Dimensional

MUTUAL FUND LANDSCAPE

2017

Each year, Dimensional analyzes returns from a large sample of US-based mutual funds. Our objective is to document the power of market prices by assessing fund manager performance relative to index benchmarks.

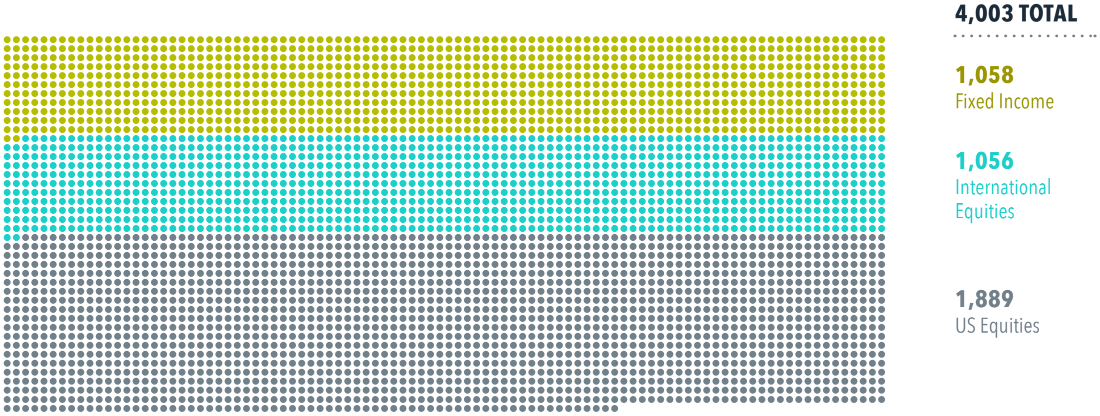
This year's study updates results through 2016. The evidence shows that a majority of fund managers in the sample failed to deliver benchmark-beating returns after costs.

We believe that the results of this research provide a strong case for relying on market prices.

SURVEYING THE LANDSCAPE

US-Based Mutual Funds, 2016

Number of equity and fixed income funds in the study



Number of US-domiciled funds in the representative industry sample as of December 31, 2016. International equities include non-US developed and emerging markets funds.

Assets under Management

In USD (billions), 2002–2016

Total value of assets in the representative fund samples over the past 15 years. Numbers may not sum due to rounding.

Past performance is no guarantee of future results. See Data Appendix for more information.

Each day, the global financial markets process millions of trades worth hundreds of billions of dollars. These trades reflect the viewpoints of buyers and sellers who are investing their capital. Through these inputs, the market functions as a powerful information processing mechanism, aggregating vast amounts of dispersed information into prices and driving them toward fair value. Investors who attempt to outguess prices are pitting their knowledge against the collective wisdom of all market participants.

So, are investors better off relying on market prices or expending resources in an effort to outguess them?

The mutual fund industry offers one test of the market's pricing power. Across thousands of funds covering a broad range of manager philosophies, objectives, and styles, the study tells a compelling story: Many of the funds evaluated have not outperformed benchmarks after costs.

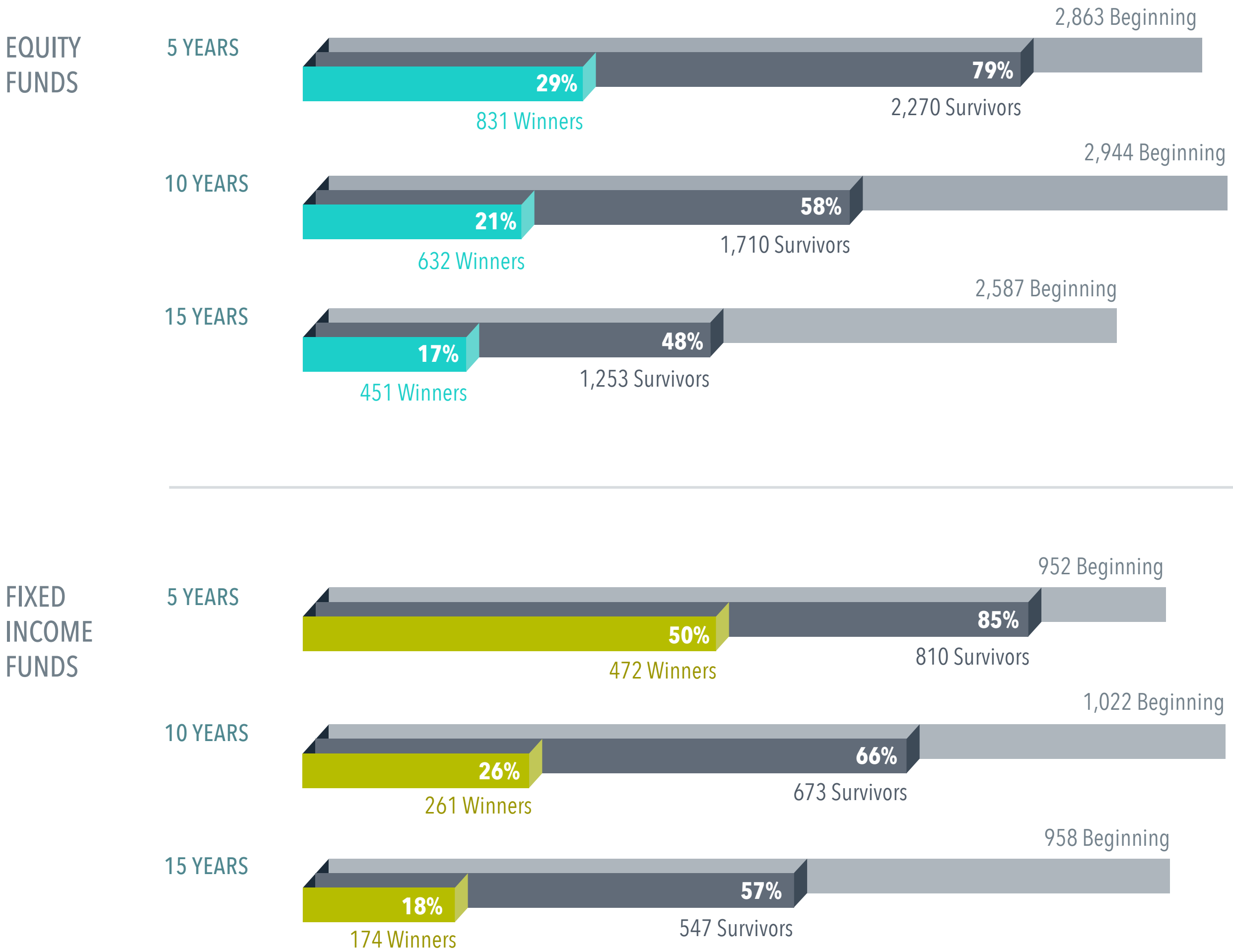
Let's consider the evidence in detail.

This study evaluates a sample of 4,003 US-based mutual funds through 2016. The funds collectively managed $6.9 trillion in shareholder wealth. Since 2002, assets under management have increased 188%.

DISAPPEARING FUNDS

Few Mutual Funds Have Survived and Outperformed

Performance periods ending December 31, 2016



The sample includes funds at the beginning of the five-, 10-, and 15-year periods ending December 31, 2016. Survivors are funds that had returns for every month in the sample period. Winners are funds that survived and outperformed their respective Morningstar category benchmark over the period.

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The size of the mutual fund landscape masks the fact that many funds disappear each year, often as a result of poor investment performance.

Investors may be surprised by how many mutual funds become obsolete over time. Funds tend to disappear quietly, and underperforming funds—especially those that do not survive and are no longer available for investment—receive little attention.

Non-surviving funds tend to be poor performers. Certainly, investors would like to identify in advance which funds will become obsolete and avoid them. But the reality is that everyone must choose from a universe that includes funds that will not survive the period, and an accurate depiction of the fund selection challenge requires performance data from both surviving and non-surviving funds.

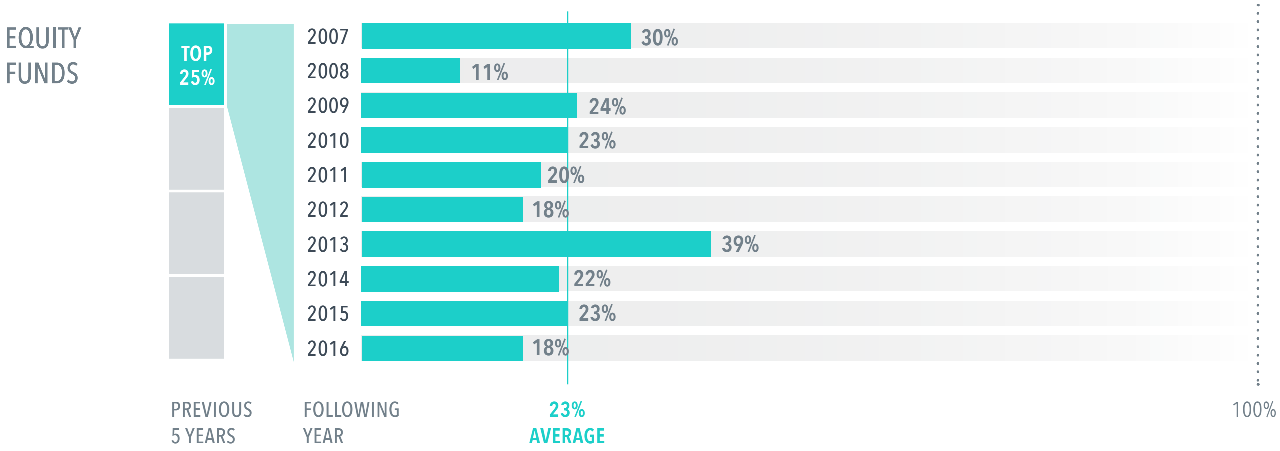
Investors likely want to do more than just pick a fund that survives. Most people want funds that outperform their benchmark. But the exhibits show the low chances of picking an outperforming, or "winning," fund. Over both short and longer time horizons, the deck is stacked against investors seeking outperforming equity and fixed income funds.

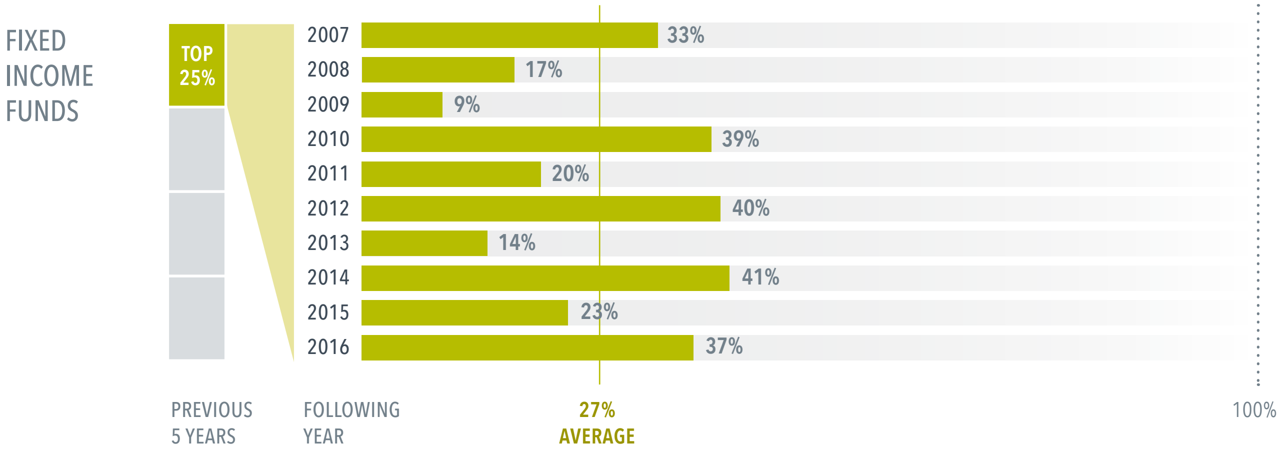
Over time, a declining percentage of mutual funds from the beginning sample survived, and only a fraction of those surviving funds delivered winning performance. For the 15-year period through 2016, only 17% of equity funds and 18% of fixed income funds survived and outperformed their benchmarks.

THE SEARCH FOR PERSISTENCE

A Fund's Past Performance Is Not Enough to Predict Future Results

Percentage of top five-year performers that also ranked in the top quartile of annual performance in the following year





At the end of each year, funds are sorted within their category based on their five-year total return. The tables show the percentage of funds in the top quartile (25%) of five-year performance that ranked in the top quartile of one-year performance in the following year. Example (upper chart): For 2007, only 30% of equity funds in the top quartile of previous five-year returns through the end of 2006 maintained a top-quartile ranking for one-year returns in 2007.

Past performance is no guarantee of future results. See Data Appendix for more information.

Some investors may resort to using track records as a guide to selecting funds, reasoning that a manager's past success is likely to continue in the future.

Does this assumption pay off? The research offers evidence to the contrary.

This exhibit shows that among funds ranked in the top quartile (25%) based on previous five-year returns, a minority also ranked in the top quartile of one-year returns in the following year. A lack of persistence casts further doubt on the ability of managers to consistently gain an informational advantage on the market.

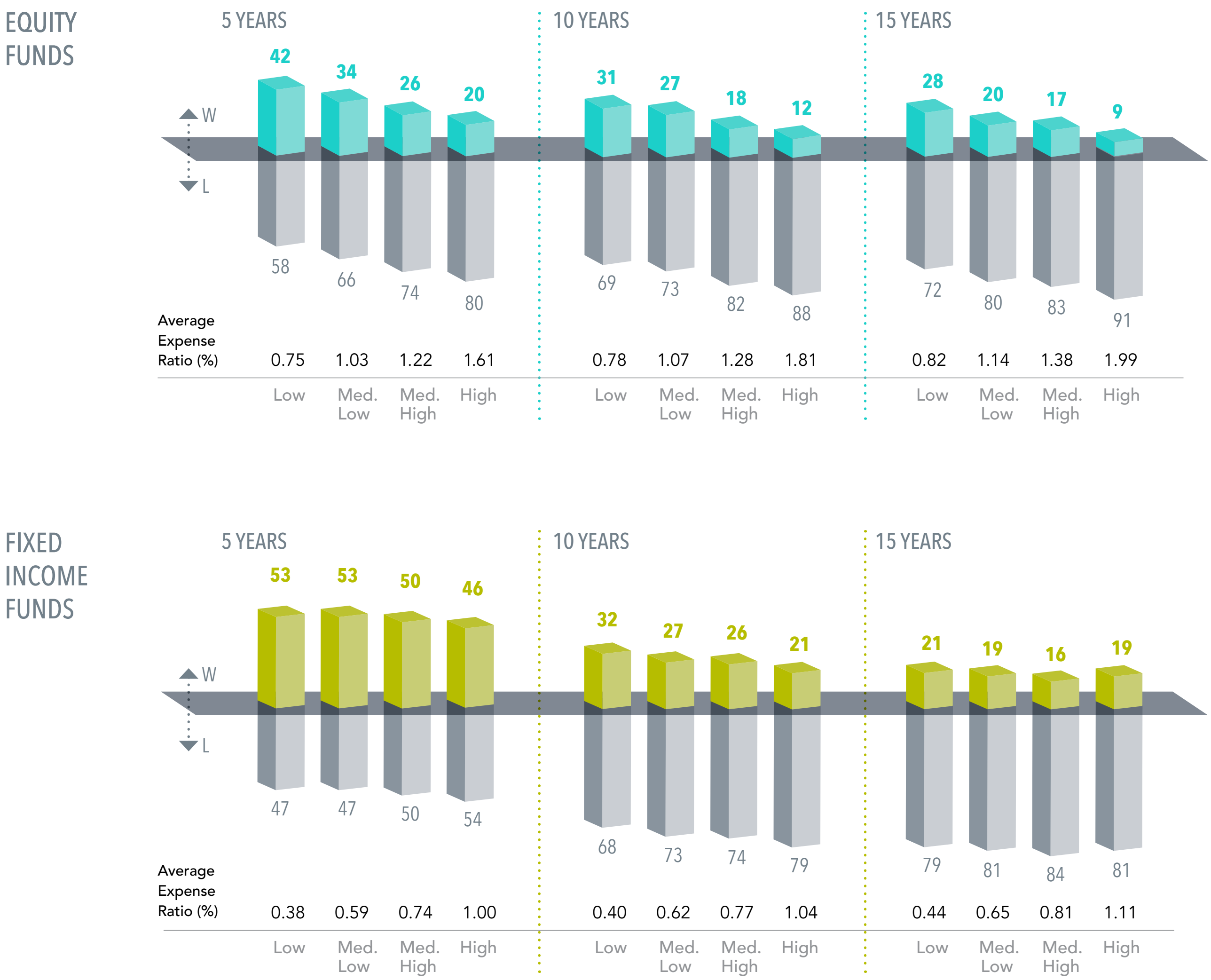
Some fund managers might be better than others, but track records alone may not provide enough insight to identify management skill. Stock and bond returns contain a lot of noise, and impressive track records may result from good luck. The assumption that strong past performance will continue often proves faulty, leaving many investors disappointed.

Most funds in the top quartile of past five-year returns did not repeat their top-quartile ranking for one-year returns in the following year. Over the 10 years through 2016, top-quartile persistence of five-year performers averaged 23% for equity funds and 27% for fixed income funds.

THE IMPACT OF COSTS

High Costs Can Reduce Performance

Winners and losers based on expense ratios (%)



The sample includes funds at the beginning of the five-, 10-, and 15-year periods ending December 31, 2016. Funds are sorted into quartiles within their category based on average expense ratio over the sample period. The chart shows the percentage of winner and loser funds by expense ratio quartile for each period, where winners are funds that survived and outperformed their respective Morningstar category benchmark and losers are funds that either did not survive or did not outperform their respective Morningstar category benchmark.

Past performance is no guarantee of future results. See Data Appendix for more information.

If competition drives prices to fair value, one might wonder why so many funds underperform. A major factor is high costs, which reduce an investor's net return and increase the hurdle for a fund to outperform.

All mutual funds incur costs. Some costs, such as expense ratios, are easily observed, while others, including trading costs, are more difficult to measure. The question is not whether investors must bear some costs, but whether the costs are reasonable and indicative of the value added by a fund manager's decisions.

Let's consider how one type of explicit cost—expense ratios—can impact fund performance. The research shows that mutual funds with the highest expense ratios had the lowest rates of outperformance. Especially for longer horizons, the cost hurdle becomes too high for most funds to overcome.

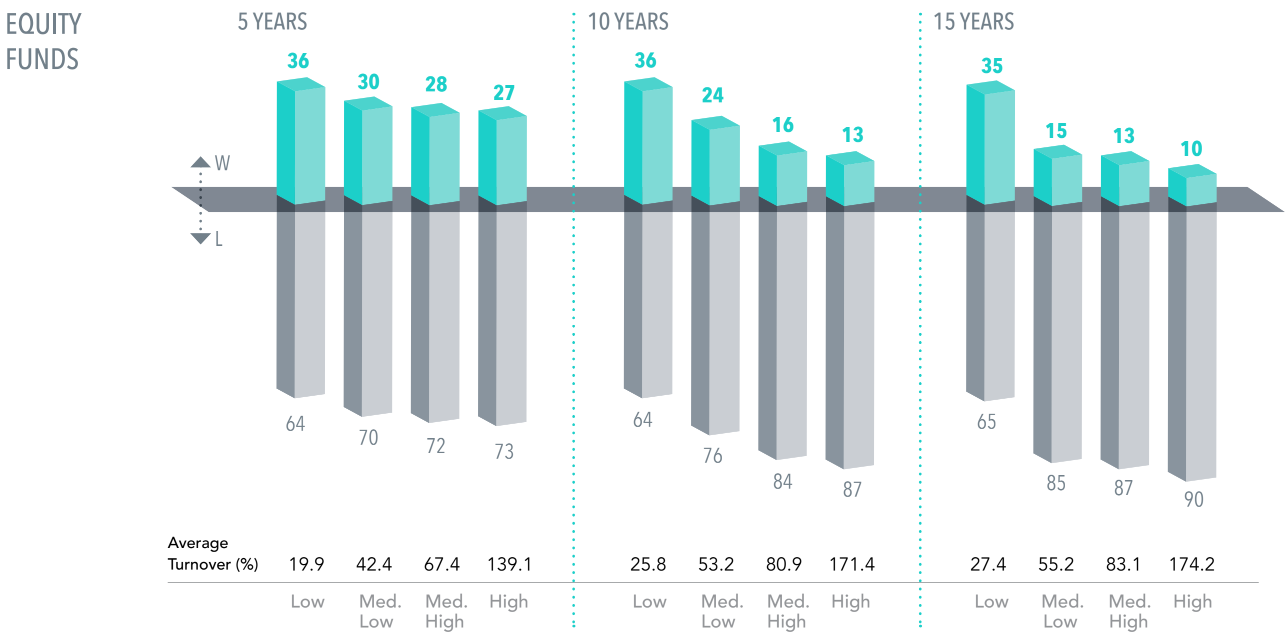
High fees can contribute to underperformance because the higher a fund's costs, the higher its return must be to outperform its benchmark. Therefore, investors may be able to increase the odds of a successful investment experience by avoiding funds with high expense ratios.

Funds with higher average expense ratios had lower rates of outperformance. For the 15-year period through 2016, 9% of the highest-cost equity funds and 19% of the highest-cost fixed income funds outperformed their benchmarks.

COSTLY TURNOVER

High Trading Costs Also Impact Returns

Winners and losers based on turnover (%)



The sample includes equity funds at the beginning of the five-, 10-, and 15-year periods ending December 31, 2016. Funds are sorted into quartiles within their category based on average turnover during the sample period. The chart shows the percentage of winner and loser funds by turnover quartile for each period, where winners are funds that survived and outperformed their respective Morningstar category benchmark and losers are funds that either did not survive or did not outperform their respective Morningstar category benchmark.

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Other activities can add substantially to a mutual fund's overall cost burden. Equity trading costs, such as brokerage fees, bid-ask spreads,[1] and price impact, can be just as large as a fund's expense ratio. Trading costs are difficult to observe and measure, but they impact a fund's return nonetheless—and the higher these costs, the higher the outperformance hurdle.

Among equity funds, portfolio turnover can offer a rough proxy for trading costs.[2] Turnover varies dramatically across equity funds, reflecting many different management styles. Managers who trade frequently in their attempts to add value typically incur greater turnover and higher trading costs.

Although turnover is just one way to approximate trading costs, the study indicates that funds with higher turnover are more likely to underperform their benchmarks. The reason is that excessive turnover creates higher trading costs, which can detract from returns.

For all periods examined, equity funds in the highest average turnover quartile had the lowest rates of outperformance. For the 15-year period through 2016, 10% of the highest-turnover funds outperformed.

1. Bid-ask spread is the difference between the highest price a buyer is willing to pay for an asset and the lowest price for which a seller is willing to sell it.

2. Fixed income funds are excluded from the analysis because turnover is not a good proxy for fixed income trading costs.

SUMMARY

The performance of US mutual funds illustrates the power of market prices. For the periods examined, the research shows that:

- **Outperforming funds were in the minority.**
- **Strong track records failed to persist.**
- **High costs and excessive turnover may have contributed to underperformance.**

In Dimensional's view, the study results suggest that investors are best served by relying on market prices. Investment methods based on a manager's ability to outguess market prices have resulted in underperformance for the vast majority of mutual funds.

Despite the evidence, many investors continue searching for winning mutual funds and look to past performance as the main criterion for evaluating a manager's future potential. In their pursuit of returns, many investors surrender performance to high fees, high turnover, and other costs of owning the mutual funds.

We believe the underperformance of most US mutual funds highlights an important investment principle: The capital markets do a good job of pricing securities, which intensifies a fund's challenge to beat its benchmark and other market participants. When fund managers charge high fees and trade frequently, they must overcome high cost barriers as they try to outperform the market.

Choosing a long-term winner involves more than seeking out funds with a successful track record, as past performance offers no guarantee of a successful investment outcome in the future. Moreover, looking at past performance is only one way to evaluate a manager.

In the end, investors should consider other aspects of a mutual fund, such as underlying market philosophy, robustness in portfolio design, and attention to total costs, all of which are important to delivering a good investment experience and, ultimately, helping investors achieve their goals.

Data Appendix

US-domiciled open-end mutual fund data is from Morningstar and Center for Research in Security Prices (CRSP) from the University of Chicago.

Equity fund sample includes the Morningstar historical categories: Diversified Emerging Markets, Europe Stock, Foreign Large Blend, Foreign Large Growth, Foreign Large Value, Foreign Small/Mid Blend, Foreign Small/Mid Growth, Foreign Small/Mid Value, Japan Stock, Large Blend, Large Growth, Large Value, Mid-Cap Blend, Mid-Cap Value, Miscellaneous Region, Pacific/Asia ex-Japan Stock, Small Blend, Small Growth, Small Value, and World Stock. For additional information regarding the Morningstar historical categories, please see "The Morningstar Category Classifications" at *morningstardirect.morningstar.com/clientcomm/Morningstar_Categories_US_April_2016.pdf.*

Fixed income fund sample includes the Morningstar historical categories: Corporate Bond, Inflation-Protected Bond, Intermediate Government, Intermediate-Term Bond, Muni California Intermediate, Muni National Intermediate, Muni National Short, Muni New York Intermediate, Muni Single State Short, Short Government, Short-Term Bond, Ultrashort Bond, and World Bond. For additional information regarding the Morningstar historical categories, please see "The Morningstar Category Classifications" at *morningstardirect.morningstar.com/clientcomm/Morningstar_Categories_US_April_2016.pdf.*

Index funds and fund-of-funds are excluded from the sample. Net assets for funds with multiple share classes or feeder funds are a sum of the individual share class total net assets. The return, expense ratio, and turnover for funds with multiple share classes are taken as the asset-weighted average of the individual share class observations. Fund share classes are aggregated at the strategy level using Morningstar FundID and CRSP portfolio number.

Each fund is evaluated relative to the Morningstar benchmark assigned to the fund's category at the start of the evaluation period. Surviving funds are those with return observations for every month of the sample period. Winner funds are those that survived and whose cumulative net return over the period exceeded that of their respective Morningstar category benchmark. Loser funds are funds that did not survive the period or whose cumulative net return did not exceed their respective Morningstar category benchmark.

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