

# Rethinking Survivorship Bias in Active/Passive Comparisons

Adjusting for survivorship bias has been standard practice in the evaluation of fund performance for the past 30 years. These adjustments aim to reduce the risk that average performance of both mutual funds and hedge funds is overstated, because the returns of now defunct — but likely underperforming — funds have been excluded from the calculation.

In this article, we take a close look at the survivorship bias adjustment in one of the most visible comparators of active and passive fund performance — Morningstar’s Active/Passive Barometer — and examine how that adjustment is affecting perceptions of the value of active management. We discuss passive fund survivorship rates and how they might be incorporated in survivorship bias calculations. We conclude with observations regarding the limitations of survivorship bias adjustments, especially when evaluating performance over long periods.

## Survivorship bias adjustments and their limitations

Much of the fund performance information available to investors doesn’t consider survivorship at all. Publicly available category rankings are computed considering just the funds that exist today and that have existed throughout the period under review.

While these “current fund only” averages are relatively easy to calculate, researchers have argued that they tend to overstate the returns that investors have earned over the period. That’s because these averages exclude the performance of funds that existed at the beginning of the period but were no longer included in the average at the end of the period. These funds have been liquidated or merged into another fund or, as is often the case with hedge funds, have stopped providing information about returns.

Studies have shown that these defunct funds have, on average, underperformed significantly.<sup>1</sup> Therefore, excluding these funds from the calculations of average fund performance leads to higher returns than if their performance were included.

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<sup>1</sup> Martin Rohleder, Hendrik Scholz and Marco Wilkens, “Survivorship Bias and Mutual Fund Performance: Relevance, Significance, and Methodical Differences,” *Review of Finance* 15, no. 2 (April 2011): 441-474. Gaurav S. Amin and Harry M. Kat, “Welcome to the Dark Side: Hedge Fund Attrition and Survivorship Bias Over the Period 1994-2001,” Alternative Investment Research Centre Working Paper Series #0002 (July 18, 2002).

As a result, many examinations of fund performance are based on data that is adjusted for “survivorship bias.” Methodologies for making these adjustments vary considerably. In an early study, Elton, Gruber and Blake adjust for survivorship bias by tracking a dollar invested; if a fund had been merged into another fund, they calculated a full period track record by appending the returns of the combined fund to the returns of the original fund.<sup>2</sup> By contrast, the SUBICO method assumes that “upon the termination of a strategy’s track record, the capital that was invested in that strategy is reallocated equally across all of the available strategies in the universe at the time of the termination,” considering both surviving strategies and new strategies created since the beginning of the period.<sup>3</sup> Morningstar’s Active/Passive Barometer uses a simpler approach, which we will describe in detail in the next section.

Yet while the survivorship bias adjustment has gained broad acceptance, the technique has limitations, when used in assessments of fund manager skill.

Notably, researcher Juhani Linnainmaa argues that survivorship bias adjustments can create “reverse survivorship bias.” In a 2013 paper on this topic, he concludes:

Because mutual funds often disappear following poor performance, some funds disappear because of bad luck and not because their true alpha is low. A fund that disappears because of a negative idiosyncratic shock leaves behind an alpha estimate that is too low. Because no mechanism eliminates just-lucky mutual funds, the observed distribution of alphas gives too pessimistic a view about the prevalence of skill among actively managed funds.

Quantitatively, Linnainmaa finds that reverse survivorship bias roughly offsets survivorship bias.<sup>4</sup>

In other words, while Linnainmaa concurs that underperformance is a key driver of fund closures, he notes that underperformance isn’t always the result of lack of manager skill. Instead, managers may have “bad luck.” If the survivorship bias adjustment fails to distinguish between “lack of skill” and “bad luck,” the assessment of manager skill based on survivorship bias-adjusted data will be too negative. Essentially, Linnainmaa is drawing a distinction between negative alpha (“lack of skill”) and market or stylistic headwinds (“bad luck”) as a source of underperformance.

At the same time, funds can be closed for reasons other than poor performance. Funds might be consolidated into other funds as part of a product line rationalization following an adviser merger. Or funds may have failed to gain assets and achieve economies of scale because of ineffective distribution, poor marketing efforts, a non-competitive fee schedule or an unattractive vehicle structure, among other non-performance reasons. (To be clear, research consistently indicates that only a small proportion of now-defunct funds were outperforming prior to closure. However, funds are most likely to be closed if they are both underperforming and small in size.)<sup>5</sup>

To summarize, funds may be closed for three broad reasons: “lack of skill,” “bad luck,” and non-performance factors. “Lack of skill” is specific to actively-managed funds, while “bad luck” and non-performance factors may affect *both* actively-managed funds and index funds. (For example, some index funds may be closed due to poor performance because of their market or style focus.) As we will discuss, the turnover among index funds suggests that the latter two factors play a significant role in fund closure decisions.

However, if the survivorship bias adjustment fails to distinguish among the reasons for fund closure, and the resulting data is used to assess manager skill, the result will be an overly negative view of that skill.

<sup>2</sup> Edwin J. Elton, Martin Gruber, and Christopher R. Blake, “Survivor Bias and Mutual Fund Performance,” *Review of Financial Studies* 9, no. 4 (October 1996): 1097-1120.

<sup>3</sup> Gregory C. Allen, Ivan S. Cliff, and Walter J. Meerschaert, “Picking Through the Alpha Graveyard: Correcting for Survivorship Bias in Investment Product Universes,” *Journal of Investment Management* 16, no. 3 (2018): 46-57.

<sup>4</sup> Juhani T. Linnainmaa, “Reverse Survivorship Bias,” *Journal of Finance* 68, no. 3 (June 2013): 789-813.

<sup>5</sup> See note 1.

In his discussion of reverse survivorship bias, Linnainmaa makes one other important point: namely, to accurately assess manager skill, an analysis needs to consider the counterfactual of what performance would be “if disappearing funds were allowed to survive.” Put differently, if managers have underperformed because of bad luck, that luck could have reversed before the end of the period if the fund had remained open. Obviously, the odds that performance could have improved increase as the length of time between closure and the end of the period increase.<sup>6</sup>

With that as background, let’s take a close look at how one of the best-known reports comparing active and passive performance — Morningstar’s Active/Passive Barometer — adjusts for survivorship in its assessment of active manager skill.

## The Barometer’s Approach to Survivorship

Morningstar’s Active/Passive Barometer is “a semiannual report that measures the performance of U.S. active managers against their passive peers within their respective Morningstar categories.” Morningstar calculates a “success rate” for each category, which indicates “what percentage of funds that started the sample period went on to survive and generate a return in excess of the equal-weighted average passive fund return over the period.”<sup>7</sup>

Let’s take a deep dive into that calculation, using an example from the most recent Barometer, which was published in February 2020 using data through year-end 2019.<sup>8</sup>

We’ll focus on the U.S. Small Blend category. Morningstar reports that, for the 1-year period ending December 31, 2019, this category had a 46.2% success rate. In other words, if there were 1,000 funds in the category on January 1, 2019, 462 of those funds still existed at the end of the year and had returns that exceeded the average return of their passive peers.

Let’s break that down further. Morningstar provides a survivorship rate for the actively managed funds. U.S. Small Blend funds had a survivorship rate of 83.0%. Again, assuming that there were 1,000 funds at the start of the year, there were 830 funds left at the end of the year. Of those 830 funds, 462 had performance which exceeded their passive peers, meaning that 368 lagged.

Referring back to our earlier discussion, the Morningstar adjustment doesn’t distinguish among the three possible reasons for fund closure. It also does not consider that closed funds might have rebounded if they had remained open until the end of the period, though that is a relatively minor consideration given the short period involved here.

In other words, the Morningstar approach takes the most negative view possible of active fund performance. As a result, the Barometer may understate the skill of active managers.

To get some idea of the potential size of that understatement, we can compare Morningstar’s survivorship-bias adjusted success rate to the unadjusted success rate. Again, Morningstar’s adjusted success rate is 46.2%, which equals the number of outperforming funds divided by the number of funds at the beginning of the period.

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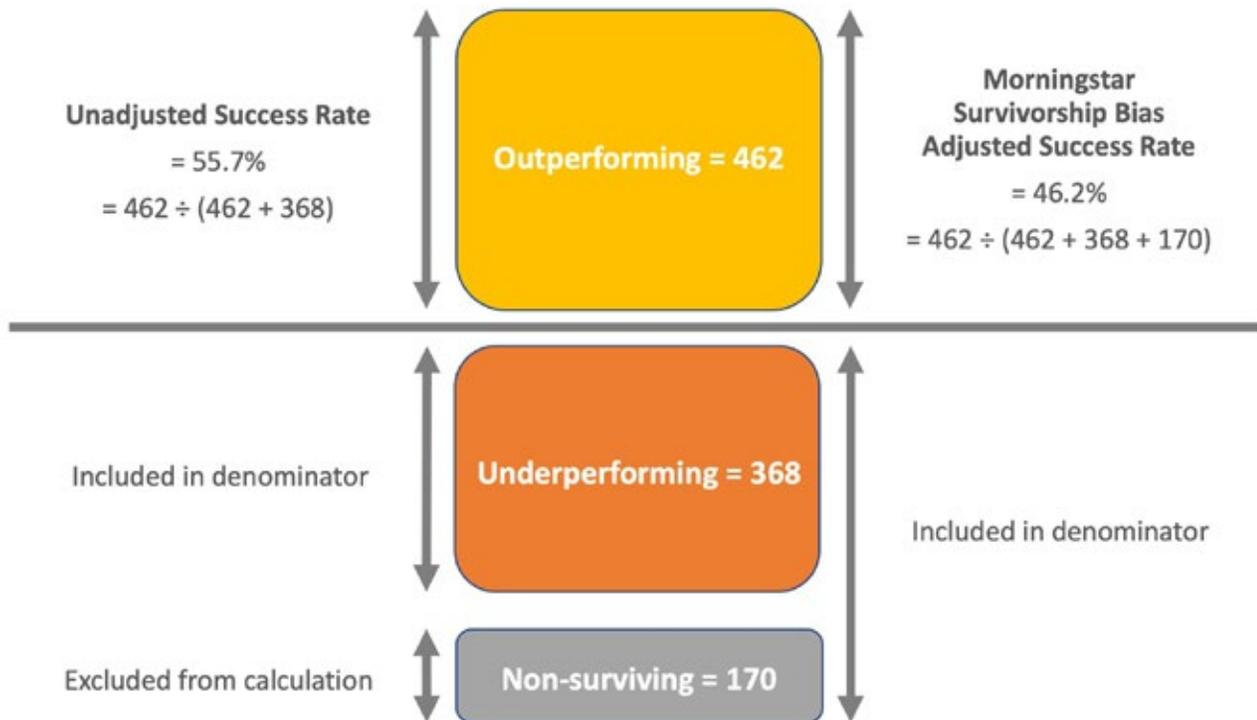
<sup>6</sup> See note 4.

<sup>7</sup> Ben Johnson et al., *Morningstar’s Active/Passive Barometer: A new yardstick for an old debate*, June 2015.

<sup>8</sup> Ben Johnson, *Morningstar’s Active/Passive Barometer*, December 2019.

The unadjusted success rate compares the number of outperforming funds against the number of surviving funds at the end of the period. Again assuming 1,000 funds at the start of the period, the unadjusted success rate is 462 outperforming funds divided by 830 surviving funds, or 55.7%. This unadjusted success rate is 9.5 percentage points above the survivorship bias-adjusted success rate of 46.2%. That's a significant differential for a short period.

### Actively Managed U.S. Small Blend Funds 1 year ending December 2019 | Per 1,000 funds

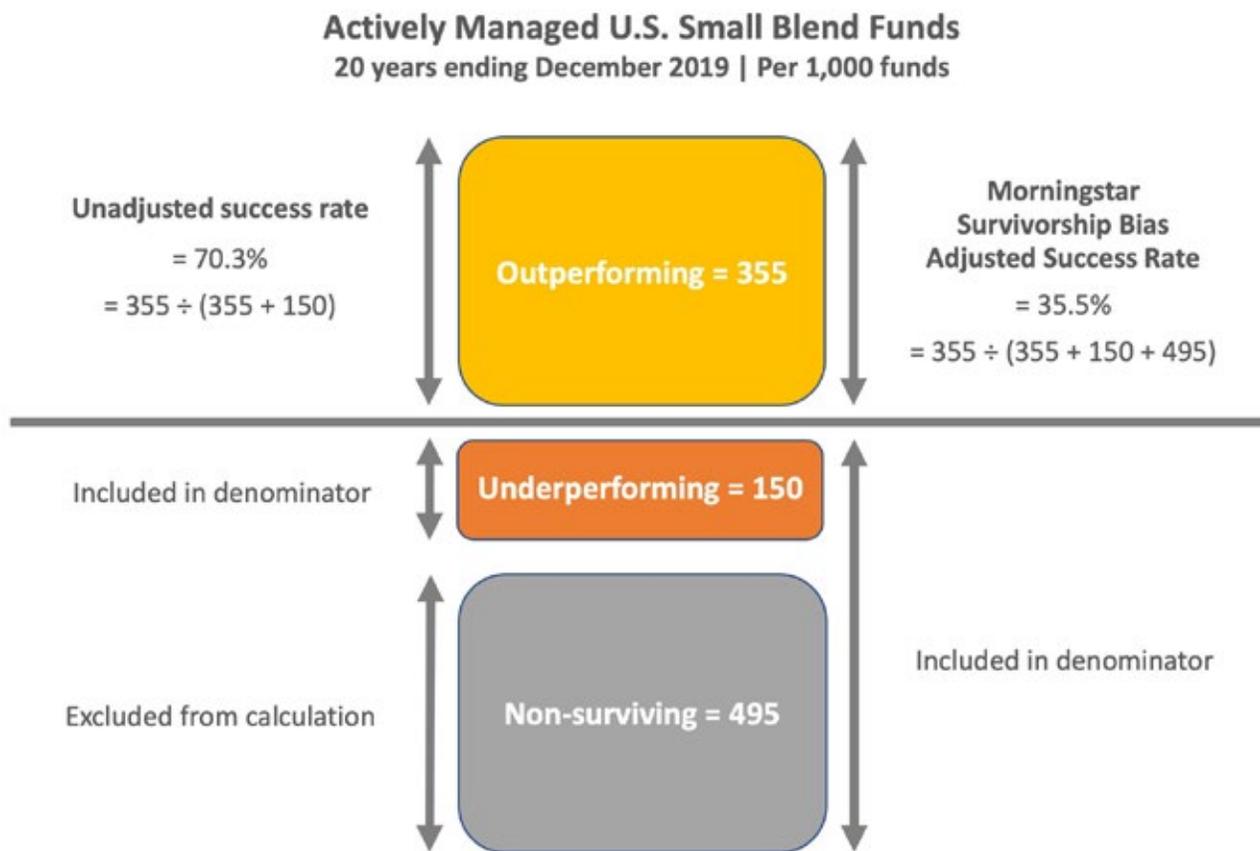


Now let's look at the impact of the survivorship adjustment over a 20-year period. The 20-year success rate for U.S. Small Blend funds was 35.5% while the survivorship rate was 50.5%. Assuming 1,000 funds at the beginning of the period, 505 funds survived through the period, and 355 of those funds outperformed.

Again, the calculation does not consider the reasons for fund closures, and, again, it does not consider the possibility that a closed fund's performance might have improved by the end of the period if it had remained open. While that may be a reasonable assumption over a short period, it becomes less tenable over longer periods, such as the 20-year span under consideration here. Does it make sense that a fund closed in the first year of the period should have the same impact on the analysis as a fund closed in the twentieth year?

For comparison, the unadjusted success rate over a 20-year period in this category is 70.3% (equal to 355 outperforming funds divided by 505 surviving funds, starting with an initial group of 1,000 funds). That's an enormous 34.8 percentage point differential versus Morningstar's adjusted success rate of 35.5%.

The end result is a potentially significant underestimation of active managers' skill.



## Using Passive Fund Survivorship for a Better Assessment of Skill

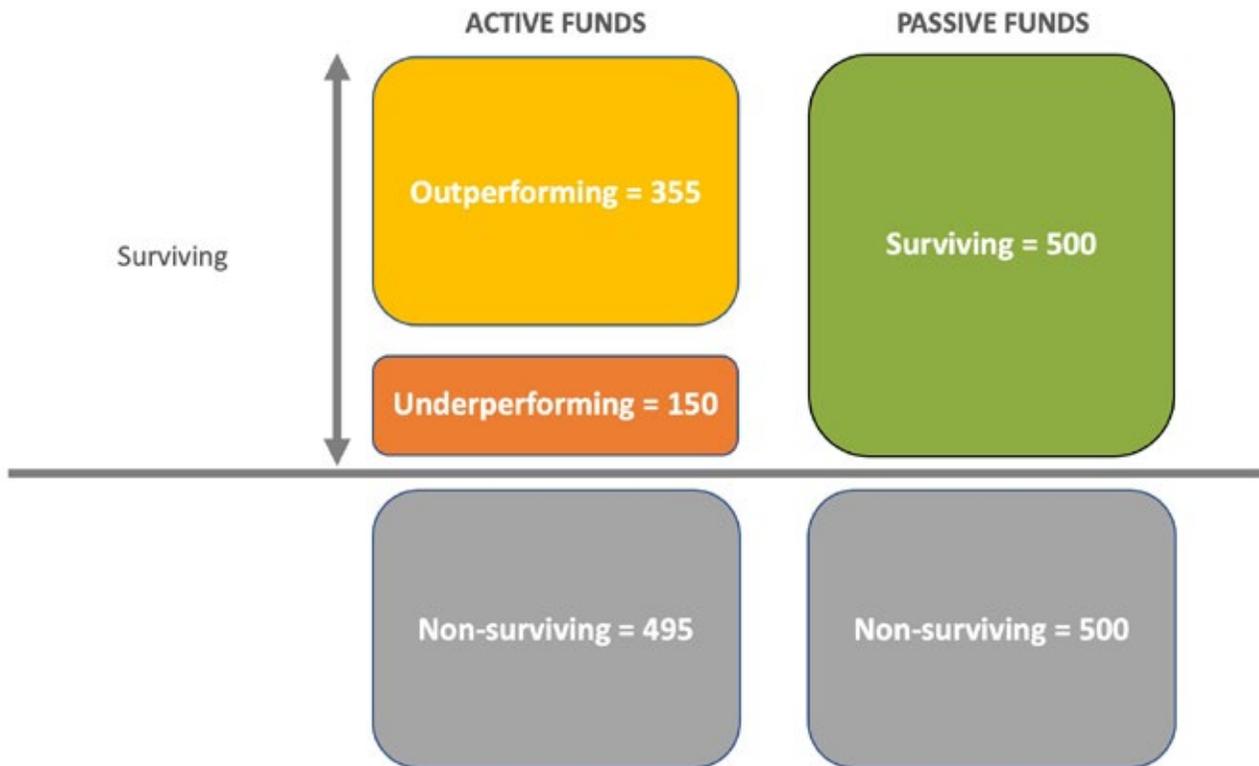
Fortunately, Morningstar provides data that can form the basis of an alternative adjustment methodology.

Specifically, Morningstar provides a survivorship rate for the passive funds that are used as a comparative group. This passive fund survivorship rate provides insights into the rate of fund closures that are driven by either “bad luck” or non-performance considerations. In the U.S. Small Blend category, the survivorship of the active funds is generally lower than that of the passive funds for most periods, though it’s virtually identical over 20 years.

Looking specifically at the 20-year period, the survivorship rate for the passive funds is 50.0%. Passive fund survivorship provides an estimate of the non-performance driven attrition in this category. In other words, it may be reasonable to use the survivorship of the passive funds as basis for estimating reverse survivorship bias in active funds.

One approach would be to use the passive fund survivorship to adjust the success rate for actively-managed funds. Again, assuming 1,000 funds at the beginning of the period, an active success rate of 35.5%, and an active survivorship rate of 50.5%, we know that 355 active funds outperformed and 495 active funds were closed.

**U.S. Small Blend Funds**  
20 years ending December 2019 | Per 1,000 funds



Based on the passive fund survivorship rate of 50.0%, we estimate that 247.5 funds were closed because of “bad luck” or for non-performance reasons. (To arrive at this estimate, we multiplied the number of active funds that were closed during the period by 100% minus the passive fund survivorship rate.) Adding those 247.5 funds to the 355 outperforming funds and dividing by 1,000 (the number of funds at the beginning of the period), we get a revised success rate of 60.3%. That’s significantly higher than the published success rate of 35.5% and makes active funds very competitive with passive funds. (Table 1 summarizes the three different success ratios for U.S. Small Cap funds over 20 years that we have discussed.)

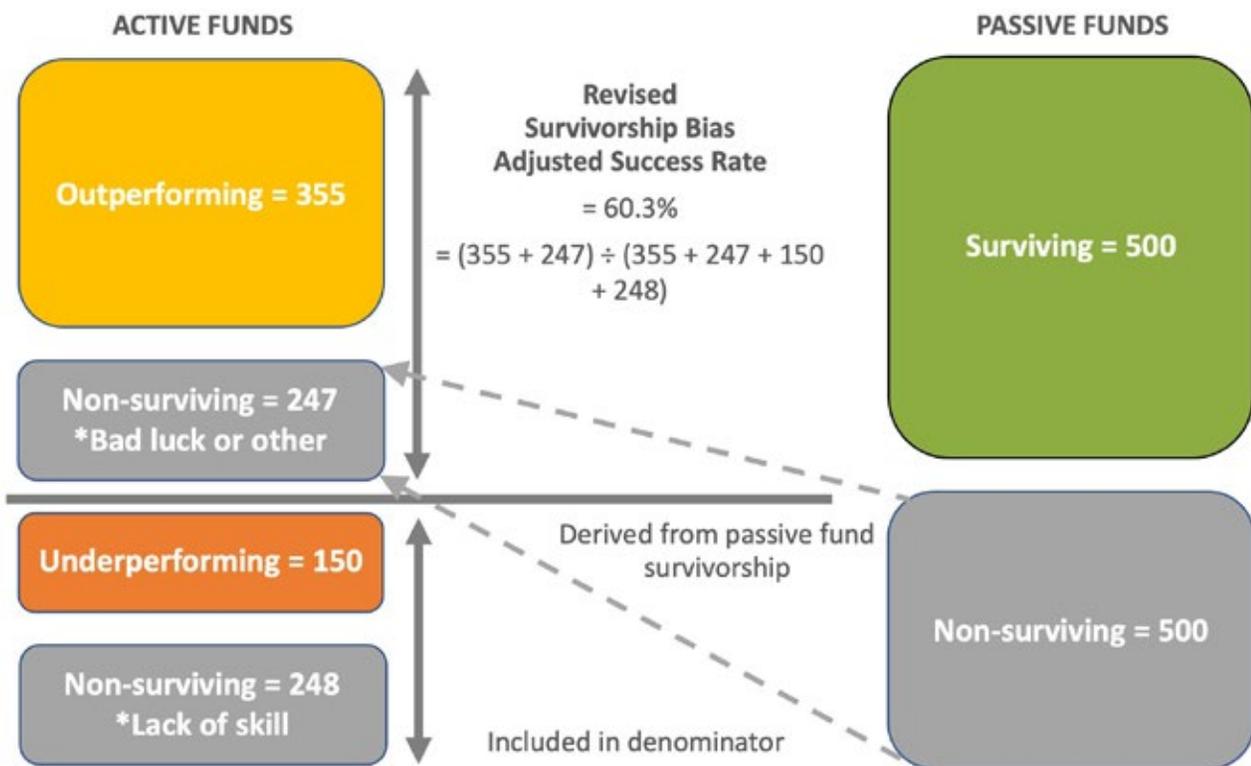
**Table 1: Success Ratios for U.S. Small Cap Funds: 20 Years Ended December 31, 2019**

Success Ratio	Numerator	Denominator	Result
Unadjusted	Outperforming funds	Surviving funds at end of period	70.3%
Revised	Outperforming funds plus (closed active funds multiplied by 100% minus passive fund survivorship rate)	Funds at beginning of period	60.3%
Morningstar	Outperforming funds	Funds at beginning of period	35.5%

This approach may provide a better estimate of active fund managers' skill than either than the unadjusted success rate or the Morningstar methodology. The unadjusted success rate (with only surviving funds in the denominator) may overstate skill because it fails to adjust for survivorship bias driven by the closure of underperforming funds. The Morningstar methodology (with the 1,000 initial funds in the denominator) may understate skill because it eliminates funds closed for reasons other than lack of skill and because it fails to allow for performance improvement prior to the end of the period. The proposed passive fund survivorship-based methodology attempts to strike a balance by estimating the number of funds closed for reasons other than "lack of skill" and using that number to adjust the success rate.

Note that this is one possible revision that could be made to the success ratio to provide a better assessment of active managers' skill. Our intent is not to propose a definitive methodology, but to initiate a discussion on the uses (and misuses) of these types of analyses.

**U.S. Small Blend Funds**  
 20 years ending December 2019 | Per 1,000 funds



## Addressing the Counterarguments

There are four arguments that can be raised regarding using passive fund survivorship as a benchmark for calibrating reverse survivorship bias.

The first is that the passive peer groups include “smart beta” funds, which have an active management component. Performance of these funds can deviate significantly from that of an unmanaged index, and they run a similar risk of being closed as a result of poor performance as active funds. We’d note that these types of funds are a relatively recent phenomenon and would not be a significant factor in the longer periods.

The second counterargument would be that passive fund closures are primarily the result of poor performance caused by high fees. However, we contend that the passive survivorship rate reflects the industry forces leading to closures of funds of all types, both passive and active. Since the Barometer is explicitly seeking to assess the performance of active funds, it should penalize active funds for only the “lack of skill” specific to active funds. Therefore, we believe that our proposed methodology provides an appropriate survivorship bias adjustment for active funds.

A third critique would be that, rather than adjust active fund performance upward, it would be more appropriate to revise performance downward for the passive peer comparison group. While we agree with the logic of this approach, it would require a major redrafting of current active-passive comparisons, which we leave to others. We are focused on the comparison as an assessment of active managers’ skill and believe that our adjustment is appropriate for that purpose.

Finally, critics of our proposed methodology might argue that adjustments for reverse survivorship bias attempt to measure active managers’ skill, but they don’t reflect returns actually earned by investors or the opportunity set available to them.

True, but neither does the Morningstar Barometer, which deviates from the investor experience in two important ways:

- The Barometer assumes that money invested in closed funds simply disappears from the analysis. But, in many instances, this money would have been transferred into another fund, as the consequence of a merger.
- The Barometer simply counts funds when computing the success rate, thereby assigning each fund an equal weight in the calculation. However, a dollar-weighted approach would be more indicative of the investor experience. In fact, Morningstar publishes supporting data that shows that dollar-weighted performance generally exceeds equal-weighted performance. Asset-weighting is particularly important when assessing survivorship bias, since non-surviving funds are considerably smaller than average.

We believe that the analysis of dollar-weighted performance provides a better view of investor success with actively-managed strategies than the success ratios. We would encourage that this data be given more prominence, both in the report itself and in media summaries of its findings.

## Summary

This analysis illustrates the limitations of survivorship bias adjustments, especially when used to assess active manager skill based on comparisons with passive benchmarks. Perhaps the most important insight from this analysis involves passive fund survivorship. Morningstar's data shows that the survivorship of passive funds is not significantly different from the survivorship of active funds. This data calls into question the assumption that active funds are closed solely because of a lack of manager skill.

This analysis focused on the methodology used in Morningstar's Active/Passive Barometer. However, it directly applies to the SPIVA® scorecards published by S&P Dow Jones Indices, which have a similar purpose and approach. More broadly, it suggests that other studies of actively-managed funds that incorporate survivorship bias adjustments may need to reconsider their methodologies if they are to make an accurate assessment of manager skill.

## APPENDIX | The Success Rate of Passive Funds

Morningstar's Active/Passive Barometer does not provide a success rate for passive funds, but the exercise of estimating one provides additional insights into the Barometer's methodology and the success rate of actively-managed funds.

Using published data, we can easily establish the maximum value of the success rate for passive funds. It is equal to the survivorship rate for passive funds, which is a data point that Morningstar provides. (Recall that in Morningstar's methodology, only those funds that survive have the potential to be "successful;" conversely, funds that are merged away or closed prior to the end of the period are, by definition, "not successful.")

Continuing our focus on the U.S. Small Blend category, we observe that, for the 20-year period ending June 30, 2019, the passive fund survivorship rate is 50.0%. Therefore, the maximum success rate for these funds is 50.0%.

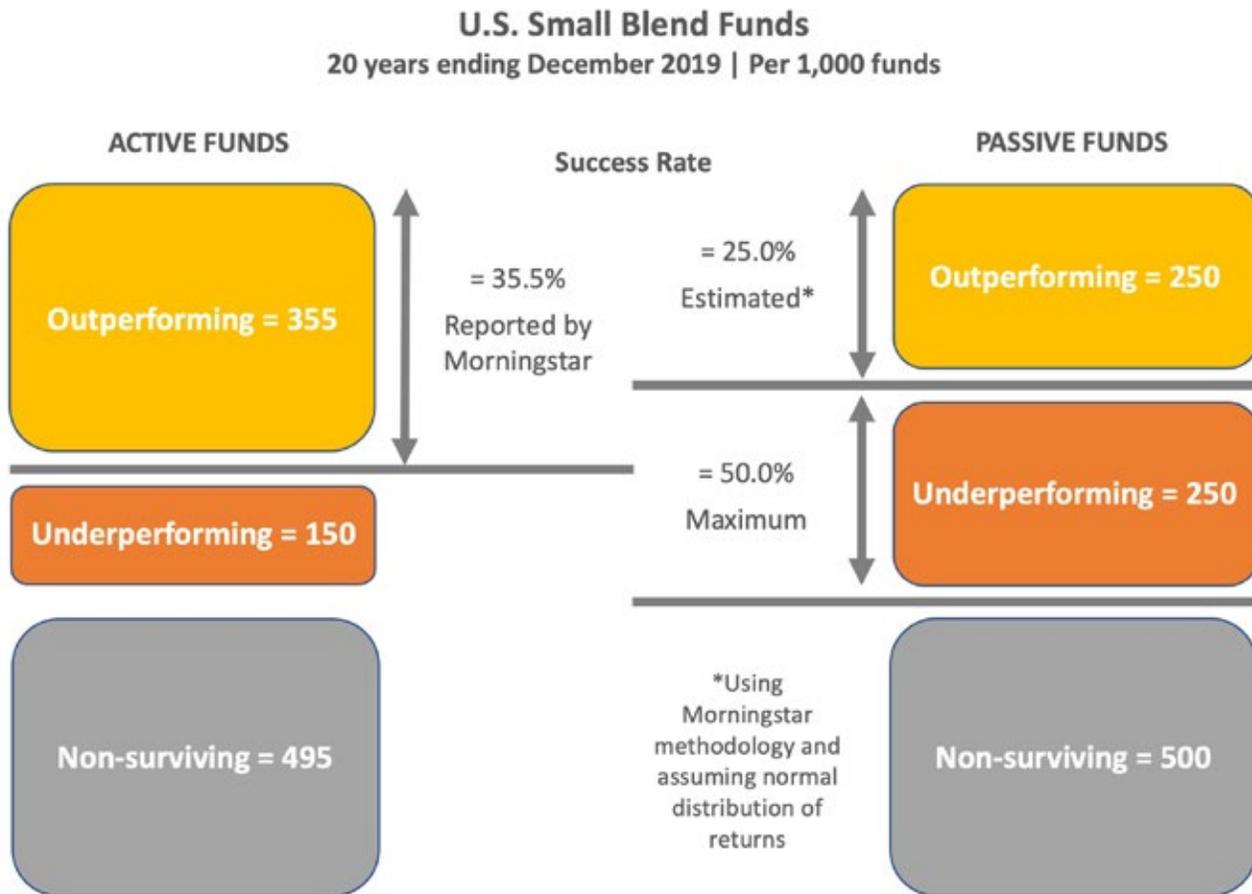
To make a more precise estimate of the success rate, however, we must make assumptions about the distribution of the returns of the passive funds. To be successful in the Active/Passive Barometer, a fund's return must exceed the average return of the passive funds in that category. (This is the standard applied to actively-managed funds as well.)

Let's begin by assuming that the returns of the surviving passive funds are normally distributed, which means that the average return in the category equals the median return. Put more simply, we assume that half of the surviving funds do better than average (and are successful), and half do worse.

In our U.S. Small Blend example, the assumption of a normal distribution of returns leads to an estimate of a 25.0% success rate over the 20-year period, which equals half of the survivorship rate for this group of funds. In other words, for every 1,000 funds at the beginning of the period, 500 were merged away or closed by the end of the period; of the 500 surviving funds, 250 outperformed the average fund and were "successful," and 250 underperform.

Under the assumption of a normal distribution, the estimated success rate for passive funds of 25.0% is significantly lower than the published success rate of 35.5% for the active funds in the category. The differential between the two provides an indication of the degree of skewness in the return distribution that would be required for the passive success rate to equal or exceed the active success rate.

Overall, the comparison suggests that active and passive funds are more similar than the headline statistics would suggest.



## Background: Reasons for return dispersion

The dispersion of returns among surviving funds is driven by the following factors:

- Benchmark choice (active and passive funds).** While all of the funds are included in the U.S. Small Blend category, they may track or be measured against different index benchmarks. Therefore, differences in benchmark performance will lead to performance variation within the category. This factor, which can have a significant impact on comparative returns, affects both active and passive funds.
- Fee differences (active and passive funds).** In addition, funds in the category often charge different fees. The management fees may vary, and funds can have different fee structures: some funds may charge only a management fee in an unbundled structure, while other funds may bundle together a management fee, recordkeeping charges, and marketing fees. Again, fee differences play a role in return dispersion for both active and passive funds.
- Tracking error (passive funds).** Even if index funds use the same benchmark, they may experience variation in tracking errors, as a result of different trading strategies, replication strategies, etc.

4. **Active decision making (active funds).** The managers of actively-managed funds make different decisions about securities to buy and sell, which contributes to return dispersion. Active decision-making will generally have a larger impact than tracking error, though size of the differential will vary by asset class and time period.

To summarize, return dispersion for both active and passive funds is driven by benchmark choice and fee differentials. Passive funds are affected by tracking error, while returns for active funds are influenced by active decision-making. Because the return variation due to active decision-making is generally larger than the return variation due to tracking error, the range of returns for active funds is likely to be larger than the range of returns for passive funds.