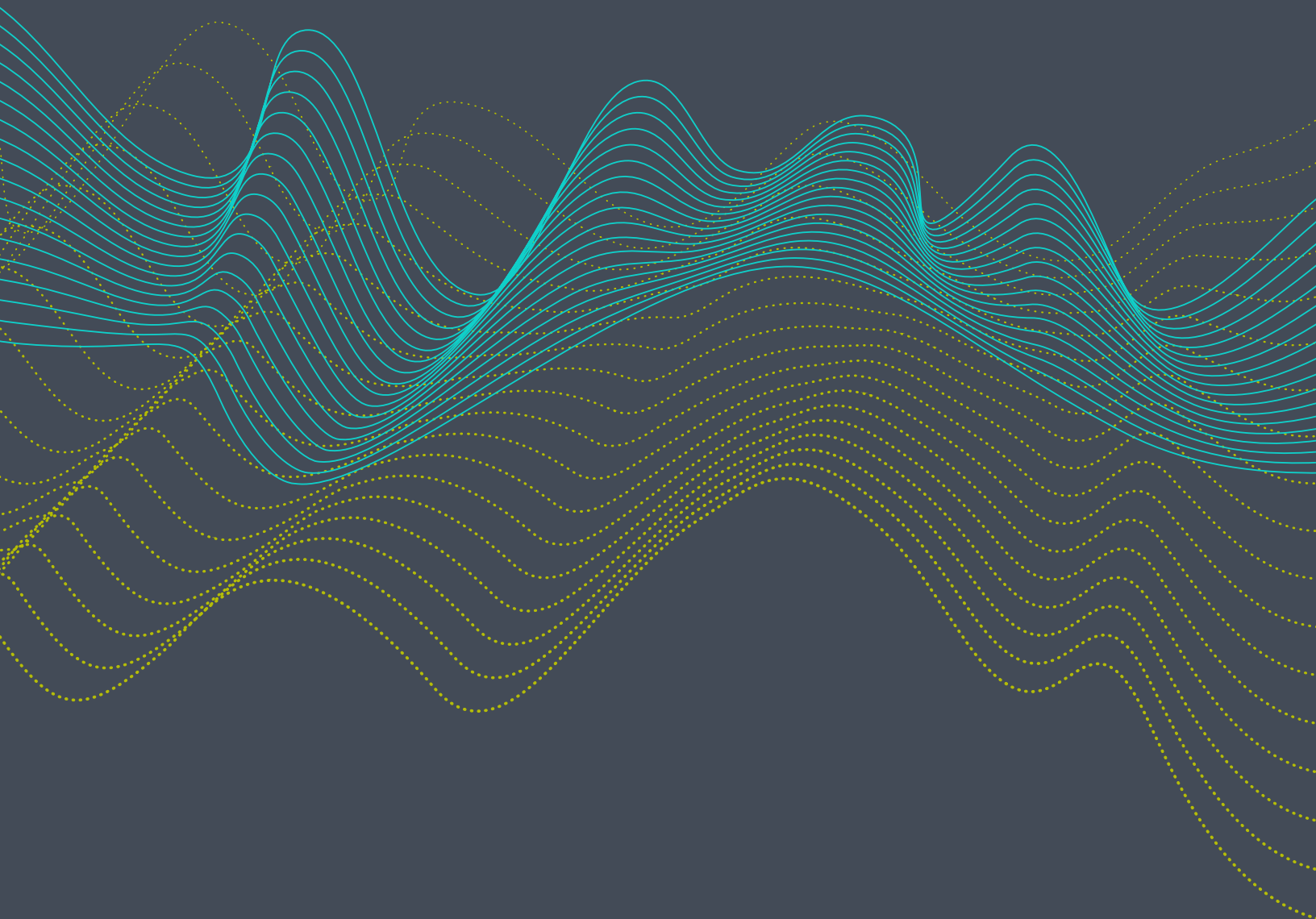

MUTUAL FUND LANDSCAPE
2019



Each year, Dimensional analyzes returns from a large sample of US-based mutual funds. Our objective is to assess the performance of mutual fund managers relative to benchmarks.*

This year's study updates results through 2018. The evidence shows that a majority of fund managers in the sample failed to deliver benchmark-beating returns after costs.

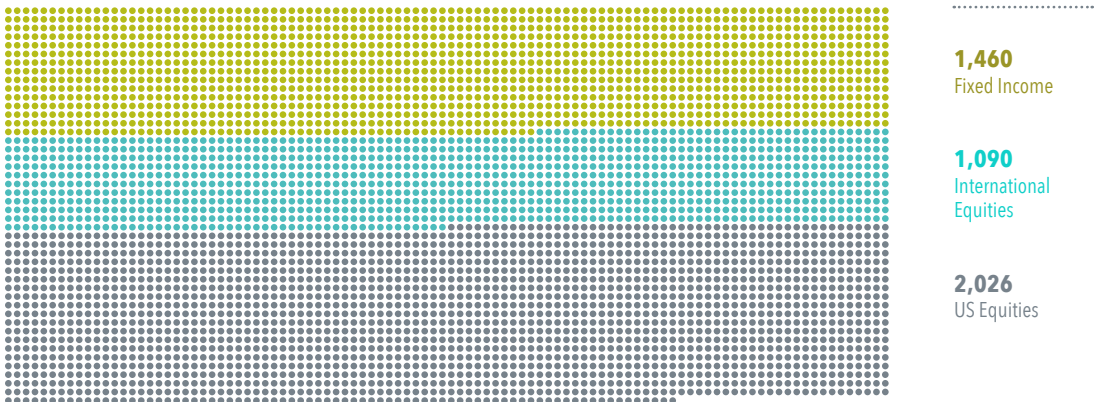
We believe that the results of this research provide a strong case for relying on market prices when making investment decisions.

**In the study results, "benchmark" refers to the primary prospectus benchmark used to evaluate the performance of each respective mutual fund in the sample where available. See Data Appendix for additional information.*

SURVEYING THE LANDSCAPE

US-Based Mutual Funds, 2018

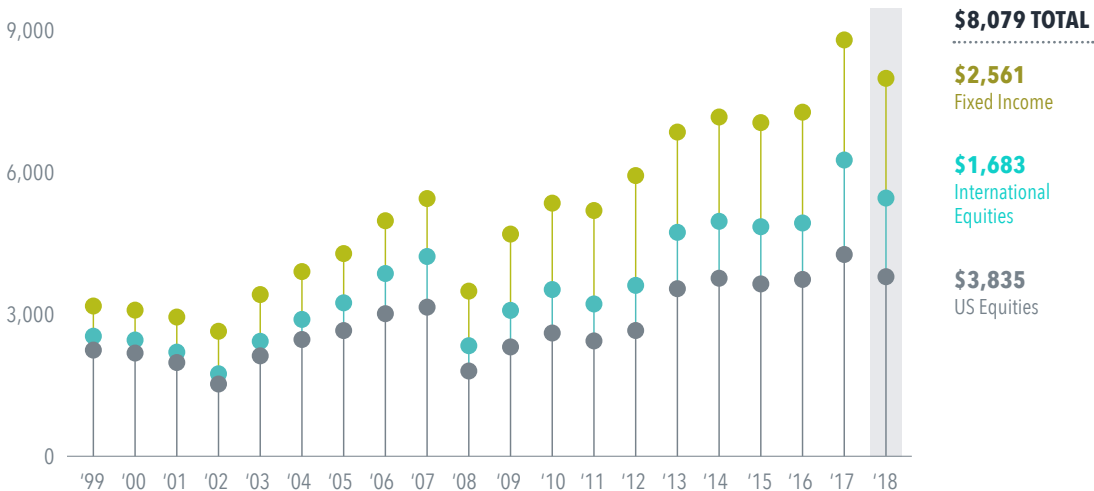
Number of equity and fixed income funds as of December 31, 2018



Number of US-domiciled funds in the sample as of December 31, 2018. International equities include non-US developed and emerging markets funds.

Assets Under Management

In USD (billions), 1999–2018



Total value of assets in the sample over the past 20 years. Numbers may not sum due to rounding.

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

The global financial markets process millions of trades worth hundreds of billions of dollars each day. These trades reflect the viewpoints of buyers and sellers who are investing their capital. Using these trades as 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 searching for mispriced securities?

Mutual fund industry performance offers one test of the market's pricing power. If markets do not effectively incorporate information into securities prices, then opportunities may arise for professional managers to identify pricing "mistakes" and convert them into higher returns. In this scenario, we might expect to see many mutual funds outperforming benchmarks. But the evidence suggests otherwise.

Across thousands of funds covering a broad range of manager philosophies, objectives, and styles, a majority of the funds evaluated did not outperform benchmarks after costs. These findings suggest that investors can rely on market prices.

Let's consider the details.

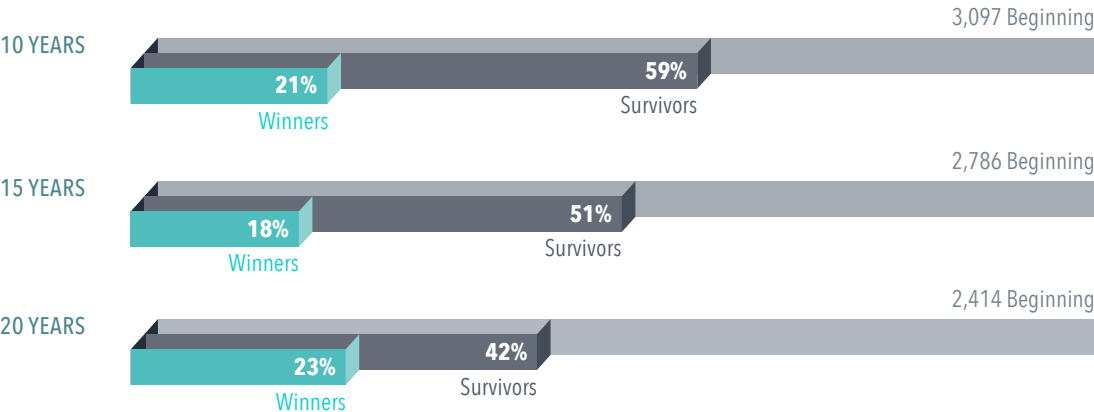
As of December 31, 2018, the sample evaluated in this study contained 4,576 US-based mutual funds. Collectively, these funds managed more than \$8 trillion in shareholder wealth.

DISAPPEARING FUNDS

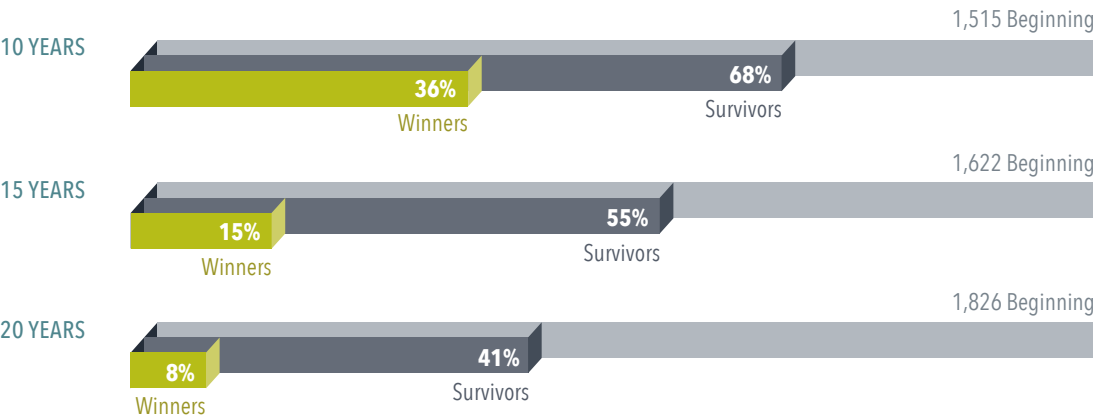
Few Mutual Funds Have Survived and Outperformed

Performance periods ending December 31, 2018

EQUITY FUNDS



FIXED INCOME FUNDS



The sample includes funds at the beginning of the 10-, 15-, and 20-year periods ending December 31, 2018. Survivors are funds that had returns for every month in the sample period. Winners are funds that survived and outperformed their benchmark over the period.

The size of the mutual fund landscape can obscure the fact that many funds disappear each year, often due to poor investment performance.

Investors may be surprised by how many mutual funds disappear over time. More than half of the equity and fixed income funds were no longer available after 20 years.

Including these non-surviving funds in the sample is an important part of assessing mutual fund performance because it offers a more complete view of the fund universe and possible outcomes at the time of fund selection. The evidence suggests that only a low percentage of funds in the original sample were “winners”—defined as those that both survived and outperformed benchmarks.

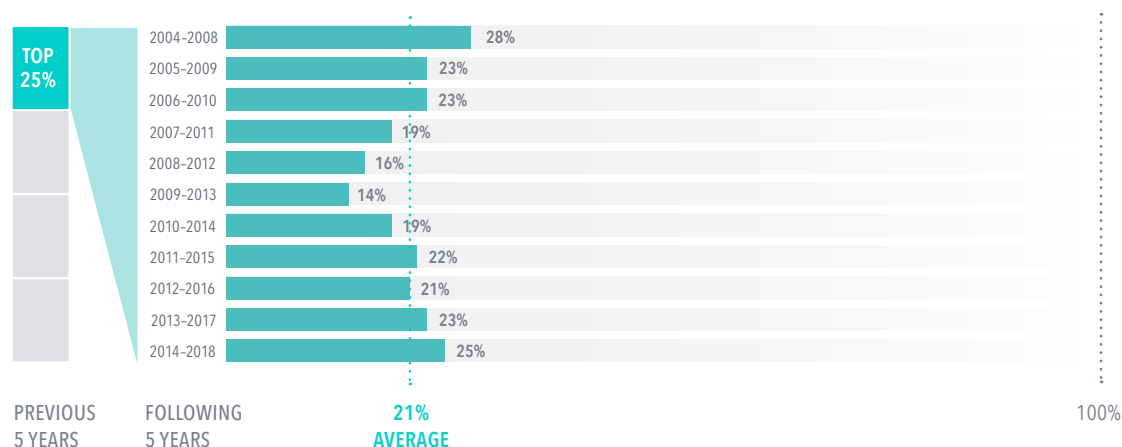
Survival and outperformance rates were low. For the 20-year period through 2018, 23% of equity funds and 8% of fixed income funds survived and outperformed their benchmarks.

THE SEARCH FOR PERSISTENCE

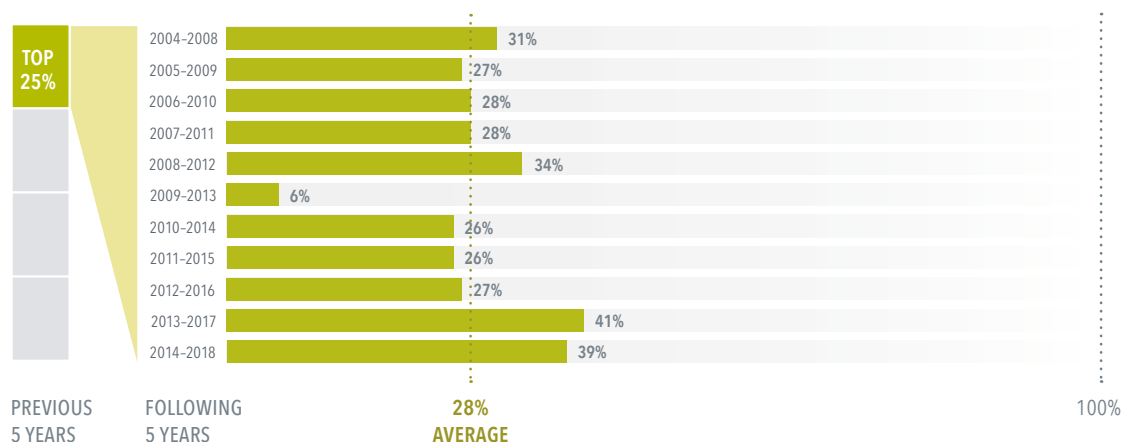
A Fund's Past Performance Is Not Enough to Predict Future Results

Percentage of funds that were top-quartile performers in consecutive five-year periods

EQUITY FUNDS



FIXED INCOME FUNDS



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 performance over the following five years. Example in upper chart (2014–2018): For equity funds ranked in the top quartile of performance in their category in the previous period (2009–2013), only 25% also ranked in the top quartile in the subsequent period (2014–2018).

Some investors select mutual funds based only on past returns. But sometimes good track records happen by chance, and short-term outperformance fails to repeat.

The 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 returns over the following five-year period. This 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.

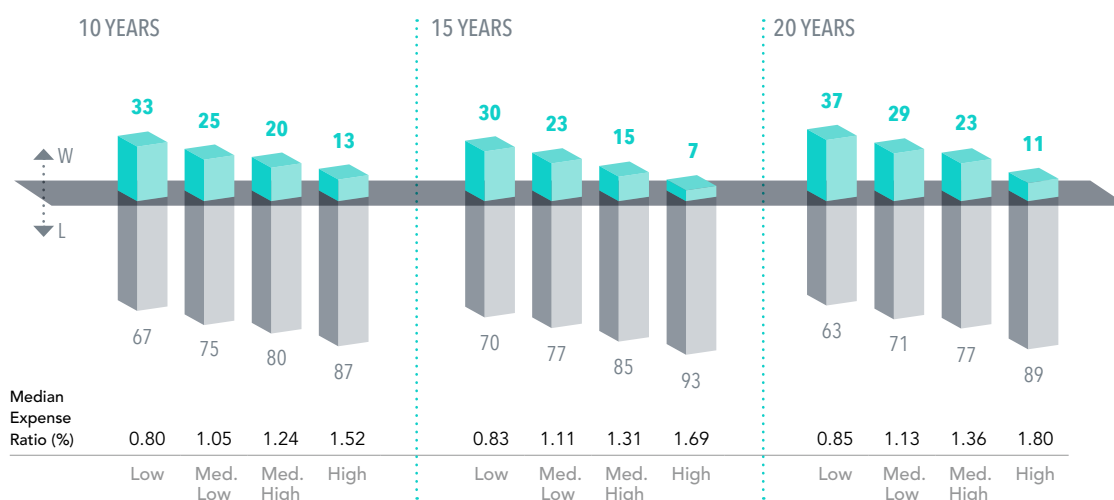
Most funds in the top quartile of past five-year returns did not repeat their top-quartile ranking over the following five years. Over the periods studied, top-quartile persistence of five-year performers averaged 21% for equity funds and 28% for fixed income funds.

THE IMPACT OF COSTS

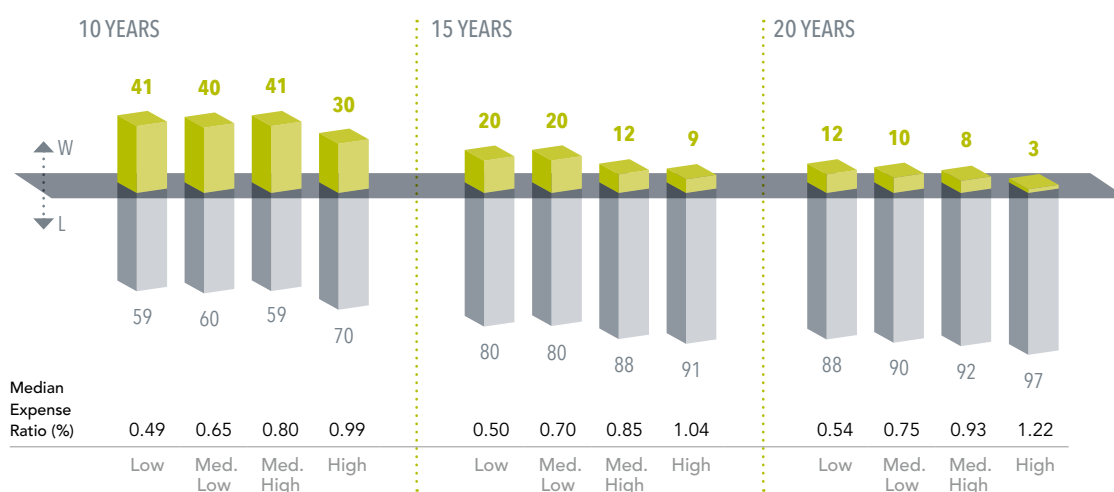
High Costs Can Reduce Performance

Percentage of winners and losers based on expense ratios

EQUITY FUNDS



FIXED INCOME FUNDS



The sample includes funds at the beginning of the 10-, 15-, and 20-year periods ending December 31, 2018. 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. Winners are funds that survived and outperformed their benchmark over the period. Losers are funds that either did not survive or did not outperform their respective benchmark.

Why do 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. Our 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.

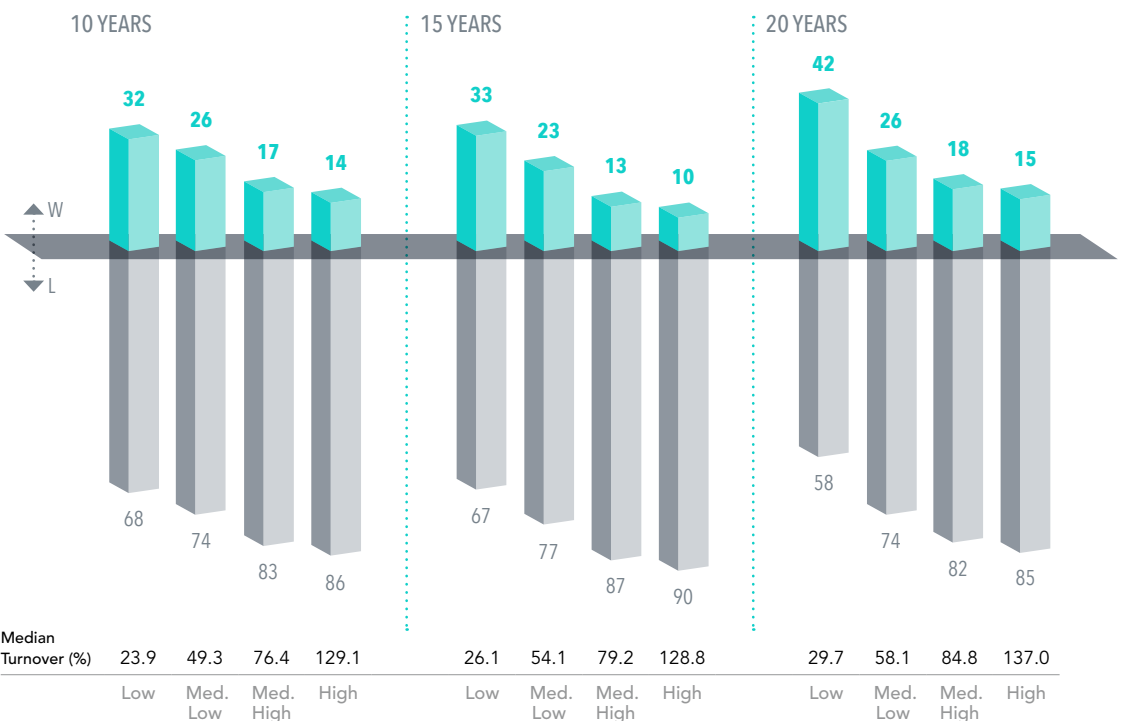
Funds with higher average expense ratios had lower rates of outperformance. For the 20-year period through 2018, 11% of the highest-cost equity funds and 3% of the highest-cost fixed income funds outperformed their benchmarks.

COSTLY TURNOVER

High Trading Costs Also Impact Returns

Percentage of winners and losers based on turnover

EQUITY FUNDS



The sample includes equity funds at the beginning of the 10-, 15-, and 20-year periods ending December 31, 2018. 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. Winners are funds that survived and outperformed their benchmark over the period. Losers are funds that either did not survive or did not outperform their respective benchmark.

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. Nonetheless, they impact a fund's return—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 20-year period through 2018, 15% 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.

The results of this study 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.

We believe the research 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.

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.

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.

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, Global Real Estate, Japan Stock, Large Blend, Large Growth, Large Value, Mid-Cap Blend, Mid-Cap Growth, Mid-Cap Value, Miscellaneous Region, Pacific/Asia ex-Japan Stock, Real Estate, Small Blend, Small Growth, Small Value, World Large Stock, and World Small/Mid Stock.

Fixed income fund sample includes the Morningstar historical categories: Corporate Bond, High Yield Bond, Inflation-Protected Bond, Intermediate Government, Intermediate-Term Bond, Long Government, Muni California Intermediate, Muni California Long, Muni Massachusetts, Muni Minnesota, Muni National Intermediate, Muni National Long, Muni National Short, Muni New Jersey, Muni New York Intermediate, Muni New York Long, Muni Ohio, Muni Pennsylvania, Muni Single State Intermediate, Muni Single State Long, Muni Single State Short, Short Government, Short-Term Bond, Ultrashort Bond, and World Bond.

Additional information regarding Morningstar's historical categories is available from Dimensional upon request.

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.

Each fund is evaluated relative to its respective primary prospectus benchmark as of the end 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 primary prospectus benchmark. Loser funds are funds that did not survive the period or whose cumulative net return did not exceed that of their respective primary prospectus benchmark. Where the full series of primary prospectus benchmark returns is unavailable, funds are instead evaluated relative to the Morningstar category index assigned to the fund's category at the start of the evaluation period.

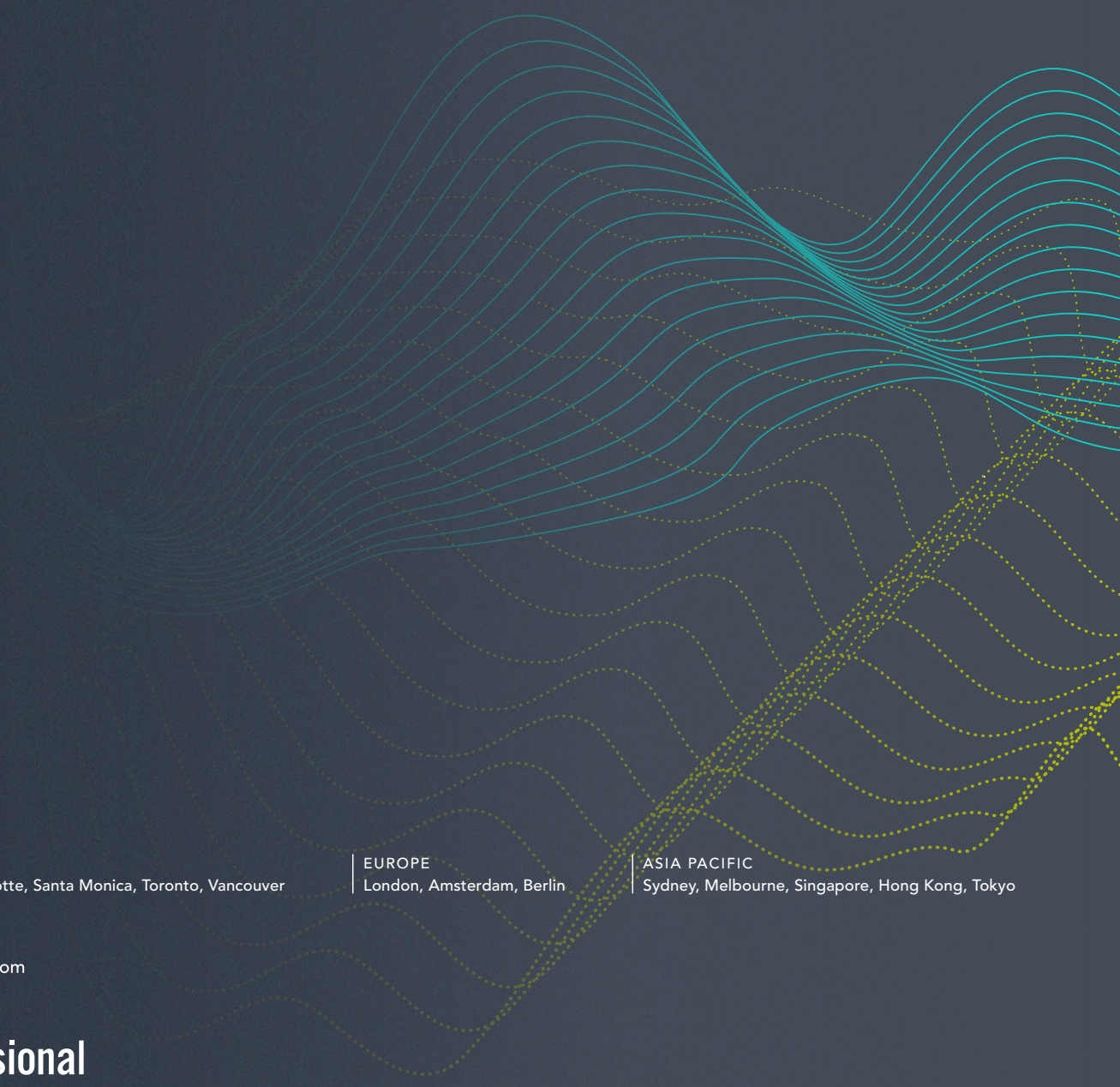
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