



PENNSYLVANIA
TREASURY



2017

PA TREASURY PASSIVE INVESTING RESOURCE GUIDE

WHAT IS ACTIVE MANAGEMENT?

Active management relies on:

- People intelligence of financial markets/trends to locate the best deals in financial markets;
- The ability to determine profitable future investment trends and prices to outperform the market.

Active managers/investors:

- Attempt to make timely picks of stocks, bonds, mutual funds by relying on their abilities to time when to move into or out of markets or market sectors;
- Use the placement of leveraged “bets” on the future direction of securities and markets;
- Have as objectives to make a profit and to do better than they would have done with the simple acceptance of average market returns;
- Rely on speculation about short-term future market movements and ignore the lessons embedded in vast amounts of historical data;
- Try to outperform the market;
- Charge high fees for service.

The climate for active investment management, once considered the predominant model of investment strategy, has changed with a shift towards passive investing. There are two major reasons often cited for this:

- High fees
- Failure to outperform the market; low rate of returns (*seen research addendum, page #*)

WHAT IS PASSIVE MANAGEMENT?

Passive investment management:

- Relies on broad sectors of the market, called asset classes or indexes to make a solid investment return;
- Is based on the average returns produced by various asset classes;
- Relies on assets based on long-term historical data that defines likely asset class risks and returns;
- Diversifies widely within and across asset classes;
- Has low management and operating fees;
- Maintains allocations long-term through periodic rebalancing of asset classes.

The term “passive” signals less trading of the fund’s portfolio, more favorable tax consequences, and lower fees and expenses than actively managed funds.

WHAT IS INDEX INVESTING?

Index investing:

- Is a form of passive investing;
- Uses portfolios that are based upon securities indexes that sample various market sectors.

Indexes are:

- Created by committees and often referred to as benchmarks;
- Reorganized (rebalanced) and modified on a regular basis, sometimes as often as every six months to delete poor performers and add good ones.

Best known of all indexes is the Dow Jones Industrial index, a group of thirty very large U.S. companies. Indexes are available for domestic and international equities and fixed income, industry sectors, commodities and gold and virtually all asset classes.

ACTIVE MANAGEMENT IS MORE EXPENSIVE THAN PASSIVE MANAGEMENT

Active investors must overcome costs to match the returns of the average passively managed portfolio.

- A decline in one stock has a proportionately greater negative effect than in a passive fund;
- Far higher expenses because of trading costs;
- Much higher management fees charged by advisors;
- Commissions

WHICH WORKS BEST?

Research supporting passive management comes from the nation's top universities (*see Addendum*) and privately funded research centers, not from Wall Street firms, powerful banks or other groups that may have a stake in the potential for huge profits that are the drivers behind active management.

Research results are clear and almost universal in their findings:

- Active investment management is a tempting dream with substantially boosted costs that can contribute to decreased investment returns when compared to passive and index portfolios (*See resource Addendum*);
- Active management does not do better in bear markets or allow investors to avoid losses, although active management investors often make that claim.

Marketwatch (7-31-15) quotes John Bogle, founder of Vanguard funds, "The job of finance is to provide capital to companies. We do it to the tune of \$250 billion a year in IPO's and secondary offerings. What else do we do? We encourage investors to trade about \$32 trillion a year. So the way I calculate it, 99% of what we do in this industry...it's a waste of resources."

Academic studies have unanimously supported the notion that few professional managers can beat their index over time, particularly once fees and taxes are considered. According to: '*A Random Walk Down Wall Street*' by Burton Malkiel, or '*The Little Book of Common Sense Investing*' by John Bogle:

- In one-year, index funds outperform 71 percent of all funds.
- In five years, index funds outperform 85 percent of all funds.
- In ten years, index funds outperform 91 percent of all funds.
- In twenty-five years, index funds outperform 95 percent of all funds.

Dimensional Fund Advisors examined the percentage of active equity funds that failed to beat their respective indexes from July 2004 through June 2009. It ranged from 63% for US large cap growth to 90% for emerging markets. For the same period, between 93% and 100% of actively managed fixed income funds failed to beat the market.

Only about 33.2% of actively managed funds outperformed their index benchmarks in 2004 and five years later, only 1.4% of the surviving funds had outperformed their benchmark every year. In the period, ending December 31, 2014 only 56% of the active equity funds had survived for ten years and only 18% of those surviving beat their benchmarks. Survival rates for fixed income funds were similar to those of equities and outperformance of bond index benchmarks was even lower at 13%.

The Financial Times (2-6-12) reported a study done by Merrill Lynch. Only one in five managers of US stocks managed to outperform the US stock market in 2011, almost an exact repeat of 2010. Only 23% of active managers outperformed the S&P 500 from 1-31-14 through 1-31-15. Active fund managers with a focus on growth stocks fared particularly poorly in 2011 with just 11% beating their benchmark and an average underperformance of 4.5%.

An S&P Dow Jones study reported on Marketwatch.com (10-10-12) found that in the five years through June 2012 less than a third of active equity managers and only 3% of active long-term bond portfolio managers beat their respective benchmarks.

Past active manager, outperformance doesn't predict future outperformance. Of the 452 domestic equity funds in the Morningstar database that existed for 20 years for 1990 through 2009, only 3% outperformed their respective indexes.

Active management in Q116 failed in a very volatile quarter with only 19% of large cap US funds beating the S&P 500 and only 19.6% of value funds beating their benchmark and only 6 percent of growth funds beating their benchmark (**Financial Times, 3-5-16**).

CHAPTER NINE



“Reversion to the Mean”

Yesterday’s Winners, Tomorrow’s Losers

IN SELECTING MUTUAL FUNDS, too many fund investors seem to rely less on sustained performance over the very long term (with all of its own profound weaknesses) than on superior performance over the short term. (Exhibits 5.2 and 5.3 in Chapter Five reinforce this point.) In 2016, over 150 percent of net investor cash flow went to funds rated four or five stars by Morningstar, the statistical service most broadly used by investors in evaluating fund returns.

These “star ratings” are based on a composite of a fund’s record over the previous three-, five-, and ten-year periods. (For younger funds, the ratings

may cover as few as three years.) As a result, the previous two years' performance alone accounts for 35 percent of the rating of a fund with ten years of history and 65 percent for a fund in business from three to five years, a heavy bias in favor of recent short-term returns.

How successful are fund choices based on the number of stars awarded for such short-term achievements? Not very! According to a 2014 study by the *Wall Street Journal*, only 14% of 5-star funds in 2004 were still at the top of the heap ten years later. 36 percent of the 5-star funds dropped at least one star. The remaining 49 percent dropped to 3 or fewer stars. Yes, they revert toward the near or below.

RTM Reaffirmed

Other data on fund returns also confirms the power of RTM. Consider Exhibit 9.1. I compared the returns of all actively managed U.S. equity funds over two consecutive sets of non-overlapping five-year periods: 2006-2011 and 2011-2016.

I sorted the returns for each period into quintiles, then looked at how those same funds fared in the subsequent five-year period. If it were easy to select funds that would outperform their peers by simply buying yesterday's winners, we would expect to see "persistence," that is, the funds that ended the first

Exhibit 9.1: Reversion to the Mean 2006-2016 First Five Years vs. Following Five Years

2006-2011 Ranking			2011-2016 Ranking					
	Number of Funds		Highest Return	High	Medium	Low	Lowest Return	Merged/ Closed
	Highest Return	353	20%	13%	13%	13%	25%	27%
High	352	20	18	15	14	21	18	12
Medium	353	20	17	17	18	14	16	18
Low	352	20	15	18	20	16	8	22
Lowest Return	352	20	17	18	16	10	12	26
Total	1762	100%	16%	16%	16%	17%	16%	18%

Note-Total number of funds merged or liquidated: 313

period at the top of the heap would remain there in next period. But no. As it turns out, RTM overpowers persistence.

Of the funds that ranked in the top quintile during the first period (2006-2011), only 13 percent remained in the top quintile over the subsequent five years. But a remarkable 27 percent of the winners from the first period ended up at the bottom quintile and another 25 percent in the next-to-last (fourth) quintile in the second period. Even worse, 10 percent of the previous winners didn't even survive the next five years.

At the other end of the spectrum, 17 percent of the first-period laggards ended up at the top of the heap in the subsequent period—even better than the first-period winners! And only 12 percent of the losers repeated their dismal performance in the second period, while 26 percent didn't survive. Even a quick glance at the table shows the remarkable randomness of returns through each of the quintiles,

with steady RTM centering around 16 percent in each quintile—less than the 20 percent we started with in the first period. This is due to the fact that fully 18 percent of the funds from the first period went out of business before the second period ended—presumably due to poor performance.

A second study reaffirms the first study.

You might be wondering if this pattern was just a one-time event, not likely to be repeated. I had the same question, so I looked at the preceding two non-overlapping five-year periods, 2001-2006 and 2006-2011. The pattern held. Of the top-quintile winners from 2006-2011, only 15 percent remained in the top quintile, while 20 percent fell to the bottom. Even worse, 13 percent of the funds—45 funds—failed to survive. Among the bottom-quintile laggards from 2001-2006, 18 percent ended the subsequent period in the top quintile—once again, even better than the first-period’s winners.

From all of these data, we can conclude that RTM exerts a powerful force on market returns, but there is remarkably little persistence. I don’t amaze easily. But these data are truly amazing. Yes, most investors seem to believe that manager skill will persist. But it doesn’t. *We are “fooled by*

Exhibit 9.2: Reversion to the Mean 2001-2011 First Five Years vs. Following Five Years

2001-2006 Ranking			2006-2011 Ranking					
	Number of Funds		Highest Return	High	Medium	Low	Lowest Return	Merged/ Closed
Highest Return	356	20%	15%	19%	15%	19%	20%	13%
High	355	20	13	15	14	15	23	19
Medium	356	20	14	13	17	17	15	24
Low	355	20	12	16	16	17	10	29
Lowest Return	355	20	18	13	12	8	6	43
Total	1777	100%	14%	15%	15%	15%	15%	26%

Note-Total number of funds merged or liquidated: 454

*randomness.*¹

Top-performing funds as a group also revert to the mean.

There is another test of the returns of leading funds that reaffirms the power of reversion to the mean. In my first book, *Bogle on Mutual Funds* (1993), I looked at the 20 top-performing mutual funds during each year from 1982 through 1992 and then tracked their records in the subsequent year (Exhibit 9.3). As it happened, the top 20 funds in each year had a subsequent average ranking of 284 among the list of 681 funds, outpacing 58 percent of their peers, or barely above average. Even the top-performing funds of each year fell to an average rank of 100 in the subsequent year, outpacing 85 percent

¹ The title of a provocative book by Nassim Nicholas Taleb.

EXHIBIT 9.3 Reversion to the Mean: Top 20 Funds, 1982-1992, 1995-2005, and 2006-2016

Rank	1982-1992		1995-2005		2006-2016	
	Average Follow-Up Rank	Performance Percentile*	Average Follow-Up Rank	Performance Percentile*	Average Follow-Up Rank	Performance Percentile*
1	100	85%	949	34%	902	59%
2	383	44	875	39	1,218	43
3	231	66	720	50	1,405	35
4	343	50	649	55	1,611	26
5	358	47	626	56	1,467	32
6	239	65	787	45	1,402	35
7	220	68	702	51	1,322	40
8	417	39	604	58	1,431	34
9	242	64	308	79	1,594	25
10	330	52	593	59	1,288	40
11	310	54	581	60	1,206	45
12	262	62	731	49	1,165	46
13	271	60	585	59	1,374	36
14	207	70	426	70	1,309	40
15	271	60	712	51	1,319	40
16	287	58	387	73	1,249	42
17	332	51	493	66	1,712	21
18	348	49	541	62	1,150	47
19	310	54	522	64	1,339	38
20	226	67	591	59	1,141	46
Average	284	58%	619	57%	1,330	39%

*Percentile 100 is best.

of their surviving peers.

The clear RTM suggested by that single test represented additional powerful evidence that winning performance by a mutual fund is unlikely to be repeated. But I did not think it wise to assume that the 1982 to 1992 experience would recur. So, just for

fun, I repeated the test in 2006, beginning with the top-performing 20 funds in 1995 and the top 20 funds in each of the nine subsequent years, and then checked the rank of each fund in the following year, just as before. I repeated the exercise once again for 2006-2016.

In general, the results were remarkably similar. The average subsequent rank of the top 20 funds from 1995 through 2005 was 619, outpacing 57 percent of their peers and barely above the average of the 1,440 total funds—just as in the prior test. In the more recent period, however, RTM asserted itself even more forcefully. The top 20 funds ended the following year with an average rank of 1,330, placing them in the 39th percentile.

During the depths of the financial crisis, an unprecedented four funds from the top 10 in 2008 didn't even make it through the end of 2009, each having been liquidated or merged into another fund. On the other hand, the top fund of 2012 held on to be the number 2 fund of 2013. While “the first can be first” sometimes, the first can be last at other times, a wonderful illustration of the inevitable randomness of fund performance.

**The stars produced in the mutual fund field
are rarely stars; all too often they are comets.**

The message is clear: reversion to the mean (RTM)—the tendency of funds whose records substantially exceed industry norms to return to

average or below—is alive and well in the mutual fund industry. In stock market blow-offs, “the first shall be last.” But in more typical environments, reversion to the fund mean is the rule. So please remember that the stars produced in the mutual fund field are rarely stars; all too often they are meteors, lighting up the firmament for a brief moment in time and then flaming out, their ashes floating gently to earth.

With each passing year, the reality is increasingly clear. Fund returns seem to be random. Yes, there are rare cases where skill seems to be involved, but it would require decades to determine how much of a fund’s success can be attributed to luck, and how much attributed to skill.

By then, you might ask yourself questions like these: (1) How long will that manager, with that staff and with that strategy, remain on the job? (2) If the fund’s assets are many times larger at the end of the period than at the beginning, will the same results that were achieved when the fund was small be sustained? (3) To what extent did high (low) expense ratios and/or high (low) portfolio turnover detract (enhance) the fund’s performance? (4) Will the stock market continue to favor the same kinds of stocks that have been at the heart of the manager’s style?

**Picking top performing funds
is hazardous duty.**

In short, selecting mutual funds on the basis of short-term performance is all too likely to be hazardous duty, and it is almost always destined to produce returns that fall far short of those achieved by the stock market, itself so easily achievable through an index fund.

Finally, we must each ask ourselves just why it is so hard to recognize the powerful principle of reversion to the mean that punctuates every corner of our lives. Here's how Nobel Laureate Daniel Kahneman answered that question in his 2013 book *Thinking, Fast and Slow*:

Our mind is strongly biased toward causal explanations and does not deal well with "mere statistics." When our attention is called to an event, associative memory will look for its cause . . . but they will be wrong because the truth is that regression to the mean has an explanation but does not have a cause.

BOX

Don't Take My Word for It

Listen to **Nassim Nicholas Taleb**, author of *Fooled by Randomness*: "Toss a coin; *heads* and the manager will make \$10,000 over the year, *tails* and he will lose

\$10,000. We run [the contest] for the first year [for 10,000 managers]. At the end of the year, we expect 5,000 managers to be up \$10,000 each, and 5,000 to be down \$10,000. Now we run the game a second year. Again, we can expect 2,500 managers to be up two years in a row; another year, 1,250; a fourth one, 625; a fifth, 313. We have now, simply in a fair game, 313 managers who made money for five years in a row. [In 10 years, just 10 of the original 10,000 managers—only 1/10th of 1 percent—will have tossed heads in each year.] Out of pure luck.... A population entirely composed of bad managers will produce a small amount of great track records. . . . The number of managers with great track records in a given market depends far more on the number of people who started in the investment business (in place of going to dental school), rather than on their ability to produce profits.”

That may sound theoretical, so here is a practical outlook. Hear *Money* magazine’s colloquy with **Ted Aronson**, partner of respected Philadelphia investment management firm AJO:

Q. You’ve said that investing in an actively managed fund (as opposed to a passively run index fund) is an act of faith. What do you mean?

A. Under normal circumstances, it takes between 20 and 800 years [of monitoring performance] to statistically prove that a money manager is skillful, not lucky. To be 95 percent certain that a manager is not just lucky, it can easily take nearly a

millennium—which is a lot more than most people have in mind when they say “long-term.” Even to be only 75 percent sure he’s skillful, you’d generally have to track a manager’s performance for between 16 and 115 years. . . . Investors need to know how the money management business really works. It’s a stacked deck. The game is unfair.

Q. Where do you invest?

A. In Vanguard index funds. I’ve owned Vanguard Index 500 for 23 years. Once you throw in taxes, it just skewers the argument for active management. Personally, I think indexing wins hands-down. After tax, active management just can’t win.”

Finally, *Wall Street Journal* columnist and author **Jason Zweig** sums up performance chasing in a single pungent sentence: “Buying funds based purely on their past performance is one of the stupidest things an investor can do.”

The case for low-cost index-fund investing

Vanguard Research

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- Due to governmental regulatory changes, the introduction of exchange-traded funds (ETFs), and a growing awareness of the benefits of low-cost investing, the growth of index investing has become a global trend over the last several years, with a large and growing investor base.
- This paper discusses why we expect index investing to continue to be successful over the long term—a rationale grounded in the zero-sum game, the effect of costs, and the challenge of obtaining persistent outperformance.
- We examine how indexing performs in a variety of circumstances, including diverse time periods and market cycles, and we provide investors with points to consider when evaluating different investment strategies.

Acknowledgments: The authors thank David J. Walker, of Vanguard's Investment Strategy Group, for his valuable contributions to this paper. This paper is a revision of Vanguard research first published in 2004 as *The Case for Indexing* by Nelson Wicas and Christopher B. Philips, updated in succeeding years by Mr. Philips and other co-authors. The current authors acknowledge and thank Mr. Philips and Francis M. Kinniry Jr. for their extensive contributions and original research on this topic.

Index investing¹ was first made broadly available to U.S. investors with the launch of the first index mutual fund in 1976. Since then, low-cost index investing has proven to be a successful investment strategy over the long term, outperforming the majority of active managers across markets and asset styles (S&P Dow Jones Indices, 2015). In part because of this long-term outperformance, index investing has seen exponential growth among investors, particularly in the United States, and especially since the global financial crisis of 2007–2009. In recent years, governmental regulatory changes, the introduction of indexed ETFs, and a growing awareness of the benefits of low-cost investing in multiple world markets have made index investing a global trend. This paper reviews the conceptual and theoretical underpinnings of index investing’s ascendancy (along with supporting quantitative data) and discusses why we expect index investing to continue to be successful and to increase in popularity in the foreseeable future.

A market-capitalization-weighted indexed investment strategy—via a mutual fund or an ETF, for example—seeks to track the returns of a market or market

segment with minimal expected deviations (and, by extension, no positive excess return) before costs, by assembling a portfolio that invests in the securities, or a sampling of the securities, that compose the market. In contrast, actively managed funds seek to achieve a return or risk level that differs from that of a market-cap-weighted benchmark. Any strategy, in fact, that aims to differentiate itself from a market-cap-weighted benchmark (e.g., “alternative indexing,” “smart beta” or “factor strategies”) is, in our view, active management and should be evaluated based on the success of the differentiation.²

This paper presents the case for low-cost index-fund investing by reviewing the main drivers of its efficacy. These include the zero-sum game theory, the effect of costs, and the difficulty of finding persistent outperformance among active managers. In addition, we review circumstances under which this case may appear less or more compelling than theory would suggest, and we provide suggestions for selecting an active manager for investors who still prefer active management or for whom no viable low-cost indexed option is available.

Notes on risk

Notes about risk and performance data: Investments are subject to market risk, including the possible loss of the money you invest. Past performance is no guarantee of future returns. Bond funds are subject to the risk that an issuer will fail to make payments on time, and that bond prices will decline because of rising interest rates or negative perceptions of an issuer’s ability to make payments. Investments in stocks issued by non-U.S. companies are subject to risks including country/regional risk, which is the chance that political upheaval, financial troubles, or natural disasters will adversely affect the value of securities issued by companies in foreign countries or regions; and currency risk, which is the chance that the value of a foreign investment, measured in U.S. dollars, will decrease because of unfavorable changes in currency exchange rates. Stocks of companies based in emerging markets are subject to national and regional political and economic risks and to the risk of currency fluctuations. These risks are especially high in emerging markets.

Funds that concentrate on a relatively narrow market sector face the risk of higher share-price volatility. Prices of mid- and small-cap stocks often fluctuate more than those of large-company stocks. U.S. government backing of Treasury or agency securities applies only to the underlying securities and does not prevent share-price fluctuations. Because high-yield bonds are considered speculative, investors should be prepared to assume a substantially greater level of credit risk than with other types of bonds. Diversification does not ensure a profit or protect against a loss in a declining market. Performance data shown represent past performance, which is not a guarantee of future results. Note that hypothetical illustrations are not exact representations of any particular investment, as you cannot invest directly in an index or fund-group average.

¹ Throughout this paper, we use the term *index investing* to refer to a passive, broadly diversified, market-capitalization-weighted strategy. Also for purposes of this discussion, we consider any strategy that is not market-cap-weighted to be an active strategy.

² See Pappas and Dickson (2015), for an introduction to factor strategies. Chow et al. (2011) explained how various alternatively weighted index strategies outperformed market-cap-weighted strategies largely on the basis of factors.

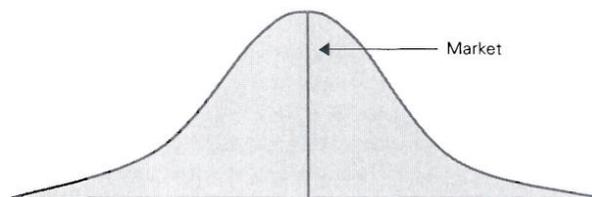
Zero-sum game theory

The central concept underlying the case for index-fund investing is that of the zero-sum game. This theory states that, at any given time, the market consists of the cumulative holdings of all investors, and that the aggregate market return is equal to the asset-weighted return of all market participants. Since the market return represents the average return of all investors, for each position that outperforms the market, there must be a position that underperforms the market by the same amount, such that, in aggregate, the excess return of all invested assets equals zero.³ Note that this concept does not depend on any degree of market efficiency; the zero-sum game applies to markets thought to be less efficient (such as small-cap and emerging market equities) as readily as to those widely regarded as efficient (Waring and Siegel, 2005).

Figure 1 illustrates the concept of the zero-sum game. The returns of the holdings in a market form a bell curve, with a distribution of returns around the mean, which is the market return.

It may seem counterintuitive that the zero-sum game would apply in inefficient markets, because, by definition, an inefficient market will have more price and informational inefficiencies and, therefore, more opportunities for outperformance. Although this may be true to a certain extent, it is important to remember that for every profitable trade an investor makes, (an)other investor(s) must take the opposite side of that trade and incur an equal loss. This holds true regardless of whether the security in question is mispriced or not. For the same reason, the zero-sum game must apply regardless of market direction, including bear markets, where active management is often thought to have an advantage. In a bear market, if a manager is selling out of an investment to position the portfolio

Figure 1. Market participants' asset-weighted returns form a bell curve around market's return



Source: Vanguard.

more defensively, another or others must take the other side of that trade, and the zero-sum game still applies. The same logic applies in any other market, as well.

Some investors may still find active management appealing, as it seemingly would provide an even-odds chance of successfully outperforming. As we discuss in the next section, though, the costs of investing make outperforming the market significantly more difficult than the gross-return distribution would imply.

Effect of costs

The zero-sum game discussed here describes a theoretical cost-free market. In reality, however, investors are subject to costs to participate in the market. These costs include management fees, bid-ask spreads, administrative costs, commissions, market impact, and, where applicable, taxes—all of which can be significant and reduce investors' net returns over time. The aggregate result of these costs shifts the return distribution to the left.

³ See Sharpe (1991) for a discussion of the zero-sum game.

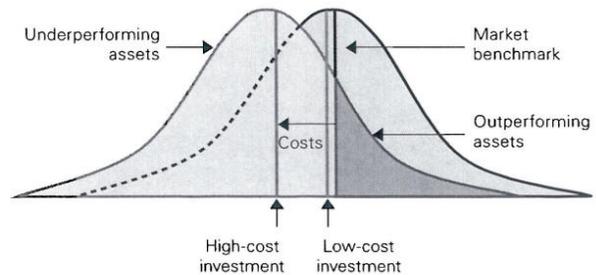
Figure 2 shows two different investments compared to the market. The first investment is an investment with low costs, represented by the red line. The second investment is a high-cost investment, represented by the blue line. As the figure shows, although both investments move the return curve to the left—meaning fewer assets outperform—the high-cost investment moves the return curve much farther to the left, making outperformance relative to both the market and the low-cost investment much less likely. In other words, after accounting for costs, the aggregate performance of investors is less than zero sum, and as costs increase, the performance deficit becomes larger.

This performance deficit also changes the risk–return calculus of those seeking to outperform the market. We previously noted that an investor may find active management attractive because it theoretically provides an even chance at outperforming the market. Once we account for costs, however, underperformance becomes more likely than outperformance. As costs increase, both the odds and magnitude of underperformance increase until significant underperformance becomes as likely, or more likely, than even minor outperformance.

Figure 3 illustrates the zero-sum game on an after-cost basis by showing the distribution of excess returns of domestic equity funds (Figure 3a) and fixed income funds (Figure 3b), net of fees. Note that for both asset classes, a significant number of funds’ returns lie to the left of the prospectus benchmark, which represents zero excess returns. Once merged and liquidated funds are considered, a clear majority of funds fail to outperform their benchmarks, meaning that negative excess returns tend to be more common than positive excess returns.⁴ Thus, as predicted by the zero-sum game theory, outperformance tends to be less likely than underperformance, once costs are considered.

This begs the question of how investors can reduce the chances of underperforming their benchmark. Considerable evidence supports the view that the odds of outperforming a majority of similar investors increase if investors simply seek the lowest possible cost for a given strategy. For

Figure 2. Market participant returns after adjusting for costs



Source: Vanguard.

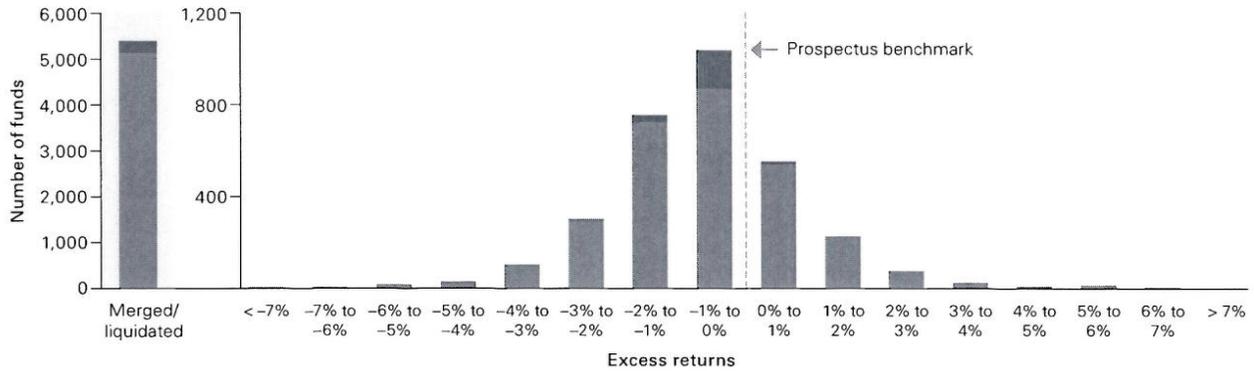
example, Financial Research Corporation (2002) evaluated the predictive value of different fund metrics, including a fund’s past performance, Morningstar rating, alpha, and beta. In the study, a fund’s expense ratio was the most reliable predictor of its future performance, with low-cost funds delivering above-average performance relative to the funds in their peer group in all of the periods examined. Likewise, Morningstar performed a similar analysis across its universe of funds and found that, regardless of fund type, low expense ratios were the best predictors of future relative outperformance (Kinnel, 2010).

This negative correlation between costs and excess return is not unique to active managers. Rowley and Kwon (2015) looked at several variables across index funds and ETFs, including expense ratio, turnover, tracking error, assets under management, weighting methodology, and active share, and found that expense ratio was the most dominant variable in explaining an index fund’s excess return.

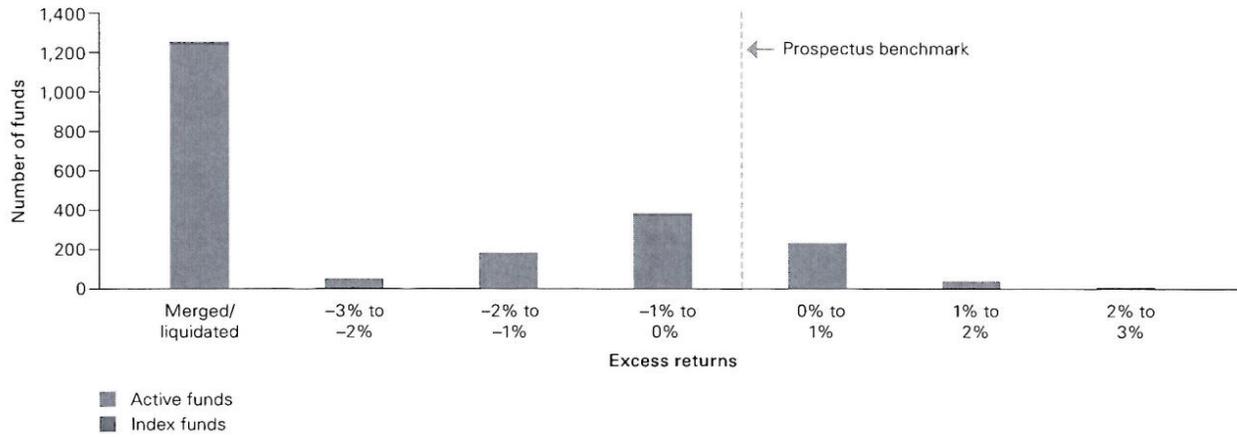
⁴ Survivorship bias and the effect of merged and closed funds on performance are discussed in more detail later in this paper.

Figure 3. Distribution of equity and fixed income funds' excess return

a. Distribution of equity funds' excess return



b. Distribution of fixed income funds' excess return



Note: Past performance is no guarantee of future results. Charts *a.* and *b.* display distribution of funds' excess returns relative to their prospectus benchmarks, for the 15 years ended December 31, 2016. Our survivor bias calculation treats all dead funds as underperformers. It's possible, of course, that some of those funds outperformed the relevant index before they died. If we splice fund category average returns onto the records of dead funds, we see a modest decline in the percentage of funds that trail the index. The differences from our existing calculations are not material.

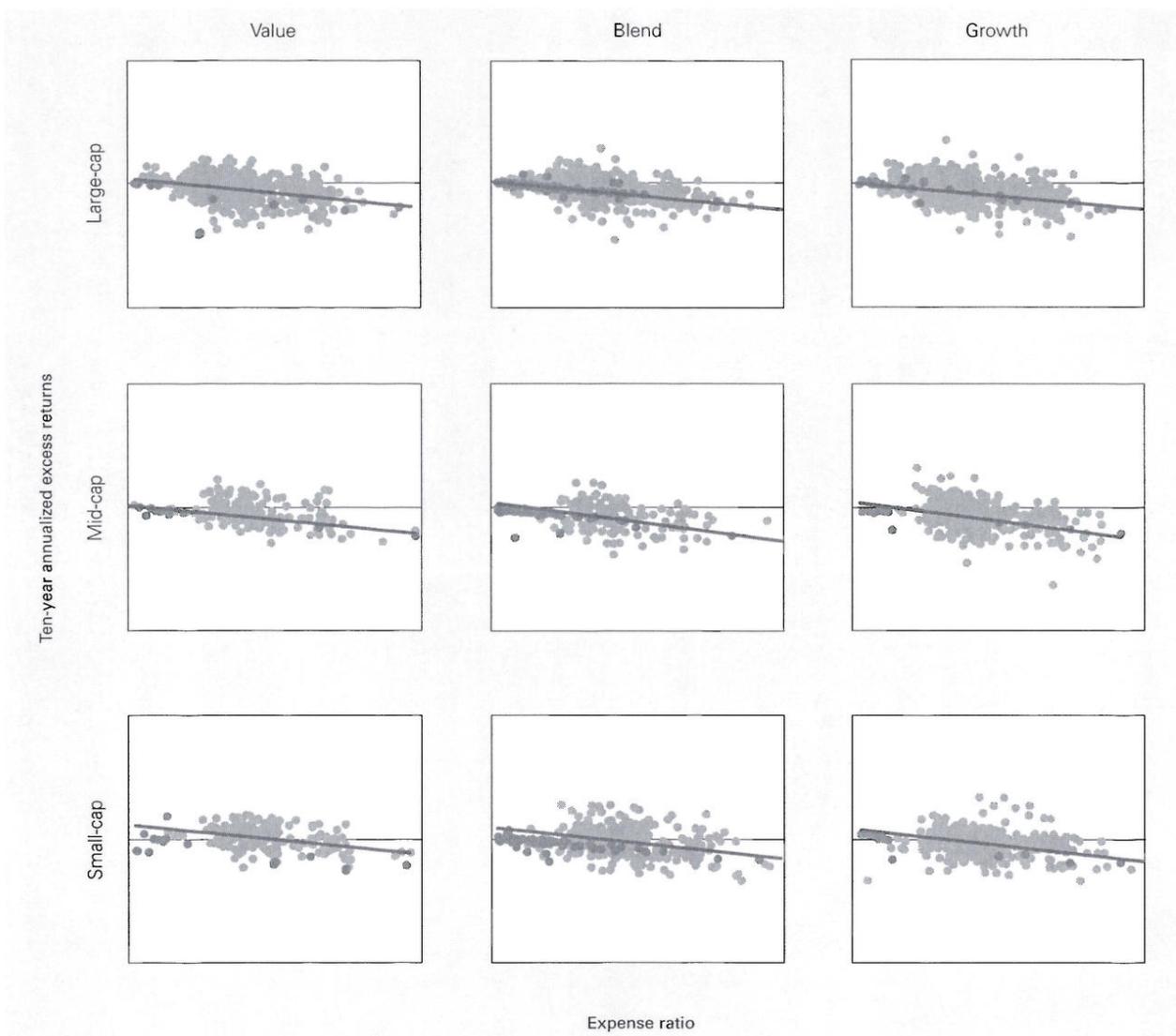
Sources: Vanguard calculations, using data from Morningstar, Inc.

To quantify the impact of costs on net returns, we charted managers' excess returns as a function of their expense ratios across various categories of funds over a ten-year period. **Figure 4** shows that higher expense ratios are generally associated with lower excess returns. The blue line in each style box in the figure represents

the simple regression line and signifies the trend across all funds for each category. For investors, the clear implication is that by focusing on low-cost funds (both active and passive), the probability of outperforming higher-cost portfolios increases.

**Figure 4. Higher expense ratios were associated with lower excess returns for U.S. funds:
As of December 31, 2016**

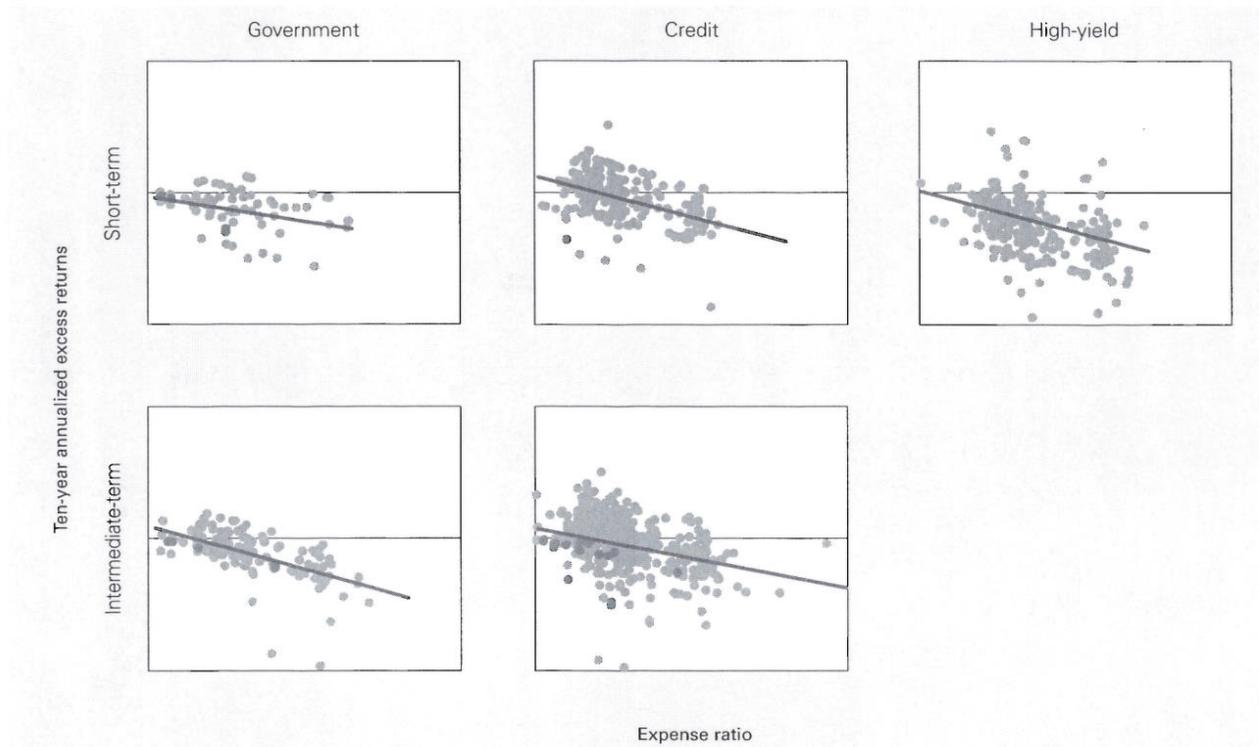
a. U.S. equity funds



(Continued on page 7)

Figure 4 (Continued). Higher expense ratios were associated with lower excess returns for U.S. funds:
As of December 31, 2016

b. U.S. bond funds



Notes to charts a. and b.: Past performance is no guarantee of future results. All data as of December 31, 2016. Index funds are shown in red. Each plotted point represents a U.S. fund within the specific size, style, and asset group. Each fund is plotted to represent the relationship of its expense ratio (x-axis) versus its ten-year annualized excess return relative to its stated benchmark (y-axis). The straight line represents the linear regression, or the best-fit trend line—that is, the general relationship of expenses to returns within each asset group. The scales are standardized to show the slopes' relationship to each other, with expenses ranging from 0% to 3% and returns ranging from -15% to 15% for equities and from -5% to 5% for fixed income. Some funds' expense ratios and returns go beyond the scales and are not shown.

Sources: Vanguard calculations, using data from Morningstar, Inc.

Costs play a crucial role in investor success. Whether invested in an actively managed fund or an index fund, each basis point an investor pays in costs is a basis point less an investor receives in returns. Since excess returns are a zero-sum game, as cost drag increases, the likelihood that the manager will be able to overcome this drag diminishes. As such, most investors' best chance at maximizing net returns over the long term lies in minimizing these costs. In most markets, low-cost index funds have a significant cost advantage over actively managed funds. Therefore, we believe that most investors are best served by investing in low-cost index funds over their higher-priced, actively managed counterparts.

Persistent outperformance is scarce

For those investors pursuing an actively managed strategy, the critical question becomes: Which fund will outperform? Most investors approach this question by selecting a winner from the past. Investors cannot profit from a manager's past success, however, so it is important to ask, Does a winning manager's past performance persist into the future? Academics have long studied whether past performance can accurately predict future performance. About 50 years ago, Sharpe (1966) and Jensen (1968) found limited to no persistence. Three decades later, Carhart (1997) reported no evidence of persistence in fund outperformance after adjusting for both the well-known Fama-French (1993) three-factor model as well as momentum. More recently, Fama and French (2010) reported results of a separate 22-year study suggesting that it is extremely difficult for an actively managed investment fund to outperform its benchmark regularly.

To test if active managers' performance has persisted, we looked at two separate, sequential, non-overlapping five-year periods. First, we ranked the funds by performance quintile in the first five-year period, with the top 20% of funds going into the first quintile, the second 20% into the second quintile, and so on. Second, we sorted those funds by performance quintile according to their performance in the second five-year period. To the second five-year period, however, we added a sixth category: funds that were either liquidated or merged during that period. We then compared the results. If managers were able to provide consistently high performance, we would expect to see the majority of first-quintile funds remaining in the first quintile. **Figure 5**, however, shows that a majority of managers failed to consistently outperform.

It is interesting to note that, once we accounted for closed and merged funds, persistence was actually stronger among the underperforming managers than those that outperformed. These findings were consistent across all asset classes and all markets we studied globally. From this, we concluded that consistent outperformance is very difficult to achieve. This is not to say that there are not periods when active management outperforms, or that no active managers do so regularly. Only that, on average and over time, active managers as a group fail to outperform; and even though some individual managers may be able to generate consistent outperformance, those active managers are extremely rare.

Figure 5. Actively managed domestic funds failed to show persistent outperformance

Initial excess return quintile, five years ended December 31, 2011	Number of funds	Subsequent five-year excess return ranking, through December 31, 2016						Total
		Highest quintile	2nd quintile	3rd quintile	4th quintile	Lowest quintile	Merged/ liquidated	
1st quintile	1,108	15.6%	11.6%	11.6%	14.6%	21.3%	25.3%	100.0%
2nd quintile	1,118	11.7	16.0	16.4	15.1	13.2	27.5	100.0
3rd quintile	1,113	14.0	13.3	15.2	14.8	11.5	31.2	100.0
4th quintile	1,112	11.5	12.4	12.5	11.9	10.2	41.5	100.0
5th quintile	1,114	12.2	12.3	9.7	8.9	9.2	47.7	100.0

Notes: The far-left column ranks all active U.S. equity funds within each of the nine Morningstar style categories based on their excess returns relative to their stated benchmarks during the five-year period ended December 31, 2011. The shaded columns show how funds in each quintile performed over the subsequent five years.

Sources: Vanguard and Morningstar, Inc.

When the case for low-cost index fund investing can seem less or more compelling

For the reasons already discussed, we expect the case for low-cost index fund investing to hold over the long term. Like any investment strategy, however, the real-world application of index investing can be more complex than the theory would suggest. This is especially true when attempting to measure indexing’s track record versus that of active management. Various circumstances, which we discuss next, can result in data that at times show active management outperforming indexing while, at other times, show indexing outperforming active management by more than would be expected. As a result, the case for low-cost index fund investing can appear either less or more compelling than the theory would indicate. The subsections following address some of these circumstances.

Survivorship bias can skew results

Survivorship bias is introduced when funds are merged into other funds or liquidated, and so are not represented throughout the full time period examined. Because such funds tend to be underperformers (see the accompanying box titled “Merged and liquidated funds have tended to be underperformers” and Figure 6, on page 10), this skews the average results upward for the surviving funds, causing them to appear to perform better relative to a benchmark.⁵

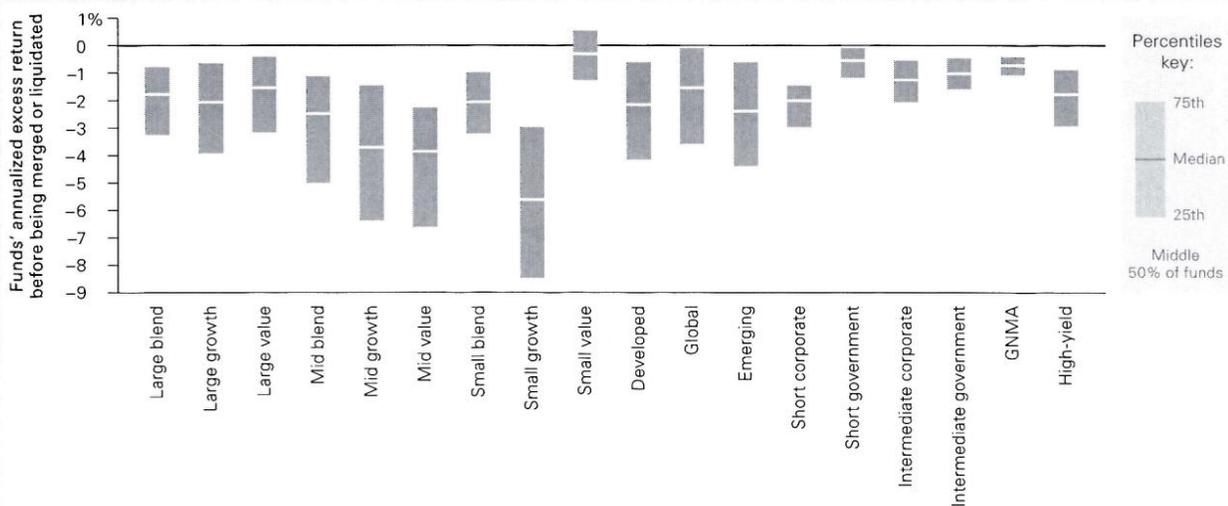
⁵ For a more detailed discussion of the underperformance of closed funds, see Schlanger and Philips (2013).

Merged and liquidated funds have tended to be underperformers

To test the assumption that closed funds underperformed, we evaluated the performance of all domestic funds identified by Morningstar as either being liquidated or merged into another fund. Figure 6 shows that funds

tend to trail their benchmark before being closed. We found the assumption that merged and liquidated funds underperformed to be reasonable.

Figure 6. Dead funds showed underperformance versus style benchmark prior to closing date



Notes: Chart displays the cumulative annualized performance of those funds that were merged or liquidated within this study's sample, relative to a benchmark representative of that fund's Morningstar category. See Appendix for the list of benchmarks used. We measured each fund's performance from January 1, 2002, through the month-end prior to its merger or liquidation. Figure displays the middle-50% distribution of these funds' returns before their closure.

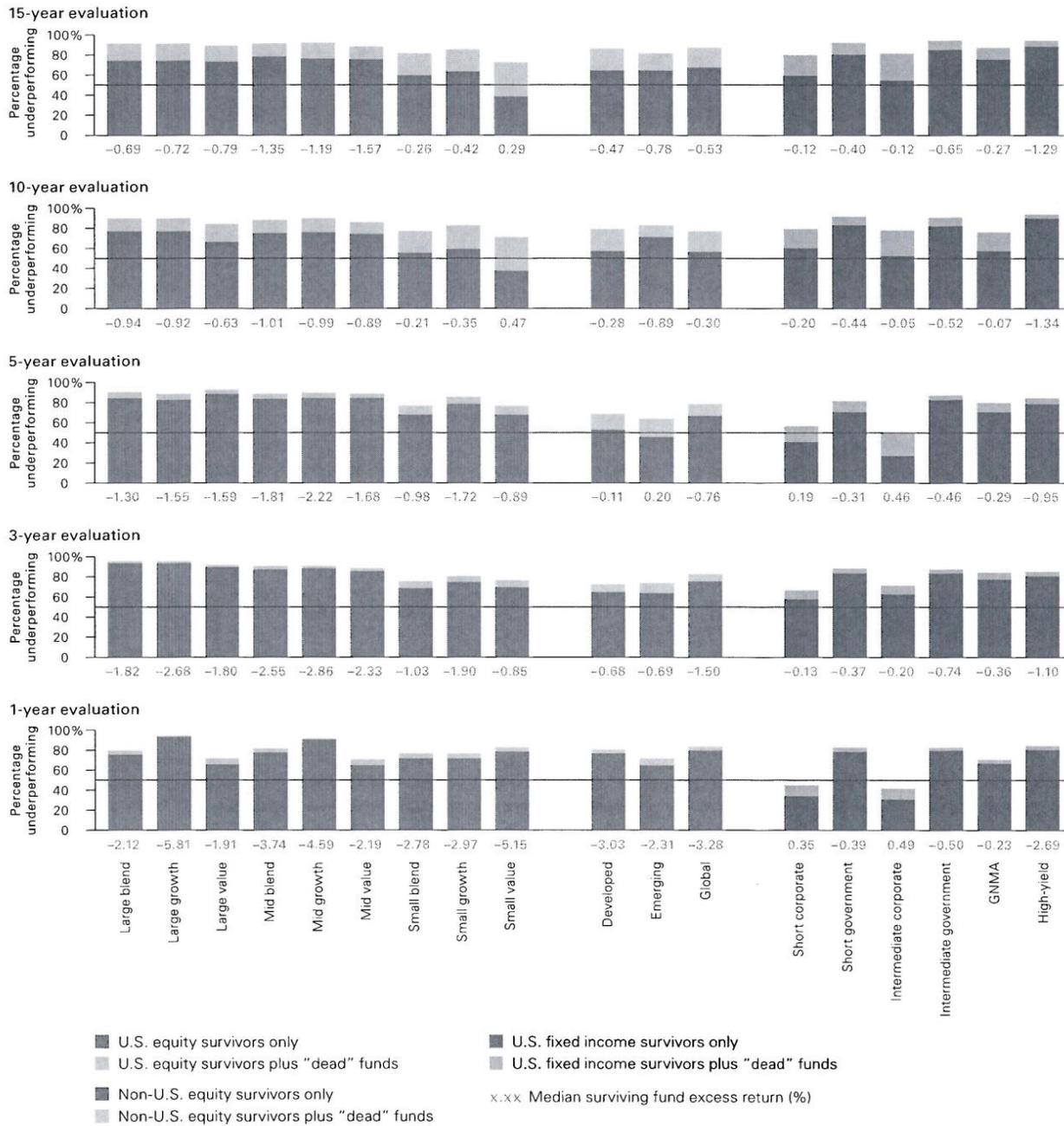
Sources: Vanguard calculations, based on data from Morningstar, Inc., Standard & Poor's, MSCI, CRSP, and Barclays.

However, the average experience of investors—some of whom invested in the underperforming fund before it was liquidated or merged—may be much different. Figure 7 shows the impact of survivorship bias on the apparent relative performance of actively managed funds versus both their prospectus and style benchmarks.

In either case, a majority of active funds underperformed, and this underperformance became more pronounced as the time period lengthened and survivorship bias was accounted for. Thus, it is critical to adjust for survivorship bias when comparing the performance of active funds to their benchmarks, especially over longer time periods.

Figure 7. Percentage of actively managed mutual funds that underperformed versus their benchmarks: Periods ended December 31, 2016

a. Versus fund prospectus



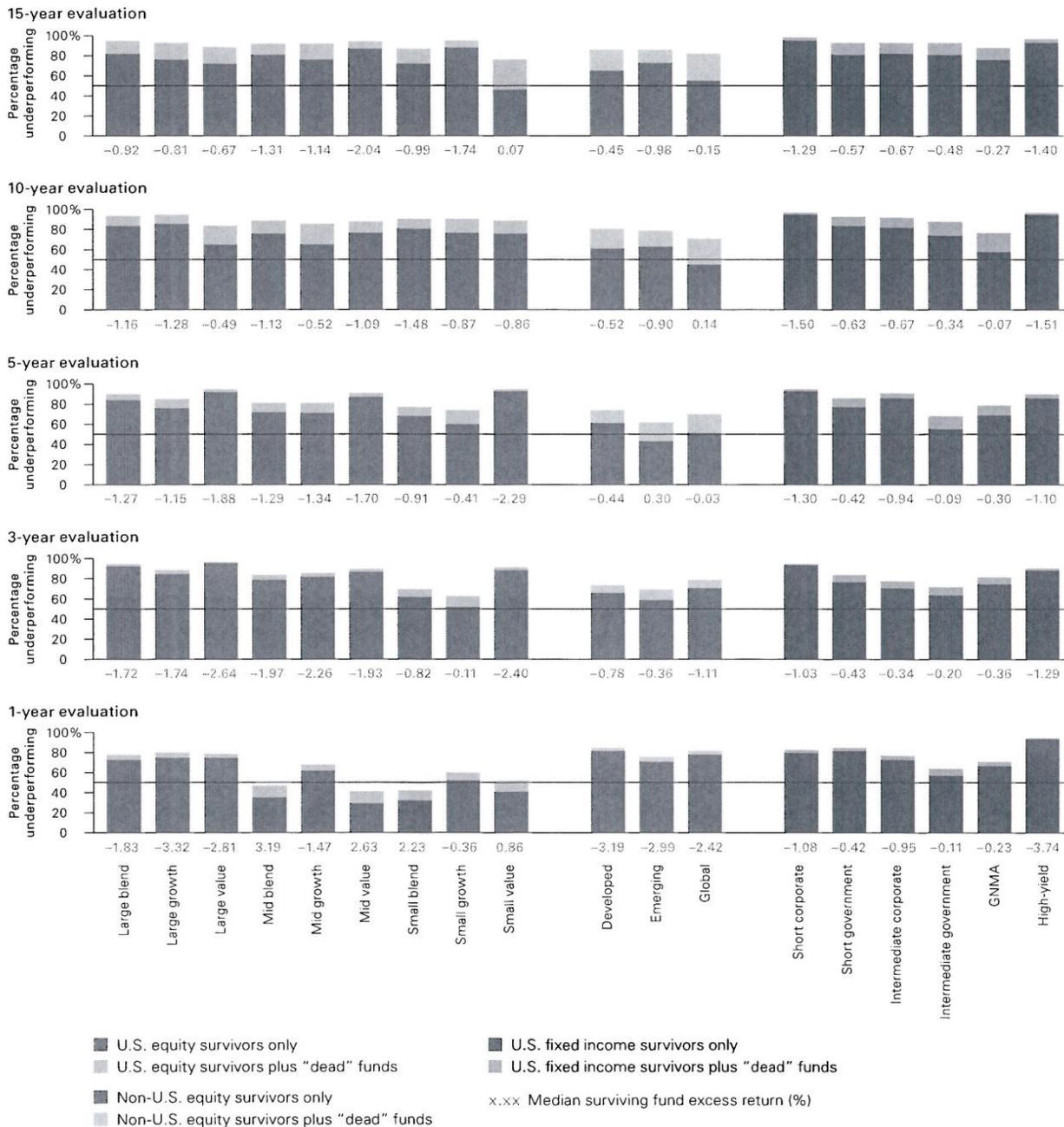
Notes: Data reflect periods ended December 31, 2016. Fund classifications provided by Morningstar; benchmarks reflect those identified in each fund's prospectus. "Dead" funds are those that were merged or liquidated during the period.

Sources: Vanguard calculations, using data from Morningstar, Inc.

(Continued on page 12)

Figure 7 (Continued). Percentage of actively managed mutual funds that underperformed versus their benchmarks: Periods ended December 31, 2016

b. Versus representative 'style benchmark'



Notes: Past performance is no guarantee of future results. Benchmark comparative indexes represent unmanaged or average returns on various financial assets, which can be compared with funds' total returns for the purpose of measuring relative performance. Data reflect periods ended December 31, 2016. "Dead" funds are those that were merged or liquidated during the period.

Sources: Vanguard calculations, using data from Morningstar, Inc., MSCI, CRSP, Standard & Poor's, and Barclays. Fund classifications provided by Morningstar. See appendix for list of benchmarks.

Mutual funds are not the entire market

Another factor that can complicate the analysis of real-world results is that mutual funds, which are used as a proxy for the market in most studies (including this one), do not represent the entire market and therefore do not capture the entire zero-sum game. Mutual funds are typically used in financial market research because their data tend to be readily available and because, in many markets, mutual fund assets represent a reasonable sampling of the overall market. It is important to note, however, that mutual funds are merely a market *sampling*. In cases where mutual funds constitute a relatively smaller portion of the market being examined, the sample size studied will be that much smaller, and the results more likely to be skewed. Depending on the direction of the skew, this could lead to either a less favorable or a more favorable result for active managers overall.

Portfolio exposures can make relative performance more difficult to measure

Differences in portfolio exposures versus a benchmark or broader market can also make relative performance difficult to measure. Benchmarks are selected by fund managers on an *ex ante* basis, and do not always reflect the style in which the portfolio is actually managed. For example, during a period in which small- and mid-cap equities are outperforming, a large-cap manager may hold some of these stocks in the portfolio to increase returns (Thatcher, 2009). Similarly, managers may maintain an over/underexposure to certain factors (e.g., size, style, etc.) for the same reason. These portfolio tilts can cause the portfolio to either outperform or underperform when measured against the fund's stated benchmark or the broad market, depending on whether the manager's tilts are in or out of favor during the period being examined. Over a full market or factor cycle, however, we would expect the performance effects of these tilts to cancel out and the zero-sum game to be restored.

Short time periods can understate the advantage of low-cost indexing

Time is an important factor in investing. Transient forces such as market cycles and simple luck can more significantly affect a fund's returns over shorter time periods. These short-term effects can mask the relative benefits of low-cost index funds versus active funds in two main respects: the performance advantage conferred on index funds over the longer term by their generally lower costs; and the lack of persistent outperformance among actively managed funds.

A short reporting period reduces low-cost index funds' performance advantage because the impact of their lower costs compounds over time. For example, a 50-basis-point difference in fees between a low-cost and a higher-cost fund may not greatly affect the funds' performance over the course of a single year; however, that same fee differential compounded over longer time periods can make a significant difference in the two funds' overall performance.

Time also has a significant impact on the application of the zero-sum game. In any given year, the zero-sum game states that there will be some population of funds that outperforms the market. As the time period examined becomes longer, however, the effects of luck and market cyclicity tend to cancel out, reducing the number of funds that outperform. Market cyclicity is an important factor in the lack of persistent outperformance as investment styles and market sectors go in and out of favor, as noted earlier.

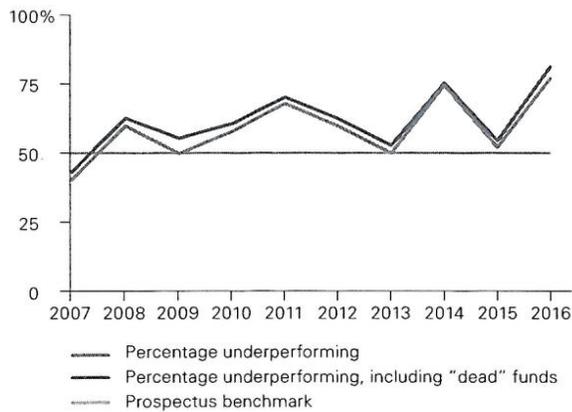
This concept is illustrated in Figure 8, which compares the performance of domestic funds over rolling one- and ten-year periods to that of their benchmarks. As the figure shows, active funds were much less likely to outperform over longer periods compared with shorter periods; this was especially true when merged and liquidated funds were included in the analysis. Thus, as the time period examined became longer, the population of funds that consistently outperformed tended to shrink, ultimately becoming very small.

Low-cost indexing—a simple solution

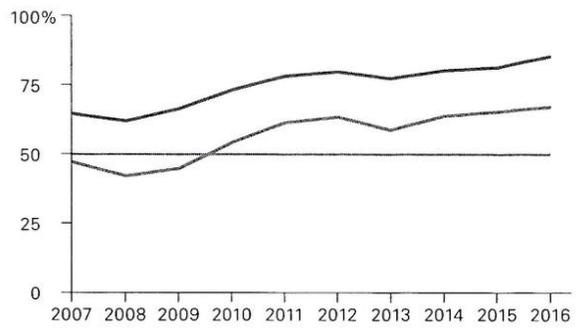
One of the simplest ways for investors to gain market exposure with minimal costs is through a low-cost index fund or ETF. Index funds seek to provide exposure to a broad market or a segment of the market through varying degrees of index replication ranging from full replication (in which every security in the index is held) to synthetic replication (in which index exposure is obtained through the use of derivatives). Regardless of the replication

Figure 8. Percentage of active U.S. equity funds underperforming over rolling periods versus prospectus benchmarks

a. One-year periods



b. Ten-year periods



Notes: Past performance is no guarantee of future results. Performance is calculated relative to prospectus benchmark. "Dead" funds are those that were merged or liquidated during the period.

Sources: Vanguard calculations, using data from Morningstar, Inc.

method used, all index funds seek to track the target market as closely as possible and, by extension, to provide market returns to investors. This is an important point and is why index funds, in general, are able to offer investors market exposure at minimal cost. Index funds do not attempt to outperform their market, as many active managers do. As such, index funds do not require the significant investment of resources necessary to find and capitalize on opportunities for outperformance (such as research, increased trading costs, etc.) and therefore do not need to pass those costs onto their investors.

By avoiding these costs, index funds are generally able to offer broad market exposure, with market returns at very low cost relative to the cost of most actively managed funds. Furthermore, because index funds do not seek to outperform the market, they also do not face the challenges of either persistent outperformance or of beating the zero-sum game. In short, by accepting market returns while keeping costs low, low-cost index funds lower the hurdles that make successful active management so difficult over the long term.

Although we believe that low-cost index funds offer most investors their best chance at maximizing fund returns over the long run, we acknowledge that some investors want or need to pursue an active strategy. For example, investors in some markets may have few low-cost, domestic index funds available to them. For those investors, or any investor choosing an active strategy, low-cost, broadly diversified actively managed funds can serve as a viable alternative to index funds, and in some cases may prove superior to higher-cost index funds; keep in mind that the performance advantage conferred by low-cost funds is quickly eroded as costs increase.

Conclusion

Since its inception, low-cost index investing has proven to be a successful investment strategy over the long term, and has become increasingly popular with investors globally. This paper has reviewed the conceptual and theoretical underpinnings of index investing and has discussed why we expect the strategy to continue to be successful, and to continue to gain in popularity, in the foreseeable future.

The zero-sum game, combined with the drag of costs on performance and the lack of persistent outperformance, creates a high hurdle for active managers in their attempts to outperform the market. This hurdle grows over time and can become insurmountable for the vast majority of active managers. However, as we have discussed, circumstances exist that may make the case for low-cost indexing seem less or more compelling in various situations.

This is not to say that a bright line necessarily exists between actively managed funds and index funds. For investors who wish to use active management, either because of a desire to outperform or because of a lack of low-cost index funds in their market, many of the benefits of low-cost indexing can be achieved by selecting low-cost, broadly diversified active managers. However, the difficult task of finding a manager who consistently outperforms, combined with the uncertainty that active management can introduce into the portfolio, means that, for most investors, we believe the best chance of successfully investing over the long term lies in low-cost, broadly diversified index funds.

References

- Carhart, Mark M., 1997. On Persistence in Mutual Fund Performance. *Journal of Finance* 52(1): 57–82.
- Chow, Tzee-man, Jason Hsu, Vitali Kalesnik, and Bryce Little, 2011. A Survey of Alternative Equity Index Strategies. *Financial Analysts Journal* 67 (5, Sept./Oct.): 37–57.
- Fama, Eugene F., and Kenneth R. French, 1993. Common Risk Factors in the Returns on Stocks and Bonds. *Journal of Financial Economics* 33(1): 3–56.
- Fama, Eugene F., and Kenneth R. French, 2010. Luck Versus Skill in the Cross-Section of Mutual Fund Returns. *Journal of Finance* 65(5): 1915–47.
- Financial Research Corporation, 2002. *Predicting Mutual Fund Performance II: After the Bear*. Boston: Financial Research Corporation.
- Jensen, Michael C., 1968. The Performance of Mutual Funds in the Period 1945–1964. Papers and Proceedings of the Twenty-Sixth Annual Meeting of the American Finance Association. Washington, D.C., December 28–30, 1967. Also in *Journal of Finance* 23(2): 389–416.
- Kinnel, Russel, 2010. How Expense Ratios and Star Ratings Predict Success (Aug. 9); available at <http://news.morningstar.com/articlenet/article.aspx?id=347327>.
- Pappas, Scott N., and Joel M. Dickson, 2015 *Factor-Based Investing*. Valley Forge, Pa.: The Vanguard Group.
- Rowley Jr., James J. and David T. Kwon, 2015. The Ins and Outs of Index Tracking. *Journal of Portfolio Management* 41(3): 35–45.
- S&P Dow Jones Indices, 2015. SPIVA U.S. Scorecard (Mid-Year 2015); available at spiva-us-midyear-2015.pdf.
- Schlanger, Todd, and Christopher B. Phillips, 2013. *The Mutual Fund Graveyard: An Analysis of Closed Funds*. Valley Forge, Pa.: The Vanguard Group.
- Sharpe, William F., 1966. Mutual Fund Performance. *Journal of Business* 39 (1, Part 2: Supplement on Security Prices): 119–38.
- Sharpe, William F., 1991. The Arithmetic of Active Management. *Financial Analysts Journal* 47(1): 7–9.
- Thatcher, William R., 2009. When Indexing Works and When It Doesn't in U.S. Equities: The Purity Hypothesis. *Journal of Investing* 18(3): 8–11.
- Waring, M. Barton, and Laurence B. Siegel, 2005. Debunking Some Myths of Active Management. *Journal of Investing* (Summer): 20–28.

Additional selected Vanguard research
on active and index investing

Low-cost: *A key factor in improving probability of outperformance in active management. A rigorous qualitative manager-selection process is also crucial.*

Daniel W. Wallick, Brian R. Wimmer, and James Balsamo, 2015. *Keys to Improving the Odds of Active Management Success*. Valley Forge, Pa.: The Vanguard Group.

Balsamo, James, Daniel W. Wallick, and Brian R. Wimmer, 2015. *Shopping for Alpha: You Get What You Don't Pay For*. Valley Forge, Pa.: The Vanguard Group.

Factor investing: *The excess return of smart beta and other rules-based active strategies can be partly (or largely) explained by a manager's time-varying exposures to various risk factors.*

Christopher B. Phillips, Donald G. Bennyhoff, Francis M. Kinniry Jr., Todd Schlanger, and Paul Chin, 2015. *An Evaluation of Smart Beta and Other Rules-Based Active Strategies*. Valley Forge, Pa.: The Vanguard Group.

Benchmark mismatch: *A manager's exposure to market-risk factors outside the benchmark may explain outperformance more than individual skill in stock selection.*

Hirt, Joshua M., Ravi G. Tolani, and Christopher B. Phillips, 2015. *Global Equity Benchmarks: Are Prospectus Benchmarks the Correct Barometer?* Valley Forge, Pa.: The Vanguard Group.

When the case for indexing can seem less or more compelling: *Despite the theory and publicized long-term success of indexed investment strategies, criticisms and misconceptions remain.*

Hirt, Joshua M., and Christopher B. Phillips, 2014. *Debunking Some Myths and Misconceptions About Indexing*. Valley Forge, Pa.: The Vanguard Group.

Active versus index debate: *Examining the debate from the perspective of market cyclicalities and the changing nature of performance leadership.*

Phillips, Christopher B., Francis M. Kinniry Jr., and David J. Walker, 2014. *The Active-Passive Debate: Market Cyclicalities and Leadership Volatility*. Valley Forge, Pa.: The Vanguard Group.

Appendix. Benchmarks represented in this analysis

Equity benchmarks are represented by the following indexes—Large blend: MSCI US Prime Market 750 Index through January 30, 2013, CRSP US Large Cap Index thereafter; Large growth: S&P 500/Barra Growth Index through May 16, 2003, MSCI US Prime Market Growth Index through April 16, 2013, CRSP US Large Cap Growth Index thereafter; Large value: S&P 500/Barra Value Index through May 16, 2003, MSCI US Prime Market Value Index through April 16, 2013, CRSP US Large Cap Value Index thereafter; Mid blend: S&P MidCap 400 Index through May 16, 2003, MSCI US Mid Cap 450 Index through January 30, 2013, CRSP US Mid Cap Index thereafter; Mid growth: MSCI US Mid Cap Growth Index through April 16, 2013, CRSP US Mid Cap Growth Index thereafter; Mid value: MSCI US Mid Cap Value Index through April 16, 2013, CRSP US Mid Cap Value Index thereafter; Small blend: Russell 2000 Index through May 16, 2003, MSCI US Small Cap 1750 Index through January 30, 2013, CRSP US Small Cap Index thereafter;

Small growth: S&P SmallCap 600/Barra Growth Index through May 16, 2003, MSCI US Small Cap Growth Index through April 16, 2013, CRSP US Small Cap Growth Index thereafter; Small value: S&P SmallCap 600/Barra Value Index through May 16, 2003, MSCI US Small Cap Value Index through April 16, 2013, CRSP US Small Cap Value Index thereafter. Bond benchmarks are represented by the following Barclays indexes: U.S. 1–5 Year Government Bond Index, U.S. 1–5 Year Corporate Bond Index, U.S. Intermediate Government Bond Index, U.S. Intermediate Corporate Bond Index, U.S. GNMA Bond Index, U.S. Corporate High Yield Bond Index. International and global benchmarks are represented by the following indexes: Global—Total International Composite Index through August 31, 2006, MSCI EAFE + Emerging Markets Index through December 15, 2010, MSCI ACWI ex USA IMI Index through June 2, 2013, FTSE Global All Cap ex US Index thereafter; Developed—MSCI World ex USA Index; Emerging markets—MSCI Emerging Markets Index.

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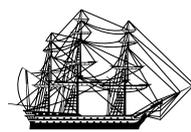
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Can active funds deliver persistent performance?

Adviser brief

December 2012

Advocates of active management aim to identify the minority of funds that consistently outperform after charges. Indeed, one of the key *raison d'être* of active management is the supposed ability to position portfolios optimally for the prevailing market conditions.

It all sounds very appealing in theory, but the unpredictable nature of markets, together with the costs involved in trading, mean that the reality doesn't always match up to the theory.

In this briefing we examine the track records of active managers to find out how many have delivered the holy grail of persistent outperformance.

We look at the data from two different perspectives:

- First, we try to establish how likely it is that an outperforming fund over one period will repeat that performance in the next period.
- And second, we look at market cycles to see how many funds succeed in beating the market in both bull and bear phases.

We also examine the lack of persistency among asset classes to illustrate the difficulty of timing asset allocation moves correctly.

We conclude that it is difficult for advisers to add value by selecting funds or timing markets. With this conclusion in mind, advisers may prefer to focus on identifying the correct long-term asset allocation for their clients and implementing the agreed weightings via low-cost funds.

This document is directed at professional investors only and should not be distributed to, or relied upon by, retail investors. Past performance is not a reliable indicator of future results. The value of investments, and the income from them, may fall or rise and investors may get back less than they invested.

Tomorrow never knows – how will today’s top performers fare in the future?

To assess the performance consistency of active managers we examined the UK equity fund universe over five years to the end of 2006 and split the results into quintiles. So the top-performing 20% of funds formed the first quintile, the next 20% constituted the second and so on. We then ran the same report over the subsequent five years, to the end of 2011, to see whether there was any read-across from one period to the next. The results are summarised in Figure 1 below.

If we ascribe equal probability to a fund ending up in each of the five quintiles or being

closed down during the subsequent period, a random result would see approximately 17% of funds in each cell of the table. In fact, 15.6% of the top-performing funds from the first period repeated that performance in the second – slightly lower than the random result you would expect to see

More worryingly, 23.4% of top-performing funds ended up in the bottom group in the second period, with an identical percentage closing down. In other words, more of the top-performing funds from the first period moved to the bottom 20% over the second period than maintained their status in the top group. And nearly three times as many dropped to the bottom quintile or were closed down.

Figure 1. Rank persistence of UK equity funds

Quintile	# of funds	Risk-adj return rank 5-year ending	Quintile rank in subsequent non-overlapping five-year period (% of funds) ending Dec 2011						Total
			Highest quintile	High	Medium	Low	Lowest quintile	Missing	
1	77	Highest quintile (1)	15.6%	14.3%	10.4%	13.0%	23.4%	23.4%	100.0%
2	73	High (2)	19.2%	8.2%	16.4%	12.3%	9.6%	34.2%	100.0%
3	80	Medium (3)	12.5%	15.0%	18.8%	18.8%	8.8%	26.3%	100.0%
4	76	Low (4)	15.8%	22.4%	6.6%	19.7%	9.2%	26.3%	100.0%
5	78	Lowest quintile (5)	3.8%	10.3%	11.5%	16.7%	17.9%	39.7%	100.0%

Sources: The Vanguard Group, Inc. and Morningstar.

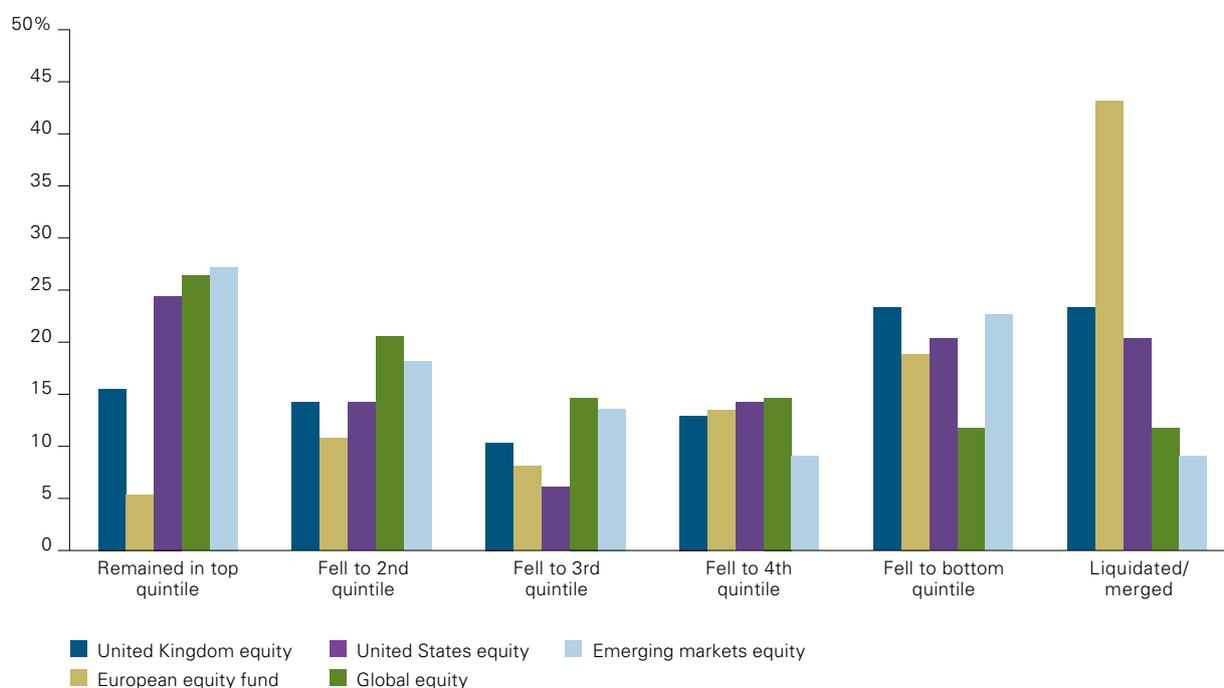
Notes: The far left column ranks all active UK equity funds based on their risk-adjusted returns relative to their peer group (Morningstar category) during the five-year period as at the date listed. Each quintile includes the funds within that quintile from each of the UK Morningstar categories. The remaining columns show how these quintiles performed over the next five years. Basis of performance calculation is net of fees, income reinvested, closing NAV prices.

Once a bad fund, always a bad fund?

Looking at the other end of the scale, it is interesting to note that past performance appears to be more useful in predicting the future for the bottom-performing funds. Fully 57.6% of funds in the bottom quintile in the first period either remained there or dropped out of the universe during the second period. And, rather disappointingly, only 3.8% managed to bounce back to appear in the top quintile in the second period.

Figure 1 concentrates on UK equities but the data suggests that performance persistency is similarly low among other asset classes. Figure 2 illustrates the record of top-performing funds in a range of sectors over the same initial period and how these funds performed in the subsequent five years. It supports the view that picking a top performer in one period is unlikely to be an effective way of securing future success.

Figure 2. Rank persistence of top-quintile funds in a range of asset classes



Sources: The Vanguard Group, Inc. and Morningstar

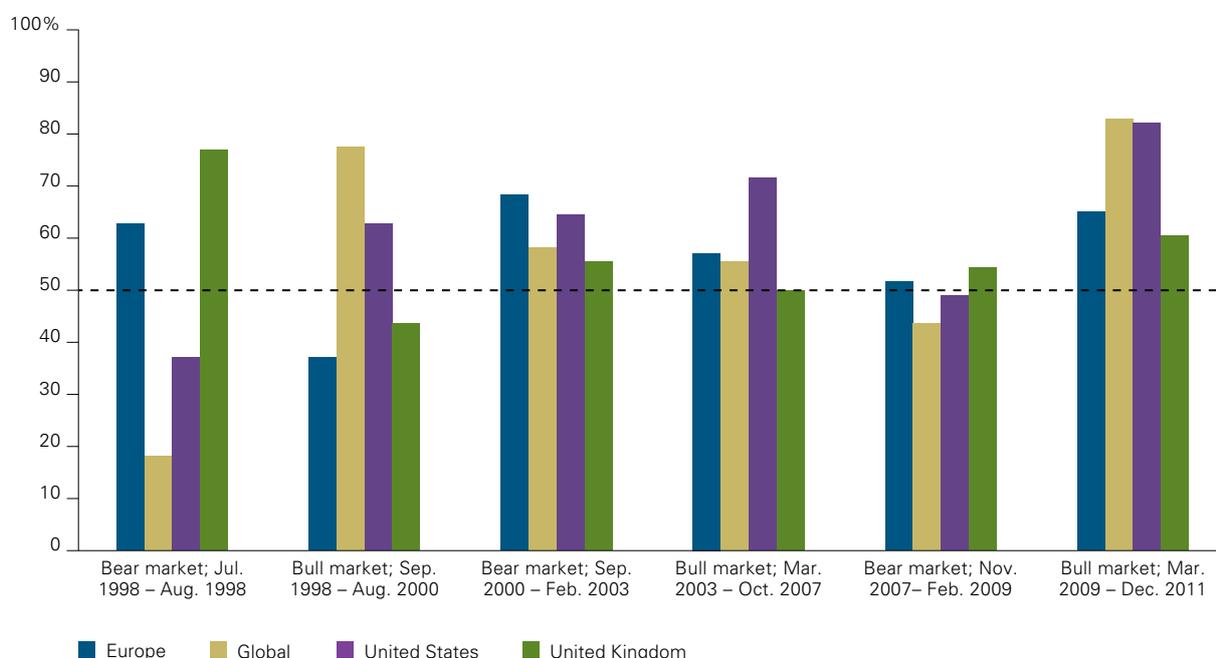
Ranks the performance of those active UK equity fund that were top-quintile performers over the five-year period to 31 December 2006 over the following five-year period ending 31 December 2011. Results are based on their risk-adjusted excess returns relative to their Morningstar category peer group. There were 567 total funds, 117 of which fell into the top risk-adjusted return quintile as of 2006. Basis of performance calculation is net of fees, income reinvested, closing NAV prices.

A fund for all seasons?

A common complaint about index funds is that they fail to take evasive action in bear market conditions and that they can't maximise performance in bull markets. Active funds, the argument goes, are far better at sheltering investor assets in cash or defensive sectors when the markets are going down. They should also be better placed to take a more aggressive stance when 'animal spirits' are high. So, do the figures back this up?

The short answer is no. Figure 3 shows the percentage of funds by sector that underperformed their respective benchmarks in a range of bull and bear markets. We would expect more than 50% of funds to underperform on average at any time as a result of the zero-sum game¹ and the effect of costs. This is precisely the result that comes out in Figure 3.

Figure 3. Percentage of active managers underperforming market during bull and bear cycles



Sources: The Vanguard Group, Inc. calculations, using data from Morningstar, Inc., and Dow Jones.

¹ For more information, see the Vanguard Adviser Briefing "Investing as a Zero-Sum Game", November 2012

Of course, there are some periods when active funds do well. Global funds in the 1998 bear market, for example, delivered strong relative performance against their benchmarks. However, their performance in the next bear market, from 2000 to 2003, was less impressive. And their record in all three bull markets covered has been lacklustre at best, with two of them seeing around 80% underperforming.

US equity funds also performed well in the first, brief bear market covered on the chart. However, active US managers failed to repeat this achievement in the subsequent three bull markets and only snuck below 50% in one of the two subsequent bear phases. It is a similar picture across the other sectors. The conclusion is that, for all the theoretical advantages of active fund flexibility, in general there is no systematic tendency for them to do better at particular stages of the cycle.

The myth of flexibility

The reason is that adding value by making big stylistic shifts relies on timing. And, in reality, few managers succeed in timing major turning points effectively. Thresholds between up and down markets are often marked by heightened volatility and uncertainty, which means that mistiming a portfolio shift even slightly can have a significant impact on returns.

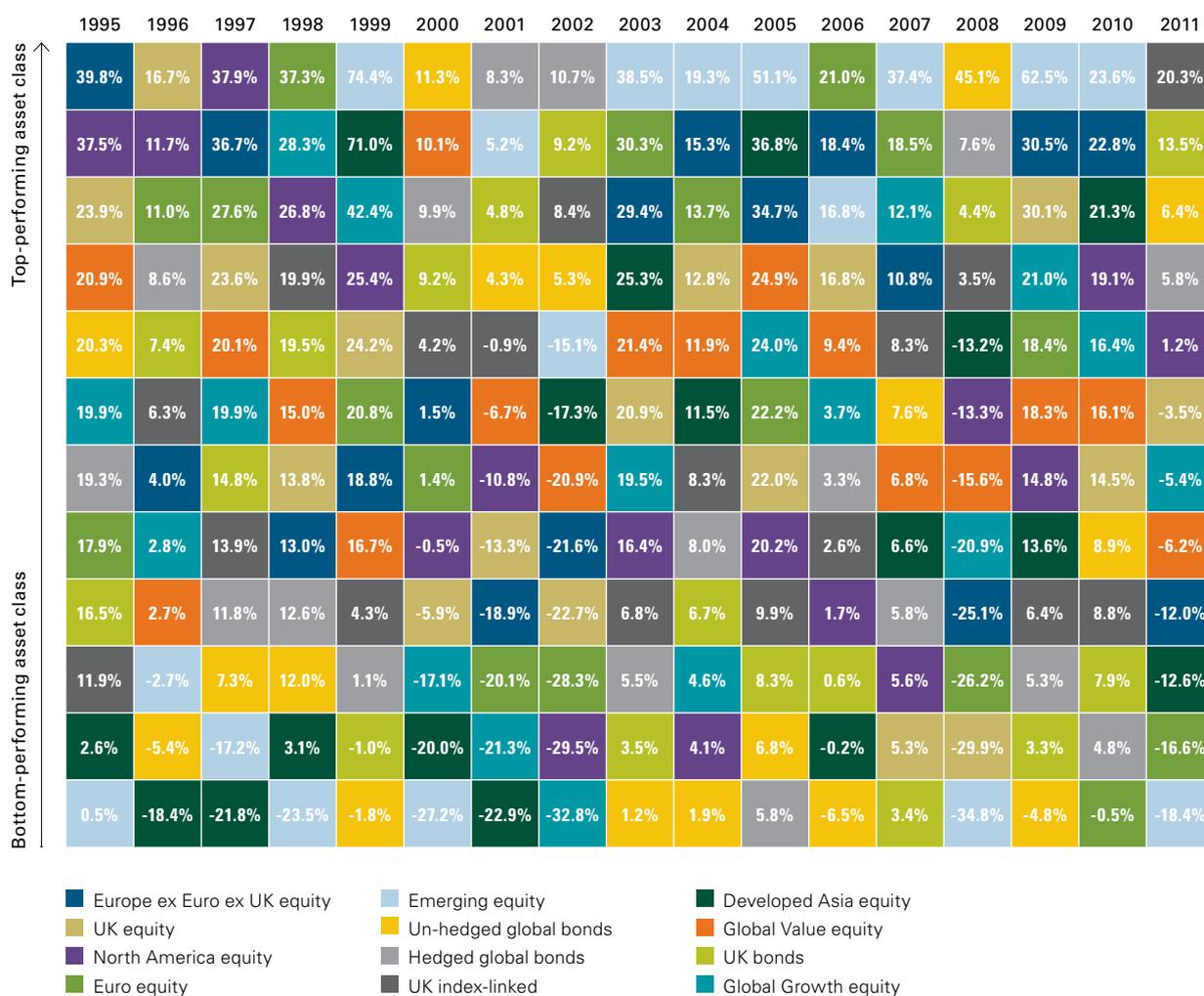
Meanwhile, for a move into or out of cash and defensives to add value, the performance benefit needs to outweigh the cost of trading. Finally, of course, even if a move is carried out in a timely and cost-effective way, success still depends upon good stock selection in bull and bear phases. All too often, active managers fail to clear one or more of these hurdles.

Shifting between assets – a recipe for disappointment

If you believe you can move into and out of different asset classes at the right time to maximise investor returns, take a look at Figure 4 below. It shows the performance of various asset

classes over the past 17 years. You can see that persistence among asset classes is just as fleeting as outperformance from active funds. For example, if you bought into emerging market equities in 2007 following a period of strong returns, you would have been disappointed to see the asset class fall to the bottom of the rankings in 2008 and 2011.

Figure 4. Performance persistency by asset class



Source: Thomson Reuters Datastream.

UK equity defined as the FTSE All Share Index, Euro Equity defined as the FTSE Eurobloc Index, Europe ex Euro ex UK equity defined as the FTSE Europe ex Eurobloc ex UK Index, Developed Asia equity defined as the FTSE Developed Asia Pacific Index, North America equity defined as the FTSE North America Index, Emerging equity defined as the FTSE Emerging Index, Growth and Value equities are defined as the FTSE World Growth and FTSE World Value Indices. UK Bonds are defined as the Citi WGBI UK Index from 1994–1998 and the Barclays Sterling Aggregate from 1999–2011. Hedged and unhedged global bonds are defined as the Barclays Global Aggregate. UK index-linked is defined as the Barclays UK Inflation Linked Index. Returns are denominated in sterling and include reinvested dividends and interest.

Conclusion

We've looked at active funds in detail to assess the persistency of their performance. Our key findings are:

- Past performance is not a guide to the future. Top-performing UK equity funds in one period are more likely to end up at the bottom of the tables in the next period, or to drop out of the peer group altogether, than to continue to outperform strongly. And, looking at a broader range of asset classes, relative performance in one period is a poor predictor of the future
- The cycle doesn't affect the results. Active funds are no more likely to outperform in bear markets than they are in bull phases. In fact, in both types of market a disappointingly high proportion of active funds underperform. The myth of active managers being better than index funds at capturing the mood of the market is just that: a myth.

We've also looked at asset class performance from one year to the next, finding that persistency between different classes of investment is weak.

Taking these findings into account, we conclude that it is very difficult to select an actively managed fund that outperforms consistently over the long term. Similarly, the unpredictable nature of markets makes it hard to time asset allocation changes.

Advisers may therefore find it easier to add value for their clients by concentrating on lifestyle coaching and setting a long-term asset allocation model, implementing the required allocation via low-cost passive funds.

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SPIVA[®] U.S. Scorecard

SUMMARY

- The first half of 2016 saw global markets end in the red, largely in part due to Brexit and market uncertainty. The U.S. equity market posted modest gains across all cap ranges, with the [S&P 500[®]](#) posting 3.84% YTD and 3.99% year-over-year as of June 30, 2016.
- During the one-year period, 84.62% of large-cap managers, 87.89% of mid-cap managers, and 88.77% of small-cap managers underperformed the S&P 500, the [S&P MidCap 400[®]](#), and the [S&P SmallCap 600[®]](#), respectively.
- The figures are equally unfavorable when viewed over longer-term investment horizons. Over the five-year period, 91.91% of large-cap managers, 87.87% of mid-cap managers, and 97.58% of small-cap managers lagged their respective benchmarks.
- Similarly, over the 10-year investment horizon, 85.36% of large-cap managers, 91.27% of mid-cap managers, and 90.75% of small-cap managers failed to outperform on a relative basis.
- Over the 12-month period ending June 30, 2016, value managers across all three market cap ranges fared better than their core and growth counterparts. Data shows that only 1 out of 10 large-cap, mid-cap, and small-cap growth managers outperformed their respective benchmarks.
- Across nine U.S. style categories, large-cap value managers performed the best over the 10-year horizon, with 32% of managers outperforming the benchmark, the [S&P 500 Value](#).
- The headline international equity and emerging market equity indices rebounded sharply during the first half of 2016. The gains, however, were not sufficient to erase the losses sustained in 2015. Over the one-year period ending June 30, 2016, the headline international and emerging market indices posted negative returns.
- During the same one-year period, with the exception of actively managed emerging markets funds, the majority of managers investing in global equities, international, and international small-cap equities underperformed their respective benchmarks.

- Over the 10-year investment horizon, managers across all international equity categories underperformed their benchmarks.
- The hunt for yield has become increasingly challenging for fixed income managers. During the one-year period studied, the majority of managers investing in government and corporate credit bond categories underperformed their benchmarks, with the exception of those managing intermediate-term corporate credit funds.
- The high-yield bond market recovered during the first half of 2016. Rebounds in the commodity sectors contributed to the rally, with spreads tightening considerably. During the one-year period, three-quarters of actively managed high-yield bonds failed to deliver higher returns than the benchmark. This marks a sharp reversal of fortune for high-yield funds from results seen at year-end 2015, when the majority of the funds beat the benchmark.
- Strength in the high-yield bond market also extended to the leverage loan sector. The [S&P/LSTA U.S. Leveraged Loan 100 Index](#) posted a gain of 5.36% YTD and 0.69% year-over-year as of June 30, 2016. Actively managed senior loan funds fared favorably over the one-year period, with nearly 60% of the funds outperforming the benchmark.
- Funds disappear at a meaningful rate. Over the five-year period, nearly 21% of domestic equity funds, 21% of global/international equity funds, and 14% of fixed income funds were merged or liquidated. This finding highlights the importance of addressing survivorship bias in mutual fund analysis.

A UNIQUE SCORECARD FOR THE ACTIVE VERSUS PASSIVE DEBATE

There is nothing novel about the index versus active debate. It has been a contentious subject for decades, and there are few strong believers on both sides, with the vast majority of market participants falling somewhere in between. Since its first publication 14 years ago, the SPIVA Scorecard has served as the de facto scorekeeper of the active versus passive debate. For more than a decade, we have heard passionate arguments from believers in both camps when headline numbers have deviated from their beliefs.

Beyond the SPIVA Scorecard's widely cited headline numbers is a rich data set that addresses issues related to measurement techniques, universe composition, and fund survivorship that are far less frequently discussed, but are often far more fascinating. These data sets are rooted in the following fundamental principles of the SPIVA Scorecard, with which regular readers will be familiar.

- **Survivorship Bias Correction:** Many funds might be liquidated or merged during a period of study. However, for someone making an investment decision at the beginning of the period, these funds are part of the opportunity set. Unlike other commonly available comparison reports, SPIVA Scorecards account for the entire opportunity set—not just the survivors—thereby eliminating survivorship bias.
- **Apples-to-Apples Comparison:** Fund returns are often compared to popular benchmarks such as the [S&P 500](#), regardless of size or style classification. SPIVA Scorecards avoid this pitfall by measuring a fund's returns against the returns of a benchmark appropriate for that particular investment category.
- **Asset-Weighted Returns:** Average returns for a fund group are often calculated using only equal weighting, which results in the returns of a USD 10 billion fund affecting the average in the same manner as the returns of a USD 10 million fund. An accurate representation of how market participants fared in a particular period can be ascertained by calculating weighted average returns where each fund's return is weighted by net assets. SPIVA Scorecards show both equal- and asset-weighted averages.
- **Style Consistency:** SPIVA Scorecards measure style consistency for each style category across different time horizons. Style consistency is an important metric because style drift (the tendency of funds to diverge from their initial investment categorization) can have an impact on asset allocation decisions.
- **Data Cleaning:** SPIVA Scorecards avoid double counting multiple share classes in all count-based calculations, using only the share class with greater assets. Since this is meant to be a scorecard for active managers, index funds, leveraged and inverse funds, and other index-linked products are excluded.

REPORTS

Report 1: Percentage of U.S. Equity Funds Outperformed by Benchmarks

FUND CATEGORY	COMPARISON INDEX	ONE-YEAR (%)	THREE-YEAR (%)	FIVE-YEAR (%)	TEN-YEAR (%)
All Domestic Equity Funds	S&P Composite 1500	90.20	87.41	94.58	87.47
All Large-Cap Funds	S&P 500	84.62	81.31	91.91	85.36
All Mid-Cap Funds	S&P MidCap 400	87.89	83.81	87.87	91.27
All Small-Cap Funds	S&P SmallCap 600	88.77	94.07	97.58	90.75
All Multi-Cap Funds	S&P Composite 1500	91.61	86.13	94.71	90.29
Large-Cap Growth Funds	S&P 500 Growth	95.10	90.32	97.38	98.59
Large-Cap Core Funds	S&P 500	81.25	87.76	92.16	88.21
Large-Cap Value Funds	S&P 500 Value	77.04	82.44	88.78	67.76
Mid-Cap Growth Funds	S&P MidCap 400 Growth	95.56	81.14	88.04	95.21
Mid-Cap Core Funds	S&P MidCap 400	82.48	84.96	87.68	92.31
Mid-Cap Value Funds	S&P MidCap 400 Value	77.78	85.33	81.71	87.21
Small-Cap Growth Funds	S&P SmallCap 600 Growth	90.09	95.26	96.85	94.53
Small-Cap Core Funds	S&P SmallCap 600	90.78	95.56	97.89	89.77
Small-Cap Value Funds	S&P SmallCap 600 Value	83.94	92.06	98.21	90.22
Multi-Cap Growth Funds	S&P Composite 1500 Growth	96.04	92.27	99.06	92.41
Multi-Cap Core Funds	S&P Composite 1500	91.16	93.21	93.37	89.33
Multi-Cap Value Funds	S&P Composite 1500 Value	83.87	77.97	87.50	80.92
Real Estate Funds	S&P US Real Estate Investment Trust	90.53	67.74	89.11	89.16

Source: S&P Dow Jones Indices LLC, CRSP. Data as of June 30, 2016. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 2: Survivorship and Style Consistency of U.S. Equity Funds

FUND CATEGORY	NO. OF FUNDS AT START	SURVIVORSHIP (%)	STYLE CONSISTENCY (%)
ONE-YEAR			
All Domestic Funds	2662	95.34	95.19
All Large-Cap Funds	1009	95.44	90.88
All Mid-Cap Funds	382	95.03	87.17
All Small-Cap Funds	644	94.88	93.79
All Multi-Cap Funds	627	95.85	86.76
Large-Cap Growth Funds	290	95.52	87.93
Large-Cap Blend Funds	337	96.74	89.61
Large-Cap Value Funds	382	94.24	86.39
Mid-Cap Growth Funds	181	95.58	81.77
Mid-Cap Blend Funds	137	93.43	81.75
Mid-Cap Value Funds	64	96.88	79.69
Small-Cap Growth Funds	223	94.17	89.24
Small-Cap Blend Funds	283	96.47	90.11
Small-Cap Value Funds	138	92.75	82.61

Source: S&P Dow Jones Indices LLC, CRSP. Data as of June 30, 2016. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 2: Survivorship and Style Consistency of U.S. Equity Funds (cont.)			
FUND CATEGORY	NO. OF FUNDS AT START	SURVIVORSHIP (%)	STYLE CONSISTENCY (%)
ONE-YEAR			
Multi-Cap Growth Funds	203	95.57	86.21
Multi-Cap Core Funds	300	97.00	81.33
Multi-Cap Value Funds	124	93.55	81.45
Real Estate Funds	96	98.96	97.92
THREE-YEAR			
All Domestic Funds	2692	89.23	86.33
All Large-Cap Funds	1044	88.41	77.78
All Mid-Cap Funds	385	88.31	73.51
All Small-Cap Funds	609	89.98	87.68
All Multi-Cap Funds	654	90.37	65.14
Large-Cap Growth Funds	314	86.62	74.52
Large-Cap Blend Funds	392	87.76	68.11
Large-Cap Value Funds	338	90.83	79.59
Mid-Cap Growth Funds	176	86.93	68.75
Mid-Cap Blend Funds	133	86.47	60.90
Mid-Cap Value Funds	76	94.74	59.21
Small-Cap Growth Funds	212	88.21	82.08
Small-Cap Blend Funds	271	91.51	76.75
Small-Cap Value Funds	126	89.68	69.05
Multi-Cap Growth Funds	208	89.42	62.50
Multi-Cap Core Funds	326	91.72	54.91
Multi-Cap Value Funds	120	88.33	61.67
Real Estate Funds	94	93.62	91.49
FIVE-YEAR			
All Domestic Funds	2826	78.95	75.02
All Large-Cap Funds	1069	78.11	64.64
All Mid-Cap Funds	408	79.17	57.84
All Small-Cap Funds	622	81.83	77.65
All Multi-Cap Funds	727	77.58	46.49
Large-Cap Growth Funds	346	76.59	61.85
Large-Cap Blend Funds	408	77.70	53.92
Large-Cap Value Funds	315	80.32	62.86
Mid-Cap Growth Funds	186	77.96	56.99
Mid-Cap Blend Funds	139	76.98	44.60
Mid-Cap Value Funds	83	85.54	34.94
Small-Cap Growth Funds	223	76.23	67.26
Small-Cap Blend Funds	286	83.92	60.84
Small-Cap Value Funds	113	87.61	59.29

Source: S&P Dow Jones Indices LLC, CRSP. Data as of June 30, 2016. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 2: Survivorship and Style Consistency of U.S. Equity Funds (cont.)

FUND CATEGORY	NO. OF FUNDS AT START	SURVIVORSHIP (%)	STYLE CONSISTENCY (%)
FIVE-YEAR			
Multi-Cap Growth Funds	214	73.83	41.12
Multi-Cap Core Funds	383	80.68	34.20
Multi-Cap Value Funds	130	74.62	35.38
Real Estate Funds	101	94.06	79.21
TEN-YEAR			
All Domestic Funds	2195	57.04	53.30
All Large-Cap Funds	690	54.35	43.33
All Mid-Cap Funds	378	57.67	37.30
All Small-Cap Funds	508	60.83	56.30
All Multi-Cap Funds	619	56.54	28.43
Large-Cap Growth Funds	213	46.95	34.74
Large-Cap Core Funds	263	54.75	36.12
Large-Cap Value Funds	214	61.21	43.46
Mid-Cap Growth Funds	188	47.34	30.32
Mid-Cap Core Funds	104	61.54	26.92
Mid-Cap Value Funds	86	75.58	22.09
Small-Cap Growth Funds	201	52.24	42.79
Small-Cap Core Funds	215	65.12	41.86
Small-Cap Value Funds	92	69.57	33.70
Multi-Cap Growth Funds	146	53.42	24.66
Multi-Cap Core Funds	300	55.67	18.00
Multi-Cap Value Funds	173	60.69	22.54
Real Estate Funds	83	72.29	53.01

Source: S&P Dow Jones Indices LLC, CRSP. Data as of June 30, 2016. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 3: Average U.S. Equity Fund Performance (Equal-Weighted)

CATEGORY	ONE-YEAR (%)	THREE-YEAR (ANNUALIZED %)	FIVE-YEAR (ANNUALIZED %)	TEN-YEAR (ANNUALIZED %)
S&P Composite 1500	3.64	11.52	11.94	7.53
All Domestic Funds	-3.34	8.35	8.69	5.96
S&P 500	3.99	11.66	12.10	7.42
All Large-Cap Funds	-0.38	9.37	9.64	6.06
S&P MidCap 400	1.33	10.53	10.55	8.55
All Mid-Cap Funds	-5.17	8.12	8.07	6.46
S&P SmallCap 600	-0.03	10.23	11.20	7.86
All Small-Cap Funds	-7.21	6.36	7.29	5.58
S&P Composite 1500	3.64	11.52	11.94	7.53
All Multi-Cap Funds	-3.39	8.48	8.59	5.66

Source: S&P Dow Jones Indices LLC, CRSP. Data as of June 30, 2016. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 3: Average U.S. Equity Fund Performance (Equal-Weighted) (cont.)					
CATEGORY	ONE-YEAR (%)	THREE-YEAR (ANNUALIZED %)	FIVE-YEAR (ANNUALIZED %)	TEN-YEAR (ANNUALIZED %)	
LARGE-CAP					
S&P 500 Growth	4.24	13.41	12.92	8.97	
Large-Cap Growth Funds	-1.93	11.08	10.06	6.93	
S&P 500	3.99	11.66	12.10	7.42	
Large-Cap Core Funds	0.37	9.43	9.89	5.95	
S&P 500 Value	3.38	9.66	11.18	5.77	
Large-Cap Value Funds	0.08	7.85	9.03	5.30	
MID-CAP					
S&P MidCap 400 Growth	1.17	10.77	10.07	9.29	
Mid-Cap Growth Funds	-7.12	8.08	7.45	6.39	
S&P MidCap 400	1.33	10.53	10.55	8.55	
Mid-Cap Core Funds	-4.32	7.76	8.06	6.35	
S&P MidCap 400 Value	1.28	10.13	10.96	7.75	
Mid-Cap Value Funds	-2.08	8.50	9.22	6.61	
SMALL-CAP					
S&P SmallCap 600 Growth	-0.63	11.00	11.05	8.63	
Small-Cap Growth Funds	-10.62	6.43	6.83	5.73	
S&P SmallCap 600	-0.03	10.23	11.20	7.86	
Small-Cap Core Funds	-5.79	6.39	7.46	5.44	
S&P SmallCap 600 Value	0.72	9.43	11.36	7.08	
Small-Cap Value Funds	-4.28	5.99	7.71	5.42	
MULTI-CAP					
S&P Composite 1500 Growth	3.84	13.14	12.63	9.01	
Multi-Cap Growth Funds	-4.28	9.88	8.95	6.40	
S&P Composite 1500	3.64	11.52	11.94	7.53	
Multi-Cap Core Funds	-3.10	7.92	8.35	5.52	
S&P Composite 1500 Value	3.10	9.68	11.16	5.98	
Multi-Cap Value Funds	-2.21	7.56	8.56	4.89	
REAL ESTATE					
S&P BMI U.S. REIT	23.71	13.34	12.45	7.27	
Real Estate Funds	18.83	11.83	10.74	6.04	

Source: S&P Dow Jones Indices LLC, CRSP. Data as of June 30, 2016. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 4: Average U.S. Equity Fund Performance (Asset-Weighted)					
CATEGORY	ONE-YEAR (%)	THREE-YEAR (ANNUALIZED %)	FIVE-YEAR (ANNUALIZED %)	TEN-YEAR ANNUALIZED (%)	
S&P Composite 1500	3.64	11.52	11.94	7.53	
All Domestic Funds	-1.11	9.65	9.92	6.61	
S&P 500	3.99	11.66	12.10	7.42	
All Large-Cap Funds	0.73	10.23	10.53	6.38	
S&P MidCap 400	1.33	10.53	10.55	8.55	
All Mid-Cap Funds	-3.83	8.85	8.93	7.22	
S&P SmallCap 600	-0.03	10.23	11.20	7.86	
All Small-Cap Funds	-5.69	6.95	7.97	6.38	
S&P Composite 1500	3.64	11.52	11.94	7.53	
All Multi-Cap Funds	-2.72	9.56	9.60	6.50	
LARGE-CAP					
S&P 500 Growth	4.24	13.41	12.92	8.97	
Large-Cap Growth Funds	-1.13	11.61	10.94	7.21	
S&P 500	3.99	11.66	12.10	7.42	
Large-Cap Core Funds	1.94	10.21	10.62	6.09	
S&P 500 Value	3.38	9.66	11.18	5.77	
Large-Cap Value Funds	1.32	8.71	9.88	5.85	
MID-CAP					
S&P MidCap 400 Growth	1.17	10.77	10.07	9.29	
Mid-Cap Growth Funds	-4.97	8.94	8.43	7.42	
S&P MidCap 400	1.33	10.53	10.55	8.55	
Mid-Cap Core Funds	-3.76	8.40	8.98	7.21	
S&P MidCap 400 Value	1.28	10.13	10.96	7.75	
Mid-Cap Value Funds	-0.37	8.93	9.73	7.06	
SMALL-CAP					
S&P SmallCap 600 Growth	-0.63	11.00	11.05	8.63	
Small-Cap Growth Funds	-7.90	7.44	8.08	6.96	
S&P SmallCap 600	-0.03	10.23	11.20	7.86	
Small-Cap Core Funds	-4.46	6.79	7.86	6.13	
S&P SmallCap 600 Value	0.72	9.43	11.36	7.08	
Small-Cap Value Funds	-4.45	6.27	7.79	5.87	
MULTI-CAP					
S&P Composite 1500 Growth	3.84	13.14	12.63	9.01	
Multi-Cap Growth Funds	-4.43	10.90	10.27	7.43	
S&P Composite 1500	3.64	11.52	11.94	7.53	
Multi-Cap Core Funds	-1.76	8.92	9.07	6.30	
S&P Composite 1500 Value	3.10	9.68	11.16	5.98	
Multi-Cap Value Funds	-1.37	8.16	9.46	5.10	
REAL ESTATE					
S&P BMI U.S. REIT	23.71	13.34	12.45	7.27	
Real Estate Funds	19.79	12.74	11.38	6.95	

Source: S&P Dow Jones Indices LLC, CRSP. Data as of June 30, 2016. All index returns used are total returns. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 5: Quartile Breakpoints of U.S. Equity Funds			
FUND CATEGORY	THIRD QUARTILE	SECOND QUARTILE	FIRST QUARTILE
ONE-YEAR			
All Domestic Funds	-6.72	-2.74	0.64
All Large-Cap Funds	-3.04	-0.43	2.20
All Mid-Cap Funds	-9.40	-5.13	-1.15
All Small-Cap Funds	-10.04	-6.31	-2.80
All Multi-Cap Funds	-6.05	-2.68	0.07
Large-Cap Growth Funds	-3.95	-1.70	0.84
Large-Cap Core Funds	-2.06	0.57	3.06
Large-Cap Value Funds	-3.38	-0.15	3.24
Mid-Cap Growth Funds	-10.79	-7.10	-3.65
Mid-Cap Core Funds	-8.25	-4.46	0.27
Mid-Cap Value Funds	-5.06	-2.70	0.54
Small-Cap Growth Funds	-14.10	-9.85	-6.22
Small-Cap Core Funds	-8.23	-5.32	-2.74
Small-Cap Value Funds	-6.26	-4.07	-0.92
Multi-Cap Growth Funds	-6.67	-3.06	-0.61
Multi-Cap Core Funds	-5.70	-2.69	-0.07
Multi-Cap Value Funds	-6.04	-2.16	1.41
Real Estate Funds	17.99	21.07	22.52
THREE-YEAR			
All Domestic Funds	6.67	8.52	10.41
All Large-Cap Funds	7.96	9.61	11.31
All Mid-Cap Funds	6.60	8.28	9.76
All Small-Cap Funds	5.01	6.88	8.28
All Multi-Cap Funds	6.73	8.61	10.57
Large-Cap Growth Funds	10.35	11.59	12.61
Large-Cap Core Funds	8.35	9.59	10.87
Large-Cap Value Funds	6.61	8.17	9.30
Mid-Cap Growth Funds	6.84	8.47	10.06
Mid-Cap Core Funds	6.07	7.85	9.75
Mid-Cap Value Funds	6.63	8.45	9.52
Small-Cap Growth Funds	4.77	6.87	8.70
Small-Cap Core Funds	5.40	7.23	8.30
Small-Cap Value Funds	4.62	6.38	7.94
Multi-Cap Growth Funds	8.09	10.04	11.91
Multi-Cap Core Funds	6.37	8.16	9.71
Multi-Cap Value Funds	6.66	8.24	9.68
Real Estate Funds	11.62	12.86	13.50

Source: S&P Dow Jones Indices LLC, CRSP. Data as of June 30, 2016. All index returns used are total returns. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 5: Quartile Breakpoints of U.S. Equity Funds (cont.)			
FUND CATEGORY	THIRD QUARTILE	SECOND QUARTILE	FIRST QUARTILE
FIVE-YEAR			
All Domestic Funds	7.39	9.08	10.50
All Large-Cap Funds	8.86	10.00	11.11
All Mid-Cap Funds	6.79	8.28	9.80
All Small-Cap Funds	6.41	7.86	9.20
All Multi-Cap Funds	7.08	8.97	10.49
Large-Cap Growth Funds	9.41	10.62	11.55
Large-Cap Core Funds	8.86	10.06	11.11
Large-Cap Value Funds	8.45	9.53	10.54
Mid-Cap Growth Funds	6.32	7.58	9.43
Mid-Cap Core Funds	7.27	8.37	9.80
Mid-Cap Value Funds	7.55	9.15	10.74
Small-Cap Growth Funds	5.87	7.20	8.64
Small-Cap Core Funds	7.07	8.23	9.32
Small-Cap Value Funds	6.63	8.13	9.23
Multi-Cap Growth Funds	7.37	9.19	10.49
Multi-Cap Core Funds	6.59	8.66	10.47
Multi-Cap Value Funds	7.98	9.18	10.53
Real Estate Funds	8.98	11.53	11.95
TEN-YEAR			
All Domestic Funds	5.17	6.27	7.36
All Large-Cap Funds	5.53	6.47	7.51
All Mid-Cap Funds	5.67	6.78	7.77
All Small-Cap Funds	5.17	6.09	7.24
All Multi-Cap Funds	4.63	5.72	7.02
Large-Cap Growth Funds	6.38	7.27	8.15
Large-Cap Core Funds	5.63	6.41	7.25
Large-Cap Value Funds	4.86	5.91	7.10
Mid-Cap Growth Funds	5.83	7.00	7.99
Mid-Cap Core Funds	6.04	6.72	7.75
Mid-Cap Value Funds	5.29	6.35	7.32
Small-Cap Growth Funds	5.36	6.44	7.44
Small-Cap Core Funds	5.05	6.03	7.23
Small-Cap Value Funds	5.16	5.86	6.59
Multi-Cap Growth Funds	5.36	6.69	7.66
Multi-Cap Core Funds	4.38	5.67	7.18
Multi-Cap Value Funds	4.31	5.30	6.27
Real Estate Funds	3.86	6.24	7.08

Source: S&P Dow Jones Indices LLC, CRSP. Data as of June 30, 2016. All index returns used are total returns. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 6: Percentage of International Equity Funds Outperformed by Benchmarks

FUND CATEGORY	COMPARISON INDEX	ONE-YEAR (%)	THREE-YEAR (%)	FIVE-YEAR (%)	TEN-YEAR (%)
Global Funds	S&P Global 1200	75.35	76.96	82.45	81.19
International Funds	S&P 700	54.92	54.55	60.45	80.21
International Small Cap Funds	S&P Developed Ex-U.S. SmallCap	74.75	74.67	55.00	62.26
Emerging Market Funds	S&P/IFCI Composite	42.22	77.42	67.63	81.94

Source: S&P Dow Jones Indices LLC, CRSP. Data as of June 30, 2016. Outperformance is based upon equal weighted fund counts. All index returns used are total returns. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 7: Survivorship and Style Consistency of International Equity Funds

FUND CATEGORY	NO. OF FUNDS AT START	SURVIVORSHIP (%)	STYLE CONSISTENCY (%)
ONE-YEAR			
Global Funds	284	94.37	89.79
International Funds	461	97.40	96.75
International Small-Cap Funds	99	93.94	92.93
Emerging Market Funds	270	96.30	97.04
THREE-YEAR			
Global Funds	217	82.95	70.51
International Funds	344	89.83	88.37
International Small-Cap Funds	75	93.33	89.33
Emerging Market Funds	217	87.56	87.10
FIVE-YEAR			
Global Funds	188	70.74	53.72
International Funds	356	78.93	75.28
International Small-Cap Funds	60	91.67	86.67
Emerging Market Funds	174	83.91	82.18
TEN-YEAR			
Global Funds	101	59.41	45.54
International Funds	289	60.90	58.48
International Small-Cap Funds	53	77.36	64.15
Emerging Market Funds	72	79.17	75.00

Source: S&P Dow Jones Indices LLC, CRSP. Data as of June 30, 2016. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 8: Average International Equity Fund Performance (Equal-Weighted)

CATEGORY	ONE-YEAR (%)	THREE-YEAR (ANNUALIZED %)	FIVE-YEAR (ANNUALIZED %)	TEN-YEAR (ANNUALIZED %)
S&P Global 1200	-2.07	7.35	6.98	5.08
Global Funds	-4.86	5.64	5.09	3.94
S&P 700	-9.58	2.15	1.38	2.46
International Funds	-9.76	1.85	1.07	1.37
S&P Developed Ex-U.S. SmallCap	-3.80	7.14	4.20	4.15
International Small Cap Funds	-6.34	4.65	3.85	3.83
S&P/IFCI Composite	-10.63	-0.06	-2.66	4.44
Emerging Market Funds	-10.06	-1.51	-3.43	2.63

Source: S&P Dow Jones Indices LLC, CRSP. Data as of June 30, 2016. All index returns used are total returns. Funds are equal-weighted, but indices are not. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 9: Average International Equity Fund Performance (Asset-Weighted)

CATEGORY	ONE-YEAR (%)	THREE-YEAR (ANNUALIZED %)	FIVE-YEAR (ANNUALIZED %)	TEN-YEAR ANNUALIZED (%)
S&P Global 1200	-2.07	7.35	6.98	5.08
Global Funds	-4.37	6.25	6.24	5.01
S&P 700	-9.58	2.15	1.38	2.46
International Funds	-9.85	2.47	1.84	2.41
S&P Developed Ex-U.S. SmallCap	-3.80	7.14	4.20	4.15
International Small Cap Funds	-5.88	5.56	4.41	4.68
S&P/IFCI Composite	-10.63	-0.06	-2.66	4.44
Emerging Market Funds	-8.32	-0.70	-2.36	3.93

Source: S&P Dow Jones Indices LLC, CRSP. Data as of June 30, 2016. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 10: Quartile Breakpoints of International Equity Funds

FUND CATEGORY	THIRD QUARTILE	SECOND QUARTILE	FIRST QUARTILE
ONE-YEAR			
Global Funds	-7.92	-4.84	-1.78
International Funds	-12.15	-10.01	-7.09
International Small Cap Funds	-8.59	-5.65	-3.56
Emerging Market Funds	-12.25	-9.59	-6.72
THREE-YEAR			
Global Funds	4.31	6.11	7.64
International Funds	0.75	2.19	3.50
International Small Cap Funds	2.89	5.64	7.24
Emerging Market Funds	-2.73	-1.44	0.01
FIVE-YEAR			
Global Funds	3.94	5.73	6.95
International Funds	0.26	1.38	2.57
International Small Cap Funds	2.75	4.09	5.79
Emerging Market Funds	-4.60	-3.12	-1.72
TEN-YEAR			
Global Funds	3.39	4.51	5.32
International Funds	0.89	1.77	2.79
International Small Cap Funds	2.95	4.15	5.13
Emerging Market Funds	1.84	2.86	4.00

Source: S&P Dow Jones Indices LLC, CRSP. Data as of June 30, 2016. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 11: Percentage of Fixed Income Funds Outperformed by Benchmarks					
FUND CATEGORY	COMPARISON INDEX	ONE-YEAR (%)	THREE-YEAR (%)	FIVE-YEAR (%)	TEN-YEAR (%)
Government Long Funds	Barclays Long Government	93.10	96.83	97.56	95.74
Government Intermediate Funds	Barclays Intermediate Government	64.29	58.62	71.05	79.66
Government Short Funds	Barclays 1-3 Year Government	69.23	67.50	68.42	79.07
Investment-Grade Long Funds	Barclays Long Government/Credit	94.39	97.32	98.41	98.21
Investment-Grade Intermediate Funds	Barclays Intermediate Government/Credit	40.00	37.33	39.35	59.81
Investment-Grade Short Funds	Barclays 1-3 Year Government/Credit	60.19	46.67	27.40	63.75
High Yield Funds	Barclays High Yield	75.00	80.47	88.78	96.62
Mortgage-Backed Securities Funds	Barclays Mortgage-Backed Securities	78.69	75.00	66.67	80.36
Global Income Funds	Barclays Global Aggregate	86.15	70.77	59.13	65.57
Emerging Markets Debt Funds	Barclays Emerging Markets	74.65	88.89	92.31	81.82
Loan Participation Funds ¹	S&P/LSTA U.S Leveraged Loan 100 Index	40.74	31.82	60.00	N/A
General Municipal Debt Funds	S&P National AMT-Free Municipal Bond Index	47.73	33.73	33.77	74.44
California Municipal Debt Funds	S&P California AMT-Free Municipal Bond Index	27.78	30.56	21.21	83.33
New York Municipal Debt Funds	S&P New York AMT-Free Municipal Bond Index	29.63	50.00	48.28	91.67

Source: S&P Dow Jones Indices LLC, CRSP. Data as of June 30, 2016. Outperformance is based upon equal-weighted fund counts. All index returns used are total returns. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 12: Survivorship and Style Consistency of Fixed Income Funds			
FUND CATEGORY	NO. OF FUNDS AT START	SURVIVORSHIP (%)	STYLE CONSISTENCY (%)
ONE-YEAR			
Government Long Funds	59	94.92	96.61
Government Intermediate Funds	28	85.71	89.29
Government Short Funds	39	92.31	92.31
Investment-Grade Long Funds	110	100.00	96.36
Investment-Grade Intermediate Funds	242	96.28	92.56
Investment-Grade Short Funds	110	96.36	92.73
High Yield Funds	237	96.20	96.20
Mortgage-Backed Securities Funds	62	100.00	93.55
Global Income Funds	130	96.92	96.15
Emerging Market Debt Funds	71	100.00	100.00
Loan Participation Funds	54	100.00	100.00
General Municipal Debt Funds	88	100.00	96.59
California Municipal Debt Funds	36	100.00	100.00
New York Municipal Debt Funds	27	100.00	100.00

Source: S&P Dow Jones Indices LLC, CRSP. Data as of June 30, 2016. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

¹ Due to the limited sample size of loan participation funds 10 years ago, we have not calculated the outperformance and the related figures.

Report 12: Survivorship and Style Consistency of Fixed Income Funds (cont.)			
FUND CATEGORY	NO. OF FUNDS AT START	SURVIVORSHIP (%)	STYLE CONSISTENCY (%)
THREE-YEAR			
Government Long Funds	64	90.63	87.50
Government Intermediate Funds	29	82.76	82.76
Government Short Funds	40	80.00	75.00
Investment-Grade Long Funds	116	97.41	79.31
Investment-Grade Intermediate Funds	294	90.14	62.24
Investment-Grade Short Funds	76	94.74	86.84
High Yield Funds	217	93.55	92.63
Mortgage-Backed Securities Funds	65	87.69	76.92
Global Income Funds	130	86.92	80.77
Emerging Market Debt Funds	54	94.44	90.74
Loan Participation Funds	44	100.00	97.73
General Municipal Debt Funds	83	96.39	90.36
California Municipal Debt Funds	36	100.00	100.00
New York Municipal Debt Funds	28	96.43	96.43
FIVE-YEAR			
Government Long Funds	83	84.34	65.06
Government Intermediate Funds	38	68.42	60.53
Government Short Funds	38	71.05	63.16
Investment-Grade Long Funds	130	90.77	61.54
Investment-Grade Intermediate Funds	278	82.73	53.60
Investment-Grade Short Funds	74	86.49	77.03
High Yield Funds	207	88.41	84.54
Mortgage-Backed Securities Funds	64	85.94	73.44
Global Income Funds	116	85.34	69.83
Emerging Market Debt Funds	52	90.38	61.54
Loan Participation Funds	35	97.14	88.57
General Municipal Debt Funds	77	92.21	83.12
California Municipal Debt Funds	33	96.97	96.97
New York Municipal Debt Funds	29	86.21	86.21
TEN-YEAR			
Government Long Funds	48	60.42	52.08
Government Intermediate Funds	59	55.93	38.98
Government Short Funds	43	58.14	48.84
Investment-Grade Long Funds	112	58.04	32.14
Investment-Grade Intermediate Funds	214	58.88	43.46
Investment-Grade Short Funds	80	62.50	57.50
High Yield Funds	148	67.57	62.16
Mortgage-Backed Securities Funds	56	71.43	62.50
Global Income Funds	61	63.93	52.46
Emerging Market Debt Funds	22	77.27	72.73
Loan Participation Funds	N/A	N/A	N/A
General Municipal Debt Funds	90	63.33	58.89
California Municipal Debt Funds	42	73.81	71.43
New York Municipal Debt Funds	36	66.67	66.67

Source: S&P Dow Jones Indices LLC, CRSP. Data as of June 30, 2016. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 13: Average Fixed Income Fund Performance (Equal-Weighted)				
CATEGORY	ONE-YEAR (%)	THREE-YEAR (ANNUALIZED %)	FIVE-YEAR (ANNUALIZED %)	TEN-YEAR (ANNUALIZED %)
Barclays Long Government	18.98	10.38	10.17	8.69
Government Long Funds	5.15	3.14	3.01	4.19
Barclays Intermediate Government	3.93	2.41	2.31	4.07
Government Intermediate Funds	3.22	2.08	1.94	3.43
Barclays 1-3 Year Government	1.31	1.00	0.84	2.54
Government Short Funds	0.78	0.60	0.48	2.00
Barclays Long Government/Credit	15.72	9.33	9.18	8.42
Investment-Grade Long Funds	6.33	4.74	4.64	5.36
Barclays Intermediate Government/Credit	4.33	2.95	2.90	4.48
Investment-Grade Intermediate Funds	4.17	3.07	3.16	4.13
Barclays 1-3 Year Government/Credit	1.59	1.22	1.10	2.80
Investment-Grade Short Funds	1.19	1.13	1.31	1.96
Barclays High Yield	1.62	4.18	5.84	7.56
High Yield Funds	-0.17	2.88	4.48	5.46
Barclays Mortgage-Backed Securities	4.34	3.76	3.01	4.96
Mortgage-Backed Securities Funds	3.25	3.06	2.71	4.14
Barclays Global Aggregate	8.87	2.80	1.77	4.40
Global Income Funds	4.35	1.91	1.67	4.07
Barclays Emerging Markets	7.83	5.99	5.99	7.74
Emerging Market Debt Funds	4.94	2.88	2.68	5.49
S&P/LSTA U.S. Leveraged Loan 100 Index	0.69	2.15	3.46	N/A
Loan Participation Funds	0.22	2.11	3.31	N/A
S&P National AMT-Free Municipal Bond Index	7.79	5.31	5.10	4.92
General Municipal Debt Funds	7.63	5.52	5.48	4.42
S&P California AMT-Free Municipal Bond Index	7.99	6.35	6.02	5.37
California Municipal Debt Funds	9.00	6.74	6.72	4.83
S&P New York AMT-Free Municipal Bond Index	7.78	5.76	5.20	5.05
New York Municipal Debt Funds	8.08	5.52	5.19	4.43

Source: S&P Dow Jones Indices LLC, CRSP. Data as of June 30, 2016. All index returns used are total returns. Funds are equal weighted, but indices are not. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 14: Average Fixed Income Fund Performance (Asset-Weighted)				
CATEGORY	ONE-YEAR (%)	THREE-YEAR (ANNUALIZED %)	FIVE-YEAR (ANNUALIZED %)	TEN-YEAR (ANNUALIZED %)
Barclays Long Government	18.98	10.38	10.17	8.69
Government Long Funds	6.46	3.88	3.68	4.92
Barclays Intermediate Government	3.93	2.41	2.31	4.07
Government Intermediate Funds	4.11	2.71	2.83	4.12
Barclays 1-3 Year Government	1.31	1.00	0.84	2.54
Government Short Funds	1.30	1.03	0.93	2.49
Barclays Long Government/Credit	15.72	9.33	9.18	8.42
Investment-Grade Long Funds	7.62	5.51	5.41	5.73
Barclays Intermediate Government/Credit	4.33	2.95	2.90	4.48
Investment-Grade Intermediate Funds	4.94	3.59	3.65	5.25
Barclays 1-3 Year Government/Credit	1.59	1.22	1.10	2.80
Investment-Grade Short Funds	1.99	1.81	1.95	2.98
Barclays High Yield	1.62	4.18	5.84	7.56
High Yield Funds	-0.04	3.34	4.87	5.98
Barclays Mortgage-Backed Securities	4.34	3.76	3.01	4.96
Mortgage-Backed Securities Funds	4.03	3.74	3.44	4.95
Barclays Global Aggregate	8.87	2.80	1.77	4.40
Global Income Funds	1.37	1.78	1.98	4.92
Barclays Emerging Markets	7.83	5.99	5.99	7.74
Emerging Market Debt Funds	7.71	4.33	3.67	6.41
S&P/LSTA Leveraged Loan 100 Total Return Index	0.69	2.15	3.46	N/A
Loan Participation Funds	0.60	2.24	3.29	N/A
S&P National AMT-Free Municipal Bond Index	7.79	5.31	5.10	4.92
General Municipal Debt Funds	8.02	6.06	6.03	4.86
S&P California AMT-Free Municipal Bond Index	7.99	6.35	6.02	5.37
California Municipal Debt Funds	9.67	7.13	7.07	5.23
S&P New York AMT-Free Municipal Bond Index	7.78	5.76	5.20	5.05
New York Municipal Debt Funds	8.41	5.29	5.44	4.48

Source: S&P Dow Jones Indices LLC, CRSP. Data as of June 30, 2016. All index returns used are total returns. Funds are equal weighted, but indices are not. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 15: Quartile Breakpoints of Fixed Income Funds			
FUND CATEGORY	THIRD QUARTILE	SECOND QUARTILE	FIRST QUARTILE
ONE-YEAR			
Government Long Funds	3.39	4.77	5.24
Government Intermediate Funds	2.08	3.41	4.49
Government Short Funds	0.70	1.00	1.42
Investment-Grade Long Funds	4.78	5.82	6.88
Investment-Grade Intermediate Funds	3.16	4.88	5.55
Investment-Grade Short Funds	1.00	1.45	1.79
High Yield Funds	-1.16	0.30	1.70
Mortgage-Backed Securities Funds	3.28	3.81	4.28
Global Income Funds	1.76	4.84	7.38
Emerging Market Debt Funds	3.00	5.44	7.91
Loan Participation Funds	0.06	0.94	1.61
General Municipal Debt Funds	6.71	7.83	8.88
California Municipal Debt Funds	7.79	8.75	10.35
New York Municipal Debt Funds	7.76	8.11	8.76
THREE-YEAR			
Government Long Funds	2.16	3.00	3.43
Government Intermediate Funds	1.48	2.40	2.94
Government Short Funds	0.55	0.86	1.13
Investment-Grade Long Funds	3.61	4.08	4.92
Investment-Grade Intermediate Funds	2.69	3.65	4.11
Investment-Grade Short Funds	1.00	1.31	1.56
High Yield Funds	2.59	3.35	4.03
Mortgage-Backed Securities Funds	2.95	3.38	3.80
Global Income Funds	1.04	2.10	3.38
Emerging Market Debt Funds	1.18	3.59	5.22
Loan Participation Funds	1.95	2.37	2.76
General Municipal Debt Funds	4.96	5.79	6.51
California Municipal Debt Funds	6.28	6.93	7.49
New York Municipal Debt Funds	5.10	5.84	6.23

Source: S&P Dow Jones Indices LLC, CRSP. Data as of June 30, 2016. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 15: Quartile Breakpoints of Fixed Income Funds (cont.)			
FUND CATEGORY	THIRD QUARTILE	SECOND QUARTILE	FIRST QUARTILE
FIVE-YEAR			
Government Long Funds	2.02	2.54	3.17
Government Intermediate Funds	1.23	2.14	2.68
Government Short Funds	0.50	0.75	1.13
Investment-Grade Long Funds	3.65	4.08	4.88
Investment-Grade Intermediate Funds	2.77	3.66	4.17
Investment-Grade Short Funds	1.22	1.44	1.83
High Yield Funds	4.26	4.92	5.52
Mortgage-Backed Securities Funds	2.45	2.84	3.17
Global Income Funds	0.59	1.70	3.42
Emerging Market Debt Funds	-2.18	2.52	4.74
Loan Participation Funds	3.01	3.37	3.73
General Municipal Debt Funds	4.83	5.75	6.31
California Municipal Debt Funds	6.19	6.90	7.18
New York Municipal Debt Funds	4.95	5.38	5.90
TEN-YEAR			
Government Long Funds	3.97	4.46	5.50
Government Intermediate Funds	3.27	4.00	4.38
Government Short Funds	1.81	2.12	2.80
Investment-Grade Long Funds	4.22	5.29	5.92
Investment-Grade Intermediate Funds	4.28	4.94	5.49
Investment-Grade Short Funds	2.50	2.88	3.16
High Yield Funds	5.65	6.08	6.71
Mortgage-Backed Securities Funds	4.16	4.39	5.00
Global Income Funds	3.49	4.50	5.44
Emerging Market Debt Funds	6.26	7.33	7.70
Loan Participation Funds	N/A	N/A	N/A
General Municipal Debt Funds	4.40	4.75	5.10
California Municipal Debt Funds	4.90	5.07	5.32
New York Municipal Debt Funds	4.49	4.66	4.94

Source: S&P Dow Jones Indices LLC, CRSP. Data as of June 30, 2016. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

APPENDIX A

SPIVA Styles and Lipper Fund Classifications

The CRSP Survivor-Bias-Free US Mutual Fund Database is the only complete database of both active and liquidated or merged mutual funds. It was created in 1995 and contains fund data from December 1961. Current and historical data from August 1998 has been supplied by Lipper and Thomson Reuters. The fund classifications are based upon the Lipper fund classification system. The SPIVA Scorecard covers domestic equity, global equity, and global fixed income categories.

U.S. Equity

SPIVA covers major capitalization levels (large-, mid-, small-, and multi-cap funds) and investment styles (growth, core, and value). S&P Dow Jones Indices uses the Lipper fund classifications, which determine a fund portfolio's capitalization and investment style assignments.

Lipper assigns a market capitalization to each fund based on the percentages of a fund's three-year weighted equity assets that fall into each of Lipper's three defined market capitalization slices. The market capitalization breakpoints are calculated using all common stocks, excluding all non-U.S. domiciled stocks and ADRs, trading on the NYSE, AMEX, and NASDAQ. Funds are assigned to the capitalization level in which they have a 75% or higher weighting. Any fund that has less than 75% of its three-year weighted allocation in any of the three market capitalization ranges is classified as a multi-cap fund.

For investment style selection, the Lipper classification system uses three-year fundamental portfolio characteristics (price/earnings, price/book, and three-year sales-per-share growth) and, if necessary, confirming secondary characteristics (price-to-sales and price-to-operating cash flow). Fund statistics are compared to their relevant S&P Dow Jones Indices capitalization-level index to determine the growth, core, or value style.

In some cases, S&P Dow Jones Indices combines closely related Lipper fund classifications in one SPIVA category. Exhibit 2 maps the SPIVA U.S. Equity fund categories to Lipper classifications.

Exhibit 2: U.S. Equity Category Mappings	
SPIVA CATEGORY	LIPPER FUND CLASSIFICATION
Large-Cap Growth Funds	Large-Cap Growth Funds
Large-Cap Core Funds	Large-Cap Core Funds
Large-Cap Value Funds	Large-Cap Value Funds
	Equity Income Funds
Mid-Cap Growth Funds	Mid-Cap Growth Funds
Mid-Cap Core Funds	Mid-Cap Core Funds
Mid-Cap Value Funds	Mid-Cap Value Funds
Small-Cap Growth Funds	Small-Cap Growth Funds
Small-Cap Core Funds	Small-Cap Core Funds
Small-Cap Value Funds	Small-Cap Value Funds
Multi-Cap Growth Funds	Multi-Cap Growth Funds
Multi-Cap Core Funds	Multi-Cap Core Funds
Multi-Cap Value Funds	Multi-Cap Value Funds
Real Estate Funds	Real Estate Funds

Source: S&P Dow Jones Indices LLC, Lipper. Table is provided for illustrative purposes.

International Equity

For international equity, SPIVA reports on four major categories (Global, International, International Small-Cap, and Emerging Market Funds) of interest to global asset allocators. These categories also include multiple Lipper capitalization and style classifications.

Exhibit 3: Global Equity Category Mappings	
SPIVA CATEGORY	LIPPER FUND CLASSIFICATION
Global Funds	Global Large-Cap Growth Funds
	Global Large-Cap Core Funds
	Global Large-Cap Value Funds
	Global Multi-Cap Growth Funds
	Global Multi-Cap Core Funds
	Global Multi-Cap Value Funds
International Funds	International Large-Cap Growth Funds
	International Large-Cap Core Funds
	International Large-Cap Value Funds
	International Multi-Cap Growth Funds
	International Multi-Cap Core Funds
	International Multi-Cap Value Funds
International Small-Cap Funds	International Small-/Mid-Cap Growth Funds
	International Small-/Mid-Cap Core Funds
	International Small-/Mid-Cap Value Funds
Emerging Market Funds	Emerging Markets Funds

Source: S&P Dow Jones Indices LLC, Lipper. Table is provided for illustrative purposes.

Fixed Income

SPIVA reports on nine domestic, two global, and three municipal fixed income categories. The Lipper domestic fixed income classifications are based on maturity and credit quality. For maturity, long is 10+ years, intermediate is 5-10 years, short/intermediate is 1-5 years, and short is 1-3.5 years. For credit quality, bonds are assigned to U.S. Treasury, U.S. Government (includes government and agency issues), A- or BBB-rated (according to Lipper fund rating methodology), Loan Participations, and High Yield classifications. Lipper also includes U.S. Mortgages and GNMA classifications.

In global fixed income, Lipper differentiates between global (including the U.S.) and international (excluding the U.S.) objectives. For municipal debt funds, we include the general classification (invests in the top four credit ratings) plus two state funds (California and New York).

Exhibit 4: Fixed Income Category Mappings	
SPIVA CATEGORY	LIPPER FUND CLASSIFICATION
Government Long Funds	General U.S. Government Funds
	General U.S. Treasury Funds
Government Intermediate Funds	Intermediate U.S. Government
	Short-Intermediate U.S. Government
Government Short Funds	Short U.S. Government Funds
	Short U.S. Treasury
Investment-Grade Long Funds	Corporate Debt Funds A-Rated
	Corporate Debt Funds BBB-Rated
Investment-Grade Intermediate Funds	Intermediate Investment-Grade Debt Funds
	Short-Intermediate Investment-Grade Debt Funds
Investment-Grade Short Funds	Short Investment-Grade Debt Funds
High-Yield Funds	High Current Yield Funds
Mortgage-Backed Securities Funds	U.S. Mortgage Funds
	GNMA Funds
Global Income Funds	Global Income Funds
	International Income Funds
Emerging Market Debt Funds	Emerging Market Debt Funds
Loan Participation Funds	Loan Participation Funds
General Municipal Debt Funds	General Municipal Debt Funds
California Municipal Debt Funds	California Municipal Debt Funds
New York Municipal Debt Funds	New York Municipal Debt Funds

Source: S&P Dow Jones Indices LLC, Lipper. Table is provided for illustrative purposes.

APPENDIX B: GLOSSARY

Percentage of Funds Outperformed by the Index

To correct for survivorship bias, we use the opportunity set available at the beginning of the period as the denominator. We determine the count of funds that have survived and beat the index. We then report the index outperformance percentage.

Survivorship (%)

This measure represents the percentage of funds in existence at the beginning of the time period that is still active at the end of the time period.

Style Consistency (%)

This calculation shows the percentage of funds that had the same style classification at the end of the time period as at the beginning of the time period.

Equal-Weighted Fund Performance

Equal-weighted returns for a particular style category are determined by calculating a simple average return of all active funds in that category in a particular month.

Asset-Weighted Fund Performance

Asset-weighted returns for a particular style category are determined by calculating a weighted average return of all funds in that category in a particular month, with each fund's return weighted by its total net assets. Asset-weighted returns are a better indicator of fund category performance because they more accurately reflect the returns of the total money invested in that particular style category.

Quartiles Breakpoints

The p^{th} percentile for a set of data is the value that is greater than or equal to $p\%$ of the data, but is less than or equal to $(100 - p)\%$ of the data. In other words, it is a value that divides the data into two parts: the lower $p\%$ of the values and the upper $(100-p)\%$ of the values. The first quartile is the 75th percentile, the value separating the elements of a population into the lower 75% and the upper 25%. The second quartile is the 50th percentile and the third quartile is the 25th percentile. For fund category quartiles in a particular time horizon, the data used is the return of the largest share class of the fund net of fees, excluding loads.

Survivorship Bias

Many funds might liquidate or merge during a period of study. This usually occurs due to continued poor performance by the fund. Therefore, if index returns were compared to fund returns using only surviving funds, the comparison would be biased in favor of the fund category. These reports remove this bias by (a) using the entire investment opportunity set, made up of all funds in that particular category at the outset of the period, as the denominator for outperformance calculations, (b) explicitly showing the survivorship rate in each category, and (c) constructing peer average return series for each category based on all available funds at the outset of the period.

Fees

The fund returns used are net of fees, excluding loads.

Indices²

A benchmark index provides an investment vehicle against which fund performance can be measured.

U.S. Equity

S&P 500

Widely regarded as the best single gauge of the U.S. equities market, this market-capitalization-weighted index includes a representative sample of 500 leading companies in the foremost industries of the U.S. economy and provides over 80% coverage of U.S. equities.

S&P MIDCAP 400

This index consists of 400 mid-sized companies and covers approximately 7% of the U.S. equities market.

² For more information on S&P Dow Jones Indices, please visit www.spindices.com.

S&P SMALLCAP 600

This index consists of 600 small-cap stocks and covers approximately 3% of the U.S. equities market.

S&P COMPOSITE 1500

This is a broad, market-capitalization-weighted index of 1500 stocks. This index is comprised of three size-based indices: the S&P 500, S&P MidCap 400, and S&P SmallCap 600, which measure the performance of large-, mid-, and small-cap stocks, respectively. This index represents 90% of U.S. equities.

S&P 500 GROWTH AND VALUE INDICES

These indices form an exhaustive, multi-factor style series covering the entire market capitalization of the S&P 500. Constituents, weighted according to market capitalization, are classified as growth, value, or a mix of growth and value.

S&P MIDCAP 400 GROWTH AND VALUE INDICES

These indices form an exhaustive, multi-factor style series covering the entire market capitalization of the S&P MidCap 400.

S&P SMALLCAP 600 GROWTH AND VALUE INDICES

These indices form an exhaustive, multi-factor style series covering the entire market capitalization of the S&P SmallCap 600.

S&P COMPOSITE 1500 GROWTH AND VALUE INDICES

These indices form an exhaustive, multi-factor style series covering the entire market capitalization of the S&P Composite 1500.

S&P UNITED STATES REIT INDEX

This index measures the investable universe of publicly traded real estate investment trusts.

International Equity

S&P GLOBAL 1200

Capturing approximately 70% of the world's capital markets, the S&P Global 1200 is a composite of seven headline indices, many of which are accepted leaders in their regions. It includes the S&P 500 (U.S.), S&P Europe 350 (Europe), S&P/Topix 150 (Japan), S&P/TSX 60 (Canada), S&P/ASX All Australian 50 (Australia), S&P Asia 50 (Asia Ex-Japan), and S&P Latin America 40 (Latin America).

S&P 700

This index measures the non-U.S. component of the global equity markets, covering all the regions included in the S&P Global 1200, excluding the U.S. (S&P 500).

S&P WORLD EX-U.S. SMALL CAP

This index represents the small-cap segment—the bottom 15%—of the world's universe of institutionally investable securities, excluding the U.S.

S&P/IFCI COMPOSITE INDEX

This index is widely recognized as a comprehensive and reliable measure of the world's emerging markets. It measures the returns of stocks that are legally and practically available to foreign market participants.

Fixed Income³

BARCLAYS CAPITAL LONG GOVERNMENT BOND INDEX

This index consists of U.S. Treasury and U.S. Government agency bonds with maturities greater than 10 years.

BARCLAYS CAPITAL INTERMEDIATE GOVERNMENT BOND INDEX

This index consists of U.S. Treasury and U.S. Government agency bonds with maturities from 1 to 10 years.

BARCLAYS CAPITAL 1-3 YEAR GOVERNMENT BOND INDEX

This index consists of U.S. Treasury and U.S. Government agency bonds with maturities from one to three years.

BARCLAYS CAPITAL LONG GOVERNMENT/CREDIT BOND INDEX

This index covers corporate and non-corporate fixed income securities that are rated investment grade and have maturities greater than 10 years.

BARCLAYS CAPITAL INTERMEDIATE GOVERNMENT/CREDIT BOND INDEX

This index covers corporate and non-corporate fixed income securities that are rated investment grade with maturities from 1 to 10 years.

BARCLAYS CAPITAL 1-3 YEAR GOVERNMENT/CREDIT BOND INDEX

This index covers corporate and non-corporate fixed income securities that are rated investment grade and have one to three years until their final maturity.

BARCLAYS CAPITAL HIGH YIELD BOND INDEX

This index includes all fixed income securities with a maximum quality rating of Ba1/BB+ (including defaulted issues), a minimum amount outstanding of USD 100 million, and at least one year to maturity.

³ Barclays Capital Fixed Income Indices were formerly the Lehman Brothers Indices.

BARCLAYS CAPITAL BROTHERS MORTGAGE-BACKED SECURITIES INDEX

This index includes 15- and 30-year fixed-rate securities backed by mortgage pools of the Government National Mortgage Association (GNMA), Federal Home Loan Mortgage Corporation (FHLMC), and Federal National Mortgage Association (FNMA)

BARCLAYS CAPITAL GLOBAL AGGREGATE BOND INDEX

This index covers the most-liquid portion of the global investment-grade, fixed-rate bond market, including government, credit, and collateralized securities.

BARCLAYS CAPITAL EMERGING MARKETS INDEX

This index includes fixed- and floating-rate USD-denominated debt from emerging markets.

S&P/LSTA U.S. LEVERAGED LOAN 100 INDEX

This index is designed to reflect the performance of the largest facilities in the floating-rate bank loan, or senior loan, market.

S&P NATIONAL AMT-FREE MUNICIPAL BOND INDEX

This index is a broad, comprehensive, market-value-weighted index designed to measure the performance of the investment-grade U.S. municipal bonds that are exempt from the Alternative Minimum Tax.

S&P CALIFORNIA AMT-FREE MUNICIPAL BOND INDEX

This index is designed to measure the performance of the investment-grade California municipal bonds that are exempt from the Alternative Minimum Tax.

S&P NEW YORK AMT-FREE MUNICIPAL BOND INDEX

This index is designed to measure the performance of the investment-grade New York bonds that are exempt from the alternative minimum tax.

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Whether Markets are More Efficient or Less Efficient, Costs Matter

By John C. Bogle
Founder and former CEO
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From the Nov-Dec 2003 issue of CFA Magazine

More than a century has passed since Louis Bachelier, in his Ph.D. thesis at the Sorbonne in 1900, wrote: "Past, present, and even discounted future events are (all) reflected in market price." Nearly half a century later, when Nobel Laureate Paul Samuelson discovered the long-forgotten thesis, he confessed that he "oscillated . . . between regarding it as trivially obvious (and almost trivially vacuous), and regarding it as remarkably sweeping."

Bachelier, of course, was *right*. By 1965, University of Chicago Professor Eugene F. Fama had performed enough analysis of the ever-increasing volume of stock price data to validate this "random walk" hypothesis, rechristened as the efficient market hypothesis (EMH). Today, the intellectual arguments against the EMH religion are few. The church, however, has three different dogmas. Princeton Professor Burton Malkiel describes them: the *weak* form (stock price changes over time are statistically independent); the *semi-strong* form (prices quickly reflect new value-changing information); and the *strong* form (professional managers are unable to accurately forecast the future prices of individual stocks).

Whatever the form of the EMH, I know of no serious academic, professional money manager, trained security analyst, or intelligent individual investor who would disagree with the thrust of EMH: *The stock market itself is a demanding taskmaster*. It sets a high hurdle that few investors can leap. While the apostles of the new so-called "behavioral" theory present ample evidence of how often human beings make irrational financial decisions, it remains to be seen whether these decisions lead to predictable errors that create systematic mispricings upon which more rational investors can readily capitalize.

In the summer of 1951, not long after I came into this business, I first heard that era's pungent description of behavioral theory: "The crowd is always wrong." (While I'm inclined to agree with that formulation, I'd substitute *usually for always*.) But I remain mystified about just how it is that "the crowd" can be wrong when, in the (essentially) closed system that is our stock market, every seller must be met by a buyer, and *vice versa*. Such a match, of course, is not necessary in each subset of the system. Indeed, in the mutual fund subset the crowd *is* almost always wrong. Investors are legendarily indifferent to buying equity funds until a bull market is well underway, but pour staggering amounts of capital into them as the subsequent and inevitable bear market approaches. To make matters worse, the objects of investor affection are usually the funds with the highest past performance, which of course are about to suffer the largest declines.

But the EMH may well prove less important in investment theory than a new wisdom that is beginning to emerge. I call it the CMH: *The Cost Matters Hypothesis*. Like the EMH before it, the CMH posits a conclusion that is both trivially obvious and remarkably sweeping: The mathematical expectation of the speculator is a loss equal to the amount of transaction costs incurred. When he concluded otherwise, that “the mathematical expectation of the speculator is zero,” Bachelier was *wrong*.

So, too, the mathematical expectation of the long-term investor is a shortfall to the stock market’s return, a shortfall that is precisely equal to the costs of our system of financial intermediation—the sum total of all those advisory fees, marketing expenditures, sales loads, brokerage commissions, transaction costs, custody and legal fees, and securities processing expenses. Intermediation costs in the U.S. equity market may well total as much as \$300 billion a year, nearly 3% of the value of that \$12 trillion market.

We don’t need the EMH to explain the dire odds that investors face in their quest to beat the stock market. We need only the CMH. *Whether markets are efficient or inefficient, investors as a group must fall short of the market return by the amount of the costs they incur*. And since the cost of our intermediation system is relatively stationary over short periods, the impact of that cost is inversely correlated with the returns on stock prices (i.e., a 3% annual cost would consume *one-fifth* of a 15% market return, but fully *one-half* of a 6% return.) Even for investors who incur more modest costs (say, 1% per year), the odds are that 95% of them will fail—often by huge amounts—to earn the stock market’s return over an investment lifetime.

It is often alleged that in “less efficient” markets, investment managers can provide investors with superior returns. But the CMH shows not only *why* that can’t be so, but why *the reverse* is true. Consider the logic: Mutual fund expense ratios and portfolio transaction costs are lower in the *most* efficient segments of the market, and higher in its *least* efficient segments. Therefore in the efficient large-cap sector, if the smartest (or luckiest) investor can beat that market segment by two percentage points annually, then the dumbest (or unluckiest) *must* lose by two percentage points. If the costs of large-cap funds average 1 ½ percentage points per year, then the winner wins by ½ percentage points net and the loser loses by 3 ½ percentage points net.

Now let’s assume that in the *less* efficient small cap sector the winner can win by twice as much, say, four percentage points, with the loser inevitably losing by the same amount. But with fund costs of, say, 3 percentage points in this segment, the winner tops the segment return by just 1 percentage point and the loser falls fully 7 percentage points behind. Inefficient markets, may create the opportunity to win by a larger margin, but they are inevitably accompanied by the equal opportunity to lose by a larger margin as well. The higher costs incurred in such markets increase disproportionately the penalties of failure.

Now for the *really* bad news. Investors pay their investment costs each year in nominal *current* dollars, but they measure their long run investment success in *real* dollars, almost inevitably eroded in value by inflation. The *nominal* long-term returns of about 10 percentage points on stocks that the financial intermediation system waves before the eyes of the naive investing public turn out to be about 6 ½ percentage points in real terms. When we realize that in the mutual fund industry intermediation costs total as much as three percentage points annually, they confiscate nearly one-half of the historical real rate of return on equities. And when we subtract the cost of taxes (paid by taxable investors in current, nominal dollars), and contemplate an era in which

returns may well fall below historic norms, we look at potential investment accumulations in a new and harsh light.

The academic and financial communities have dedicated enormous intellectual and financial resources to studying past returns on stocks, to regression analysis, to modern portfolio theory, to behaviorism, and to the EMH. It's high time we turn more of our attention to the CMH. We need to know just how much our system of financial intermediation has come to cost, to know whether high turnover pays, to know the *real* net returns that managers deliver to investors, and to evaluate the perverse impact on investors of the irrational investment choices offered by the mutual fund industry.

Investment professionals need not—indeed since time is money to our clients, *must* not—wait to act until those studies confirm much of what our intuition tells us already—things that are, well, “both trivially obvious and remarkably sweeping.” We must be figuring out how to take a major chunk of costs out of our system of financial intermediation—eliminating excess capacity, as the economists would say—so as to reduce the burden of costs and taxes on our clients. And it's high time we become more serious about accepting the merits of passive all-stock-market investing as a separate and distinct asset class. It is never too late to begin to build a better world for the investors of tomorrow.

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