight benchmarks in other market segments seems a natural extension.

<sup>18</sup> See Hewitt EnnisKnupp, “[Conviction in Equity Investing](#),” 2012.

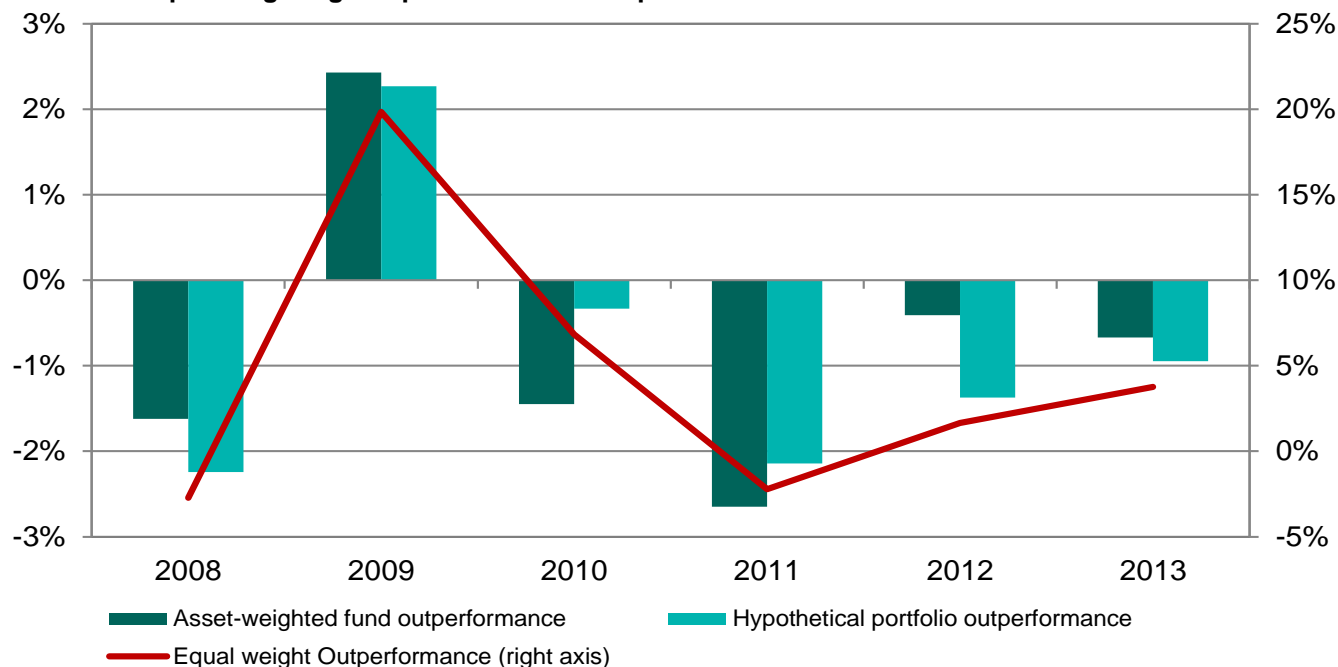
<sup>19</sup> See Edwards and Lazzara, *op cit*.

- However, our discussion in Section 3 suggests that only a small proportion of equal-weight performance might be captured on an asset-weighted basis (perhaps as little as 20%).<sup>20</sup>

The average active large-cap U.S. manager might therefore deliver a return similar to that of a hypothetical portfolio invested 80% in the S&P 500 and 20% in the S&P 500 Equal Weight Index, minus a fee (perhaps 1.3%, see Exhibit 7) and minus some unspecified costs such as trading expenses (for which we use the admittedly arbitrary estimate of 0.4%).

Exhibit 9 compares the annual performance of this hypothetical portfolio to the annual asset-weighted average return of large-cap U.S. mutual funds. In our view, the hypothetical portfolio provides a decent proxy for aggregate mutual fund performance.

**Exhibit 9: Replicating Large-Cap Mutual Fund Outperformance**



Source: S&P Dow Jones Indices LLC. Charts and tables are provided for illustrative purposes. First series is the asset-weighted, average large-cap U.S. mutual fund performance in each calendar year. The second series shows returns from the synthetic portfolio as previously described minus the total return of the S&P 500. Past performance is no guarantee of future results.

Exhibit 9 does not “prove” anything about the nature of active management. It does, however, demonstrate that the performance of active managers is consistent with the assumption that the average manager tilts away from market cap, towards equal weighting, to a relatively small degree and while charging significant fees to boot.

Nonetheless, active management continues to hold the lion’s share of investment capital across many types of investors. In marketing presentations across the globe, active strategies are sold via a comparison to a market-cap-weighted index. **However, in periods when the average stock outperforms the capitalization-weighted index, the standard comparison may be too easy. The convenience of equal weighting as a universal and “hard to beat” reference point is therefore a matter of potentially great practical importance.**

<sup>20</sup> The figure of 20% taken here is liable to the accusation of “data-fitting;” we make no apology in the context of showing how active returns *might* be replicated via simple averages.

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