

# Performance Persistence Among U.S. Mutual Funds

## Morningstar Manager Research

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## Executive Summary

It's no secret that investors often interpret past performance as evidence of manager skill and put their money to work accordingly. But risk-taking that paid off in the past may not continue to do so in the future. Luck—good or bad—may also influence past performance, but it's fleeting. Many studies have analyzed the relationship between past and future performance and have generally found some evidence of performance persistence over short horizons. But there is less evidence that past performance can predict future performance over longer windows.

This study differs from others by measuring fund performance relative to peers within several Morningstar Categories over several lookback and holding periods. It also uses more recent data than many of the papers published on this topic and digs into the drivers behind these return differences. The study found:

- There is some evidence that relative fund performance persists in the short term. In the equity categories, this appears to be attributable to differences in exposure to momentum stocks, rather than differences in manager skill.
- Over the long term, there is no meaningful relationship between past and future fund performance.
- In most cases, the odds of picking a future long-term winner from the best-performing quintile in each category aren't materially different than selecting from the bottom quintile.
- Survivorship rates are higher among previous winners than they are among previous losers. This difference increases with the length of the prior performance window and subsequent holding period.

Overall, the results strongly indicate that long-term investors should not select funds based on past performance alone. Rather, they should combine performance analysis with an assessment of other quantitative and qualitative factors, such as the fund's fees, the quality of its investment process and management team, and the stewardship practices of the asset management firm. This more holistic approach should improve investors' odds of success.

## Introduction

Investors often interpret past fund performance as evidence of a strategy's merit or the skill of its management team. Therefore, it is not surprising that assets chase performance. But the results of this study suggest that there is not a reliable relationship between past and future performance over long horizons. This suggests that investors should not hire or fire managers based on past performance alone because it is not a clean measure of skill. Even the best managers generally do not consistently outperform. Those who lack the patience to stick with an active manager through multiyear rough patches may be better off in a low-cost index fund.

Many previous studies have investigated performance persistence among mutual funds. Most of these focus on short-term performance. One of the most important studies on this topic is Mark Carhart's paper, "On Persistence in Mutual Fund Performance." He found that funds that have outperformed over the past year tended to continue to outperform over the next year. However, this performance edge largely disappeared over longer horizons. Carhart attributed this effect to momentum, showing that recent outperformers happen to hold stocks with strong momentum on average, though they don't necessarily follow a momentum strategy. Differences in expense ratios and transaction costs also contributed to this short-term performance persistence. This study further suggested that funds with the worst recent performance continued to offer terrible returns, which momentum and expenses could not fully explain.

A survey of the literature reveals a well-documented short-term performance persistence effect, but less evidence of persistence over longer horizons. Appendix A highlights some of these studies. The absence of longer-term persistence may be surprising, as many investors use long-term performance to assess manager skill. Relative performance is driven by differences in style orientations, luck, skill, and fees. Therefore, relative performance alone is a noisy proxy for skill. But differences in skill are not necessary to create long-term performance persistence, as differences in style and fees could also create this effect. Past long-term winners tend to have lower fees than past laggards, and those cost differences are likely to persist.

At the individual stock level, performance appears to revert to the mean over the long term, as Werner De Bondt and Richard Thaler first documented in their paper, "Does the Stock Market Overreact?" Stocks that have outperformed over the past few years may become expensive and offer lower future returns as a result. Conversely, stocks that have underperformed eventually become cheap and are often priced to offer better returns going forward. If mutual funds charged the same fees and did not trade, they might experience a similar reversal in performance over the long term. But turnover, fund liquidations, and differences in fees and skill may prevent this pattern among mutual funds.

S&P publishes a semiannual report, "The Persistence Scorecard," which measures actively managed mutual fund performance persistence in several domestic-equity and fixed-income categories.

It assigns U.S. funds within each category to quartiles based on their returns over the previous 12-months and tracks those that consistently remain in the top quartile over subsequent 12-month periods. According to the report, few funds consistently stayed in the top quartile, particularly in the domestic-equity categories.

The scorecard also sorts funds into quartiles based on their prior three- and five-year returns and tracks those that remain in the top quartile over the subsequent three- and five-year periods, respectively. Of the U.S. equity funds that fell in the top quartile over the trailing three years through March 2015, only 33.5% remained in that top quartile over the subsequent three years. That figure fell to 24.8% in the five-year windows. S&P's results indicated that performance was more likely to persist on the fixed-income side, particularly over the three-year windows. But even here, the results suggested that many previous top performers fell in the rankings.

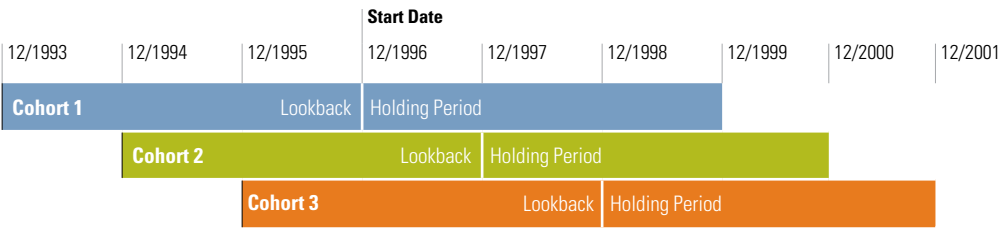
### Research Design

While much has already been written about performance persistence among mutual funds, most of these studies were published more than a decade ago, focus on short-term performance, and do not focus on returns relative to funds with similar strategies.

For our study, we looked at fund performance relative to Morningstar Category peers, assigning all actively managed funds in each category to quintiles based on their performance over the past one-, two-, three-, four-, five-, and 10-year periods. Each of these sorting periods represents a separate analysis. We track the average returns of the funds in each quintile over the same period after the sorting date. For example, for the three-year performance sorting period, funds are ranked according to their total returns over the past three years through the sorting date (for example, December 1996). This is the lookback period. Funds representing the best-performing 20% of each category over that period are assigned to the top quintile (Q1), the next-best-performing 20% go into the second quintile (Q2), and so on. The study then tracks the performance of each quintile over the subsequent three years (for example, January 1997 through December 1999).

We roll the sorting windows forward each year and take the average of the overlapping cohorts to reduce sensitivity to different start and end dates. The diagram below illustrates how this works for the three-year sorting period.

**Exhibit 1** Three-Year Performance Sorting and Holding Period Illustration



Source: Morningstar. Data as of 12-31-2014.

This analysis provides insight into the relationship between past and future performance, but it does not directly indicate the likelihood that the funds in each group will outpace their peers over the subsequent period. In order to address that question, we track the percentage of funds in each quintile that landed among the top half of their surviving category peers in each of the rolling holding periods and take the average.

We used data from Morningstar Direct, including both surviving and nonsurviving actively managed funds. The performance ranking, and subsequent tracking, is based on the original category assignments. So if a large-value fund migrates into the mid-value category after the sorting date, its performance data will continue to be included in the large-value category. This approach effectively tracks how an investor’s original opportunity set fared. It differs from S&P’s approach, which excludes funds that change categories from the final rankings. In further contrast to S&P, this study measures each fund’s return as the average return of all its share classes.

The sample period for most of the categories included in the study ran from the end of 1996 (the year Morningstar introduced the current category system) through December 2014, where December 1996 was the first sorting date. Each category had to have at least 15 funds (three in each quintile) in order to make the cut. This requirement delayed the first sorting dates for the world-bond, world-stock, diversified emerging-markets, and small-growth categories. The same start date applies across all the sorting windows within each category. The table below lists the categories included, along with each category’s first sorting date.

**Exhibit 2** First Sorting Dates By Category

Category	First Sorting Date
Large Blend	12/1996
Large Growth	12/1996
Large Value	12/1996
Mid-Cap Blend	12/1996
Mid-Cap Growth	12/1996
Mid-Cap Value	12/1996
Small Blend	12/1996
Small Growth	12/1999
Small Value	12/1996
World Stock	12/2000
Diversified Emerging Mkts	12/1999
High-Yield Bond	12/1996
Intermediate-Term Bond	12/1996
World Bond	12/2001

Source: Morningstar. Data as of 12-31-2014.

**Results**

Consistent with Carhart's findings, our study offers some evidence that relative fund performance tends to persist in the short term. The best-performing funds (Q1) over the previous year continued to outpace the previous worst-performing (Q5) over the next year in every category included in the study. However, these differences were only statistically significant in five of the 14 categories.<sup>1</sup> In the other nine categories, there is greater than a 5% probability that the apparent performance persistence was attributable to chance.

The performance gap between the previous winners and losers was generally smaller in the two-year sorting and holding periods. Here the previous winners only continued to outperform in 10 of the 14 categories, and the results were only statistically significant in one. The results were even weaker in the three-, four-, and five-year sorting periods. In these runs, the previous top performers only continued to outperform the previous laggards in six to seven of the 14 categories—not much different than a coin toss. Among the groups where performance persisted, only two turned in results that were statistically significant in three-year sorting periods, and none were significant in the four- and five-year periods. (In the three-year sorting period for the small-value category, the return spread between the top and bottom quintiles was negative and statistically significant, indicating that previous top performers subsequently lagged, and vice versa.)

Performance appeared to be more persistent in the 10-year sorting period, though not as strong as in the one-year periods. Here the return spread was positive in 11 of the 13 categories<sup>2</sup> and statistically significant in two. However, in the mid-growth category, the previous top performers lagged the previous losers by a statistically significant margin.

<sup>1</sup> We used a pairwise t-test to determine significance at the 5% level.

<sup>2</sup> The diversified emerging-markets category was dropped from the 10-year sorting analysis because too few funds qualified for inclusion in the sample in the early years.

The table below shows the average raw return spreads between the top and bottom quintiles for each category. The charts in Appendix C display the actual annualized returns for each performance quintile.

**Exhibit 3** Annualized Return Differences Between Q1 and Q5

	1 Yr	2 Yr	3 Yr	4 Yr	5 Yr	10 Yr
High-Yield Bond (1996-2014)	1.23	0.38	0.16	0.05	-0.50	0.55
Intermediate-Term Bond (1996-2013)	<b>1.16</b>	0.69	<b>0.56</b>	0.33	0.27	0.42
Large Blend (1996-2014)	1.78	0.24	0.38	-0.01	0.03	0.38
Large Growth (1996-2014)	1.04	-0.67	-0.15	0.05	0.15	<b>2.36</b>
Large Value (1996-2014)	1.46	0.26	0.02	0.05	0.13	<b>1.59</b>
Mid-Cap Blend (1996-2014)	2.86	0.12	-1.04	-0.45	0.29	<b>1.95</b>
Mid-Cap Growth (1996-2014)	1.72	-1.24	-0.79	-0.09	-0.32	<b>-1.69</b>
Mid-Cap Value (1996-2014)	0.98	1.50	0.23	0.16	0.16	1.60
Small Blend (1996-2014)	<b>3.72</b>	0.33	-0.75	-0.65	-0.77	0.11
Small Growth (1999-2014)	1.11	0.32	-0.48	-0.28	-0.53	0.70
Small Value (1996-2014)	0.62	-0.47	<b>-1.37</b>	-1.12	-0.94	1.08
World Bond (2001-2014)	<b>3.25</b>	-0.49	-0.89	-0.93	-0.81	-0.58
World Stock (2000-2014)	<b>3.93</b>	1.04	0.27	-0.30	-0.32	7.07
Diversified Emerging Mkts (1996-2014)	<b>2.63</b>	<b>2.35</b>	<b>1.66</b>	1.25	0.92	—

Source: Morningstar. Data as of 12-31-2014. Figures in **Bold** are statistically significant.

Short-term performance persistence and weak-to-no persistence in the longer term, which this study documents, is consistent with momentum. As Carhart demonstrated, funds that have recently outperformed may have greater exposure to stocks that have recently outperformed than funds that have recently lagged. Historically, these stocks have tended to continue to outperform in the short run, as investors may stick with recent winners or be slow to react to new information. While such exposure can benefit investors, it is not indicative of unique manager skill.

More broadly, differences in returns across funds do not provide sufficient evidence of skill, as they may be driven by differences in style characteristics. Although funds within each style category have similar value/growth and size characteristics, there can still be meaningful differences among them that may drive relative returns within a category.

### Regression Analysis: Equity

In order to better understand what drove the differences in returns between the top and bottom prior performance quintiles, we regressed these return spreads against a few well-known return drivers. On the equity side, these included the market risk premium (return on a broad market index minus the return on one-month Treasuries), the size premium, the value premium, and momentum. The size premium captures the return of small-cap stocks minus the return of large-cap stocks, labeled in the tables as SMB. The value factor measures the difference between the returns of stocks with high and low book value relative to price, labeled as HML. The momentum factor measures the

subsequent return difference between stocks with the best and worst price performance over the previous 12 months, excluding the most recent one, labeled as WML.

Data for all the factors are from the French Data Library. Differences in returns that can't be attributed to one of those four factors are reported as alpha, which can be interpreted as a proxy for skill.

A positive alpha suggests that previous top-performing managers (Q1) are more skilled than those in the bottom quintile (Q5) on average. A positive market beta suggests the funds in the top quintile are taking greater market risk, and positive coefficients on the SMB, HML, and WML factors suggest they have greater exposure to small-cap, value, and momentum stocks, respectively. The opposite is true when the figures are negative. Only the bolded figures in the regression output are statistically significant. The results are presented on page 8.

For example, consider the regression output for the one-year sorting period for the large-blend category. The alpha is positive but not statistically significant, suggesting that there is not compelling evidence that the return spread between the funds in the top and bottom quintiles owed to differences in skill. There is a small but statistically significant difference in market betas, indicating that previous top performers took slightly greater market risk than the previous laggards in the holding period. Similarly, the positive coefficient on SMB and negative loading on HML (both of which are statistically significant) indicate that the managers in the top quintile exhibited a smaller-cap and stronger growth tilt than those in the bottom quintile.

More interestingly, the positive and significant coefficient on the WML factor suggests that the managers in the top quintile had greater exposure to stocks with positive momentum (or less exposure to stocks with negative momentum) than those in the bottom quintile during the holding periods. The adjusted R-squared indicates how well the model fit the data. In this case, the regression could explain 56% of the variance in the returns between the funds in the top and bottom quintiles. This means that the model explains a significant part of the story, but there is much it doesn't capture.

Overall, differences in momentum, rather than differences in skill, appear to explain return persistence in the short term. Over the one-year sorting and holding windows, funds in the top quintile exhibited stronger exposure to the momentum factor than those in the bottom quintile in every category, and all of these differences were statistically significant. Yet the alphas were not statistically significant in any category, indicating that differences in skill could not explain one-year performance persistence.

Over longer windows, the difference in momentum exposures between the top and bottom quintiles declined, which may explain why the performance gaps narrowed. The explanatory power of the

regressions also declined.<sup>3</sup> Outside the one-year window, there generally wasn't a big difference in market betas or market-cap orientations between the top and bottom quintiles in most categories.

More often than not, previous outperformers had a stronger growth tilt than previous losers during the holding periods. This is not surprising because previous top performers likely own stocks that have appreciated more than their counterparts and have more richly valued portfolios as a result.

After controlling for differences in style characteristics between the top and bottom prior performance quintiles, most differences in performance could not be attributed to differences in skill. There were a few exceptions. Skill may have contributed to performance persistence in the diversified emerging-markets category in the two-, three-, and four-year sorting periods. Skill also may have contributed to the return spreads between the top and bottom quintiles in the large-growth and large-value categories in the 10-year sorting period and to the spread in the mid-cap value category in the two-year sorting period. In contrast, the previous winners in the mid-cap growth category in the 10-year sorting period appeared to have less skill in the subsequent 10 years than the previous losers. This helps explain why relative performance reversed in this category, as illustrated in Exhibit 3.

Some caveats are in order. The low adjusted R-squared values suggest that there is much that these models do not capture. If there are any relevant variables missing from the model, it may over- or understate the return to skill. (For instance, the model ignores differences in expense ratios and transaction costs.) Even if the models were specified perfectly, some of the results might appear significant by chance. With a 5% significance level and 66 regressions, we would expect three regressions (5% times 66) to have statistically significant alphas by chance, even if none of the managers were skilled.

**Exhibit 4** One-Year Sorting Period Regression Output

	Large Blend	Large Growth	Large Value	Mid-Cap Blend	Mid-Cap Growth	Mid-Cap Value	Small Blend	Small Growth	Small Value	World Stock	Diversified EM	Average
Alpha	0.06	-0.06	0.03	0.06	-0.01	-0.01	0.19	0.00	-0.03	0.03	0.10	0.03
Market Beta	<b>0.03</b>	0.05	0.01	0.05	0.02	<b>0.05</b>	0.02	0.02	0.00	<b>0.08</b>	<b>0.07</b>	0.04
SMB	<b>0.08</b>	<b>0.18</b>	<b>0.05</b>	<b>0.21</b>	<b>0.28</b>	<b>0.07</b>	<b>0.17</b>	<b>0.29</b>	0.03	<b>0.18</b>	0.02	0.14
HML	<b>-0.07</b>	-0.06	<b>-0.06</b>	<b>-0.13</b>	<b>-0.11</b>	<b>-0.12</b>	<b>-0.10</b>	-0.07	<b>-0.06</b>	<b>0.17</b>	-0.02	-0.06
WML	<b>0.15</b>	<b>0.23</b>	<b>0.17</b>	<b>0.27</b>	<b>0.29</b>	<b>0.17</b>	<b>0.19</b>	<b>0.26</b>	<b>0.18</b>	<b>0.29</b>	<b>0.17</b>	0.22
Adj R2	0.56	0.49	0.52	0.60	0.43	0.44	0.43	0.53	0.46	0.44	0.27	0.47

Source: Morningstar. Data as of 12-31-2014. Figures in **Bold** are statistically significant.

<sup>3</sup> The regressions continued to explain much of the absolute performance of the individual quintiles but less so for the differences between the top and bottom quintiles.



**Exhibit 5** Two-Year Sorting Period Regression Output

	Large Blend	Large Growth	Large Value	Mid-Cap Blend	Mid-Cap Growth	Mid-Cap Value	Small Blend	Small Growth	Small Value	World Stock	Diversified EM	Average
Alpha	0.02	-0.06	0.02	0.02	-0.07	<b>0.16</b>	0.02	0.10	0.02	0.05	<b>0.21</b>	0.04
Market Beta	<b>0.03</b>	<b>0.03</b>	0.02	0.02	0.03	-0.01	0.01	0.04	<b>-0.06</b>	0.02	<b>0.06</b>	0.02
SMB	-0.01	0.02	<b>-0.03</b>	0.02	0.05	<b>-0.06</b>	<b>0.10</b>	<b>0.20</b>	-0.03	0.08	0.01	0.03
HML	<b>-0.11</b>	<b>-0.11</b>	<b>-0.13</b>	<b>-0.15</b>	<b>-0.18</b>	<b>-0.14</b>	<b>-0.10</b>	<b>-0.29</b>	<b>-0.15</b>	-0.06	<b>-0.11</b>	-0.14
WML	<b>0.04</b>	<b>0.05</b>	<b>0.06</b>	<b>0.04</b>	<b>0.04</b>	0.00	<b>0.03</b>	<b>0.11</b>	0.01	<b>0.07</b>	<b>0.07</b>	0.05
Adj R2	0.37	0.26	0.38	0.29	0.30	0.14	0.29	0.56	0.25	0.06	0.23	0.28

Source: Morningstar. Data as of 12-31-2014. Figures in **Bold** are statistically significant.**Exhibit 6** Three-Year Sorting Period Regression Output

	Large Blend	Large Growth	Large Value	Mid-Cap Blend	Mid-Cap Growth	Mid-Cap Value	Small Blend	Small Growth	Small Value	World Stock	Diversified EM	Average
Alpha	0.05	0.00	0.01	-0.05	-0.04	0.07	-0.05	0.04	-0.07	0.02	<b>0.22</b>	0.02
Market Beta	<b>0.03</b>	<b>0.03</b>	<b>0.03</b>	0.01	<b>0.05</b>	0.02	0.00	0.05	<b>-0.05</b>	<b>0.05</b>	<b>0.07</b>	0.03
SMB	<b>-0.06</b>	-0.02	<b>-0.07</b>	-0.01	<b>-0.06</b>	<b>-0.08</b>	<b>0.05</b>	<b>0.20</b>	<b>-0.03</b>	0.05	0.01	0.00
HML	<b>-0.07</b>	<b>-0.06</b>	<b>-0.07</b>	<b>-0.13</b>	<b>-0.08</b>	<b>-0.11</b>	<b>-0.08</b>	<b>-0.27</b>	<b>-0.10</b>	<b>-0.08</b>	<b>-0.15</b>	-0.11
WML	0.01	0.01	<b>0.02</b>	0.00	0.01	<b>-0.03</b>	0.01	<b>0.07</b>	0.01	0.03	0.03	0.02
Adj R2	0.29	0.12	0.21	0.21	0.24	0.13	0.12	0.56	0.21	0.05	0.24	0.22

Source: Morningstar. Data as of 12-31-2014. Figures in **Bold** are statistically significant.**Exhibit 7** Four-Year Sorting Period Regression Output

	Large Blend	Large Growth	Large Value	Mid-Cap Blend	Mid-Cap Growth	Mid-Cap Value	Small Blend	Small Growth	Small Value	World Stock	Diversified EM	Average
Alpha	0.01	0.00	0.00	0.00	-0.01	0.03	-0.06	0.00	-0.04	-0.02	<b>0.17</b>	0.01
Market Beta	<b>0.02</b>	<b>0.03</b>	<b>0.05</b>	0.02	<b>0.05</b>	<b>0.04</b>	0.01	0.04	<b>-0.03</b>	<b>0.07</b>	<b>0.06</b>	0.03
SMB	<b>-0.04</b>	0.01	<b>-0.05</b>	0.00	<b>-0.03</b>	<b>-0.04</b>	<b>0.05</b>	<b>0.15</b>	-0.01	-0.04	0.01	0.00
HML	<b>-0.03</b>	<b>-0.06</b>	<b>-0.04</b>	<b>-0.13</b>	<b>-0.06</b>	0.00	<b>-0.05</b>	<b>-0.15</b>	<b>-0.09</b>	-0.04	<b>-0.13</b>	-0.07
WML	0.00	0.01	0.01	-0.01	<b>0.02</b>	<b>-0.04</b>	<b>0.03</b>	<b>0.08</b>	-0.01	0.01	0.01	0.01
Adj R2	0.21	0.24	0.18	0.30	0.25	0.13	0.14	0.45	0.13	0.06	0.21	0.21

Source: Morningstar. Data as of 12-31-2014. Figures in **Bold** are statistically significant.

**Exhibit 8** Five-Year Sorting Period Regression Output

	Large Blend	Large Growth	Large Value	Mid-Cap Blend	Mid-Cap Growth	Mid-Cap Value	Small Blend	Small Growth	Small Value	World Stock	Diversified EM	Average
Alpha	0.01	0.01	0.01	0.04	-0.03	-0.01	-0.08	-0.02	-0.04	-0.02	0.11	0.00
Market Beta	<b>0.02</b>	<b>0.03</b>	<b>0.06</b>	<b>0.03</b>	<b>0.07</b>	<b>0.07</b>	-0.02	<b>0.07</b>	<b>-0.03</b>	0.03	<b>0.04</b>	0.03
SMB	<b>-0.02</b>	<b>0.04</b>	<b>-0.04</b>	-0.01	-0.01	0.01	<b>0.10</b>	<b>0.14</b>	-0.02	<b>-0.14</b>	-0.01	0.00
HML	-0.01	<b>-0.06</b>	-0.02	<b>-0.09</b>	<b>-0.10</b>	0.02	-0.01	<b>-0.15</b>	<b>-0.03</b>	0.05	<b>-0.10</b>	-0.04
WML	-0.01	0.00	-0.01	-0.01	<b>0.04</b>	<b>-0.02</b>	<b>0.04</b>	<b>0.07</b>	<b>-0.03</b>	-0.01	<b>0.04</b>	0.01
Adj R2	0.11	0.35	0.23	0.22	0.43	0.15	0.21	0.42	0.08	0.04	0.13	0.22

Source: Morningstar. Data as of 12-31-2014. Figures in **Bold** are statistically significant.

**Exhibit 9** 10-Year Sorting Period Regression Output

	Large Blend	Large Growth	Large Value	Mid-Cap Blend	Mid-Cap Growth	Mid-Cap Value	Small Blend	Small Growth	Small Value	World Stock	Diversified EM	Average
Alpha	0.03	<b>0.19</b>	<b>0.12</b>	0.11	<b>-0.11</b>	0.10	-0.02	0.09	0.11	0.21	—	0.03
Market Beta	<b>0.01</b>	<b>0.05</b>	<b>0.06</b>	<b>0.15</b>	0.01	<b>0.09</b>	0.01	<b>0.06</b>	<b>-0.04</b>	<b>0.33</b>	—	0.04
SMB	<b>-0.04</b>	0.01	<b>-0.04</b>	0.00	<b>0.05</b>	<b>0.06</b>	-0.04	<b>0.18</b>	<b>0.07</b>	-0.21	—	0.14
HML	<b>-0.05</b>	<b>-0.09</b>	-0.02	-0.02	<b>-0.11</b>	-0.01	<b>0.07</b>	<b>-0.21</b>	<b>-0.05</b>	<b>0.44</b>	—	-0.06
WML	<b>0.02</b>	0.00	<b>-0.02</b>	-0.02	0.01	<b>-0.04</b>	0.02	<b>0.14</b>	<b>-0.04</b>	0.11	—	0.22
Adj R2	0.22	0.33	0.27	0.36	0.36	0.21	0.07	0.59	0.10	0.15	—	0.47

Source: Morningstar. Data as of 12-31-2014. Figures in **Bold** are statistically significant.

**Regression Analysis: Fixed Income**

The regression models for the three fixed-income categories were a bit different. While some have found evidence of momentum in bond returns, it is difficult to find data to construct a bond momentum factor. Instead, the model for the intermediate-term and high-yield bond categories includes two duration factors (intermediate-term and long-term) and two credit factors (investment-grade credit and high-yield credit).

The intermediate-term duration factor was constructed as the difference between the return on the Barclays Intermediate U.S. Treasury Index and the return on the one-month U.S. Treasury bill. The long-term duration factor is the difference between the return on the Barclays Long and Intermediate U.S. Treasury indexes.

The investment grade credit factor is measured as the average difference in returns on long- and intermediate-term Barclays U.S. Corporate Baa Bond indexes relative to duration-matched Barclays U.S. Treasury indexes. This largely isolates the payoff to Baa credit risk. The high-yield credit factor is defined as the difference between the returns on the Barclays U.S. Corporate High Yield Index and the Barclays U.S. Corporate Baa Intermediate Index.

This model should help explain whether the return gaps between previous top and bottom performers are attributable to differences in interest rate and credit risk. The interpretation of the regression output is similar to the equity analysis: Larger positive coefficients on the duration or credit factors indicate that the funds in Q1 took more rate risk in the period following the sorting date than those in Q5. The results are displayed in the table below.

**Exhibit 10** Bond Sorting Period Regression Output

Name	1-Year		2-Year		3-Year		4-Year		5-Year		10-Year	
	High-Yield	Intermediate-Term	High-Yield	Intermediate-Term	High-Yield	Intermediate-Term	High-Yield	Intermediate-Term	High-Yield	Intermediate-Term	High-Yield	Intermediate-Term
Alpha	0.13	<b>0.09</b>	0.06	0.04	0.02	0.03	0.00	0.00	-0.04	-0.01	0.05	0.03
Intermediate Duration	0.04	0.11	<b>-0.14</b>	0.00	-0.02	-0.03	0.01	0.02	-0.03	0.05	<b>-0.11</b>	-0.01
Long Duration	<b>-0.09</b>	-0.03	0.01	<b>0.04</b>	-0.01	<b>0.06</b>	-0.01	<b>0.04</b>	0.00	<b>0.03</b>	0.03	0.01
Investment-Grade Credit	-0.04	<b>-0.06</b>	0.02	-0.01	<b>0.03</b>	<b>0.02</b>	<b>0.03</b>	<b>0.03</b>	0.01	<b>0.02</b>	0.00	0.00
High-Yield Credit	<b>-0.18</b>	-0.02	<b>-0.08</b>	<b>0.03</b>	0.00	<b>0.05</b>	0.03	<b>0.06</b>	<b>0.07</b>	<b>0.06</b>	<b>0.14</b>	<b>0.06</b>
Adj R2	0.18	0.21	0.02	0.07	0.05	0.31	0.17	0.47	0.17	0.42	0.37	0.11

Source: Morningstar. Data as of 12-31-2014. Figures in **Bold** are statistically significant.

This fixed-income regression model does less to explain the return spreads than the equity model, as the adjusted R-squared values demonstrate. However, the model did a reasonable job explaining the absolute returns of each performance quintile. There only appeared to be a significant difference in skill between the top and bottom quintiles in the intermediate-term bond category in the one-year sorting period. But it is possible that momentum (which was excluded from this model) accounts for the difference in alpha. The previous winners in this category took greater high-yield credit risk than the previous losers in all but the one-year sorting period. They also took more long-duration and investment-grade credit risk in the three-, four-, and five-year sorting periods. It is also interesting to note that the previous winners in the high-yield bond category took less high-yield credit risk than the previous laggards in the one- and two-year sorting periods. The opposite was true in the five- and 10-year sorting windows.

Since data are limited, the regression model for the world-bond category only included one duration factor and two credit factors. The duration factor measures the difference between the returns on the Barclays Global Treasury Index and global T-bills.<sup>4</sup> The investment-grade credit factor is the difference between the returns on the Barclays Global Aggregate Corporate Bond and Treasury indexes. Finally, the high-yield factor is defined as the return difference between the Barclays Global High Yield and Barclays Global Aggregate Corporate Bond indexes. The results are displayed below.

<sup>4</sup> The T-bill data are from the French Data Library.

**Exhibit 11** World Bond Sorting Period Regression Output

	1-Year	2-Year	3-Year	4-Year	5-Year	10-Year
Alpha	0.22	-0.12	<b>-0.14</b>	<b>-0.18</b>	-0.12	0.05
Intermediate Duration	<b>0.23</b>	<b>0.15</b>	0.04	<b>0.14</b>	0.03	<b>-0.23</b>
Investment-Grade Credit	0.03	0.11	<b>0.20</b>	<b>0.17</b>	<b>0.13</b>	<b>-0.07</b>
High-Yield Credit	-0.08	<b>0.10</b>	<b>0.16</b>	<b>0.16</b>	<b>0.13</b>	<b>-0.05</b>
Adj R2	0.06	0.07	0.28	0.20	0.12	0.42

Source: Morningstar. Data as of 12-31-2014. Figures in **Bold** are statistically significant.

Recall that performance in the world-bond category only persisted in the one-year sorting and holding period. Over that horizon, funds in the top quintile took on greater interest-rate risk than those in the bottom quintile, but there was no significant difference in skill. The previous winners also appeared to take greater risk in the two-, three-, four-, and five-year periods than the previous laggards. This risk profile reversed over the 10-year sorting period, where the funds in the top quintile exhibited lower interest-rate and credit risk than those in the bottom quintile in the subsequent holding periods. It is also notable that the previous winners generated significantly lower returns from skill than the previous losers in the three- and four-year lookback and holding periods.

**Success and Survivorship Rates**

To here, our analysis has focused on the average returns of the funds in each prior performance quintile, but outliers can influence the results. To better gauge the likelihood of selecting winning funds from each quintile, we track the percentage of funds from each quintile that survive and land in the top half of their surviving category peers from the original sorting group. (This is labeled “success rate” below.) For example, if the top quintile includes 10 funds on the formation date and six subsequently land in the top half of all surviving funds in the category, the success rate is 60%. For reference, we also track the survivorship rates for each quintile.

These data are calculated for each rolling period in the study. The tables below show the differences in the average success and survivorship rates between the top and bottom quintiles across all rolling periods in each sorting window (one, two, three, four, five, and 10 years). Charts showing the absolute success and survivorship rates for each quintile are presented in Appendices D and E, respectively.

**Exhibit 22** Success Rate Differences Between Q1 and Q5

	1 Yr	2 Yr	3 Yr	4 Yr	5 Yr	10 Yr
High-Yield Bond (1996-2014)	12.01	4.96	-4.98	-5.33	2.18	-1.13
Intermediate-Term Bond (1996-2013)	5.85	0.91	3.14	-1.86	-1.19	9.14
Large Blend (1996-2014)	6.40	-2.52	-1.47	-3.49	-2.32	-6.61
Large Growth (1996-2014)	6.92	2.42	-1.52	-4.20	-3.02	6.28
Large Value (1996-2014)	6.98	1.67	-2.52	1.48	-0.86	1.03
Mid-Cap Blend (1996-2014)	4.99	1.24	-2.01	-2.68	5.49	6.15
Mid-Cap Growth (1996-2014)	2.17	-1.63	-0.15	-1.98	-0.66	0.77
Mid-Cap Value (1996-2014)	7.84	-2.60	0.77	-1.40	-6.29	0.05
Small Blend (1996-2014)	1.53	0.38	-0.83	-1.74	-5.37	-6.14
Small Growth (1999-2014)	0.33	0.36	-0.46	-1.57	-2.74	9.62
Small Value (1996-2014)	0.86	0.18	-1.02	3.87	0.52	7.22
World Bond (2001-2014)	20.69	-5.96	-0.59	3.44	-2.47	-2.50
World Stock (2000-2014)	9.12	2.13	-4.21	0.67	2.58	13.76
Diversified Emerging Mkts (1996-2014)	6.65	0.80	2.09	-3.50	2.05	—

Source: Morningstar. Data as of 12-31-2014.

**Exhibit 23** Survivorship Rate Differences Between Q1 and Q5

	1 Yr	2 Yr	3 Yr	4 Yr	5 Yr	10 Yr
High-Yield Bond (1996-2014)	2.95	4.39	6.64	9.51	8.70	25.67
Intermediate-Term Bond (1996-2013)	3.73	10.44	15.85	13.30	12.76	22.30
Large Blend (1996-2014)	7.12	11.84	15.31	19.26	22.45	27.68
Large Growth (1996-2014)	4.90	13.21	14.86	18.54	18.97	33.89
Large Value (1996-2014)	5.05	11.64	16.26	16.64	17.96	21.20
Mid-Cap Blend (1996-2014)	3.06	7.56	12.87	11.06	13.52	24.14
Mid-Cap Growth (1996-2014)	3.83	8.73	11.18	14.90	19.98	16.00
Mid-Cap Value (1996-2014)	4.52	9.24	13.32	15.23	17.87	16.24
Small Blend (1996-2014)	5.18	9.66	12.49	17.27	16.77	3.10
Small Growth (1999-2014)	7.63	17.36	22.54	25.40	27.83	8.12
Small Value (1996-2014)	4.53	6.91	7.37	4.94	8.19	12.96
World Bond (2001-2014)	5.78	7.94	12.00	14.00	13.58	-9.58
World Stock (2000-2014)	7.59	14.08	14.58	20.35	29.95	72.00
Diversified Emerging Mkts (1996-2014)	4.54	8.30	12.11	20.22	28.59	—

Source: Morningstar. Data as of 12-31-2014.

Consistent with the previous results, the top quintiles (Q1) tended to have higher success rates than the bottom quintiles in most categories over the one-year lookback and holding horizon. This success-rate gap was largest in the world-bond and high-yield bond categories and smallest in the small-growth and small-value categories. To illustrate, on average 61% of the funds in Q1 in the world-bond category went on to land in the top half of their surviving peers over the subsequent one-year holding periods. The corresponding figure for Q5 was 40%, for a gap of 21%. There was virtually no difference in the success rates between the top and bottom quintiles in the small-growth and small-value categories. But the top quintiles did not exhibit lower success rates than the bottom quintiles in any category in the one-year windows.

Over longer horizons, the success-rate gaps between the top and bottom quintiles generally were smaller, particularly in the two-, three-, four- and five-year sorting periods. Over these horizons, the difference between the success rates for the top and bottom quintiles was less than 5% (when it was positive) in all but one case (the five-year sorting period in the mid-blend category). In contrast, the one-year success rates of Q1 exceeded the corresponding figures for Q5 by more than 5% in nine of the 14 categories. The success rate gap between the top and bottom quintile was negative in many categories over these longer windows. But top quintile funds opened up a wider success rate advantage in several categories over the 10-year sorting period, partially due to larger differences in survivorship rates over that horizon. (These gaps were still smaller on average than they were over the one-year horizon.)

It is also notable that the success rates are fairly low in most cases for the lookback and holding periods longer than a year. This suggests that it is difficult to pick funds that will outperform over the long term based on their prior records alone. For example, of the funds that landed in the top quintile of the large-blend category in the 10-year lookback periods, on average only 36% went on to land in the top half of their surviving peers in the subsequent 10 years.

Yet, the top prior performance quintiles had higher survivorship rates than the bottom quintiles across the board in each sorting period. (The sole exception appeared in the 10-year sorting period for the world-bond category.) This isn't surprising because it's easier to market funds with good records than laggards, which asset managers are more likely to merge or liquidate. Differences in the survivorship rates between the top and bottom quintiles tended to increase with the length of the lookback and holding periods. This is because funds with extended slumps are more likely to lose assets and become less viable than those with attractive long-term records. High rates of attrition in the lower performance quintiles over long windows can limit mean-reversion because many of these funds are merged or liquidated away before they have a chance to improve their performance.

## Conclusion

This study suggests that there is no meaningful relationship between past and future fund performance over long horizons. However, it offers some evidence that relative performance tends to persist in the short term. Funds that have outperformed over the past year often continue to do so over the next year, and vice versa. On the equity side, this effect can be attributed to differences in exposure to momentum stocks rather than differences in skill. These results are consistent with previous academic findings. Differences in skill may have contributed to the short-term persistence in intermediate-term bond fund returns, but it is possible that momentum (which was not included in the model) could be at work here as well.

It is difficult to identify funds that will outperform over the long term based solely on their past performance. The difference in success rates between the top and bottom prior performance quintiles is fairly small in most categories in the lookback and holding periods longer than a year. In

contrast to long-term returns, survivorship rates do appear to be related to past performance, and this relationship tends to be stronger over longer periods.

It is clear that investors need a more holistic framework to select funds that have a good chance to outperform over the long term. This is why Morningstar began qualitatively evaluating mutual funds nearly 30 years ago. In 2011, Morningstar launched a forward-looking qualitative rating system that evaluates mutual funds in five “Pillars”: Process, People, Parent, Price, and Performance. Top-rated funds have a well-defined investment process that managers consistently apply, and a competitive edge that should allow them to execute the strategy better than others. These funds have an experienced management team with long tenure on the strategy and skin in the game through significant investments in fund shares. They are offered by an asset-management firm (parent) that’s a responsible steward of capital, and have competitive fees and a record of success that is consistent with expectations for the strategy.

Together, these characteristics will likely point to better long-term investments. Nowhere is that more evident than with fees. A recent study by Morningstar’s Russel Kinnel demonstrated that a simple screen for low-cost funds can significantly improve investors’ odds of success. Morningstar research also found that firms that are strong stewards of capital offered funds that were more likely to outperform than those with weaker stewardship practices. These factors, together with a rigorous qualitative assessment of the management team and investment process, should supplement performance analysis. Over the past decade through July 2015, more than 70% of funds in each asset class that had a Morningstar Analyst Rating of Gold or were designated as a Fund Analyst Pick (a predecessor ratings system) have outperformed their category average. This suggests that a comprehensive approach to fund analysis can improve investors’ odds of success. ■■

## Appendix A: Previous Studies

In their paper, "Performance Persistence," Stephen Brown and William Getzmann found that performance from one year persists to the next, largely because the worst performers continue to disappoint. They also found that persistence across managers is correlated, which is consistent with Carhart's momentum explanation. Additional studies documenting short-term performance persistence include "Short-term Persistence in Mutual Fund Performance," by Bollen and Busse and "Mutual Fund Performance Persistence, Market Efficiency and Breadth" by Joop Huij and Simon Lansdorp.

A study published by Russ Wermers suggests that investor behavior may contribute to short-term performance persistence. He found that investors tend to chase winners over the previous year. The managers of those funds tend to put this new money to work in momentum stocks, which may contribute to their outperformance over the subsequent two years. In contrast, managers of recently underperforming funds appear more reluctant to sell losing stocks. Wermers also suggests that investor inflows may push up the stock prices of winning funds' holdings, which may further explain their performance persistence.

Consistent with these studies, Edwin Elton, Martin Gruber, and Christopher Blake found that total returns over the past year were highly correlated with future excess returns after controlling for style (or alpha) over the next year in their paper, "The Persistence of Risk-Adjusted Mutual Fund Performance." They also found a meaningful relationship between risk-adjusted performance (alpha) over the past three years and the next three years. Their findings suggested that risk-adjusted performance was more persistent than absolute performance.

An earlier study published by Mark Grinblatt and Sheridan Titman offers some additional evidence that performance can persist over longer horizons. Using data from December 1974 through 1984, they found a positive relationship between fund performance in the first half of that period and performance in the second half. However, the data set they use was subject to survivorship bias. Differences in fees and transaction costs could explain part of this persistence, but the authors noted that there was probably more to the story.

Pierre Hereil, Nicolas Moussavi, Philippe Mitaine, and Thierry Roncalli took a different tack and investigated the persistence of Morningstar's star ratings in six categories in their paper, "Mutual Fund Ratings and Performance Persistence." They found that the star ratings tended to persist for less than a year across the categories they investigated. In other words, a fund was no more likely to retain its 5-star rating (for example) than to be assigned another star rating after several months. This does not directly answer the more important question of whether top-performing funds continue to outperform their peers. (For example, a fund that loses its 5-star rating may continue to outperform.) This analysis is also complicated by the fact that star ratings can mean different things for different funds because funds that have been around longer have more performance history behind their star ratings.



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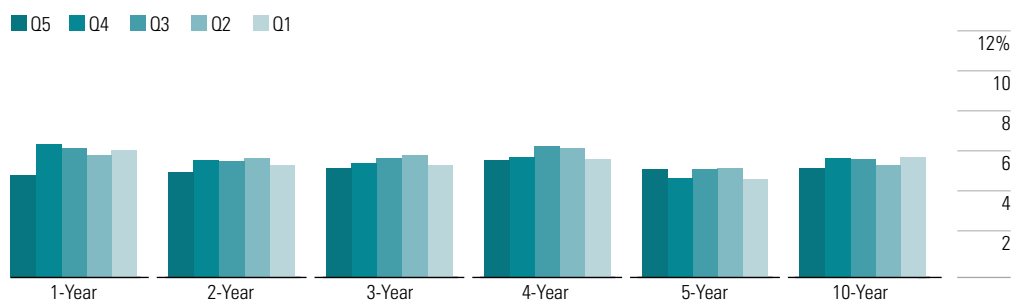
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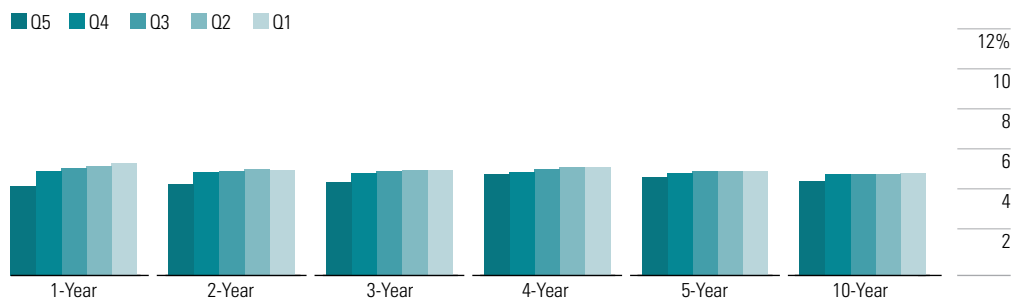
## Appendix C: Annualized Returns by Quintile

**Exhibit 24** High-Yield Bond Annualized Returns % (12/1996-12/2014)

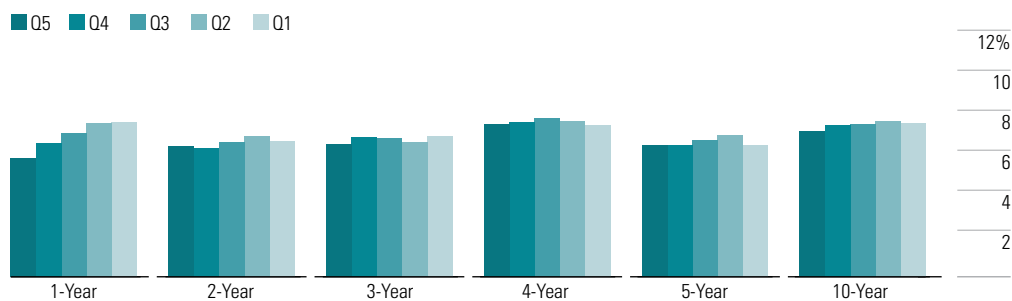


Source: Morningstar. Data as of 12/31/14.

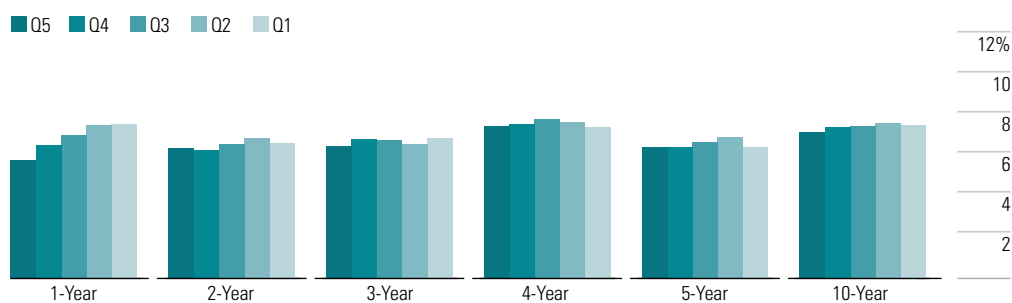
**Exhibit 25** Intermediate-Term Bond Annualized Returns % (12/1996-12/2014)



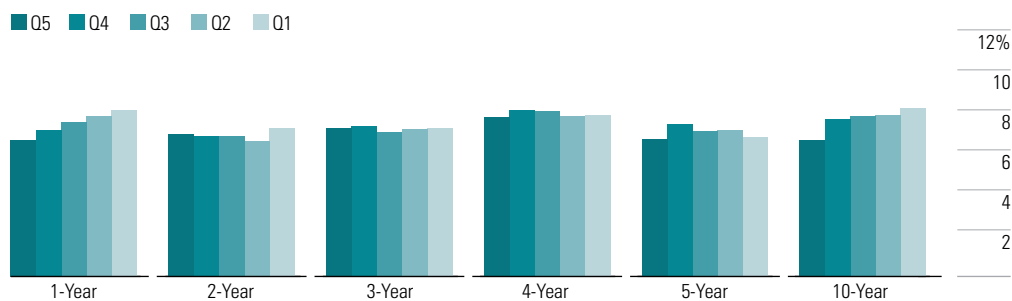
Source: Morningstar. Data as of 12/31/14.

**Exhibit 26** Large Blend Annualized Returns % (12/1996-12/2014)

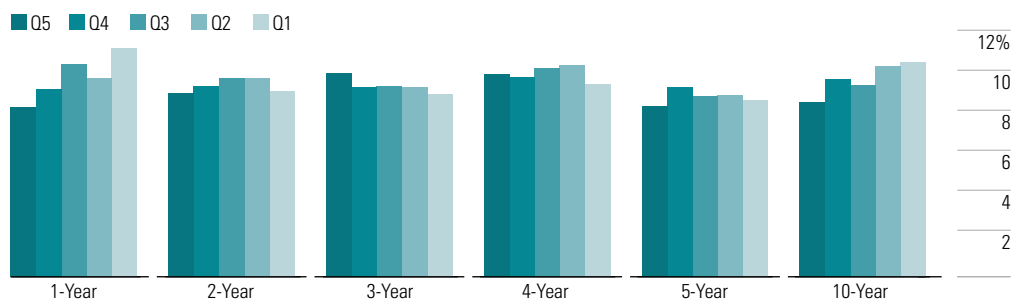
Source: Morningstar. Data as of 12/31/14.

**Exhibit 27** Large Growth Annualized Returns % (12/1996-12/2014)

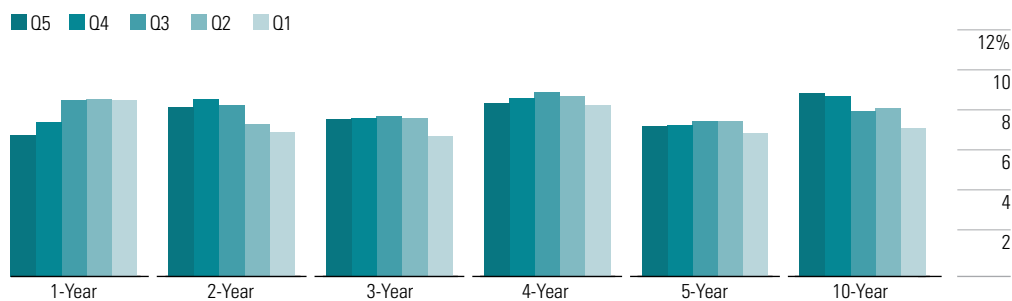
Source: Morningstar. Data as of 12/31/14.

**Exhibit 28** Large Value Annualized Returns % (12/1996-12/2014)

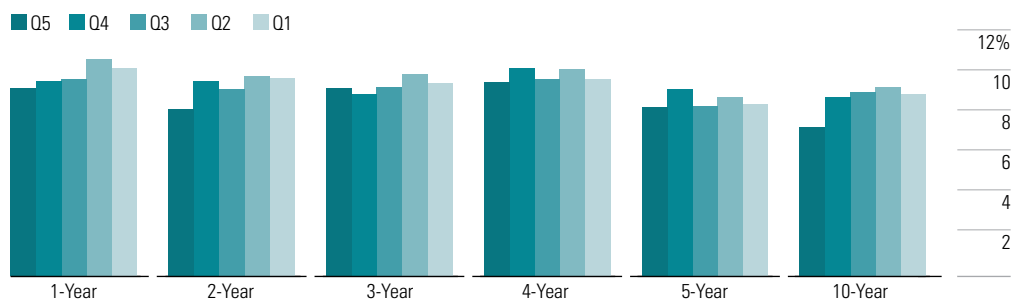
Source: Morningstar. Data as of 12/31/14.

**Exhibit 29** Mid Blend Annualized Returns % (12/1996-12/2014)

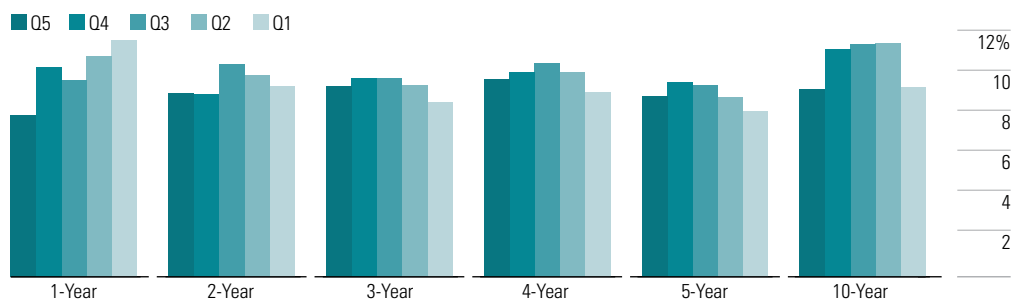
Source: Morningstar. Data as of 12/31/14.

**Exhibit 30** Mid Growth Annualized Returns % (12/1996-12/2014)

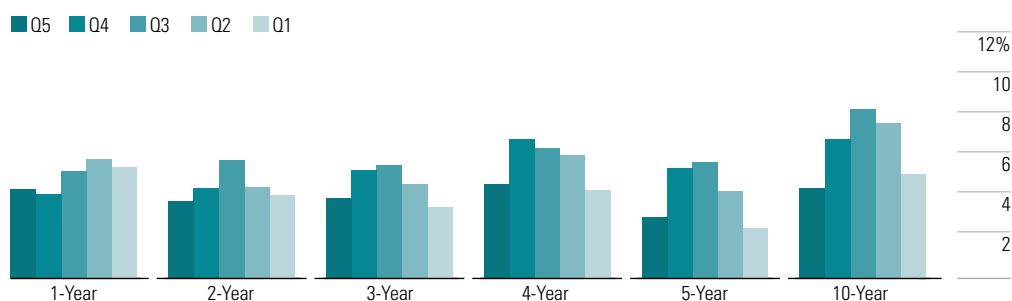
Source: Morningstar. Data as of 12/31/14.

**Exhibit 31** Mid Value Annualized Returns % (12/1996-12/2014)

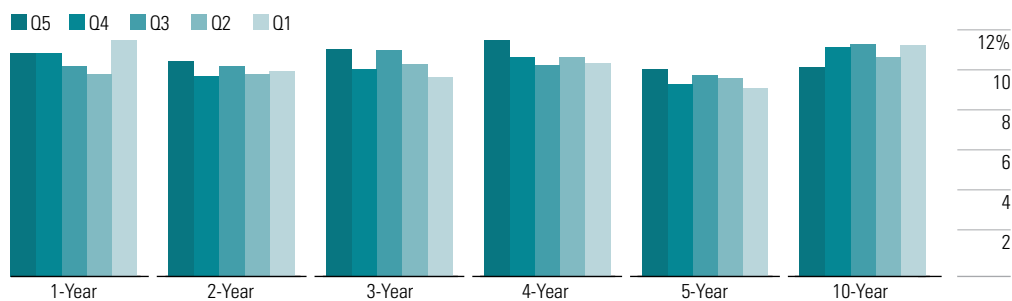
Source: Morningstar. Data as of 12/31/14.

**Exhibit 32** Small Blend Annualized Returns % (12/1996-12/2014)

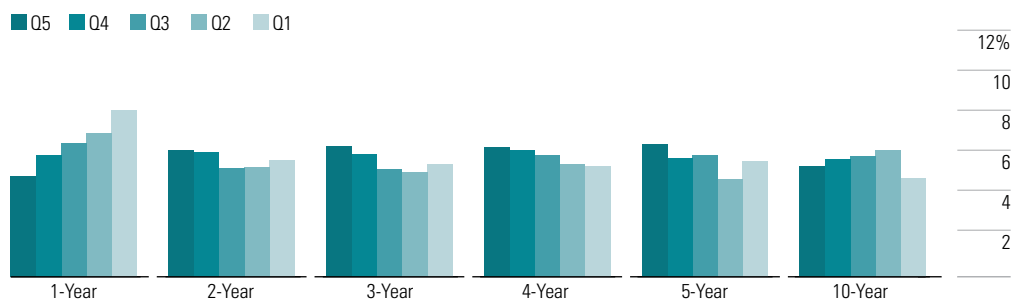
Source: Morningstar. Data as of 12/31/14.

**Exhibit 33** Small Growth Annualized Returns % (12/1999-12/2014)

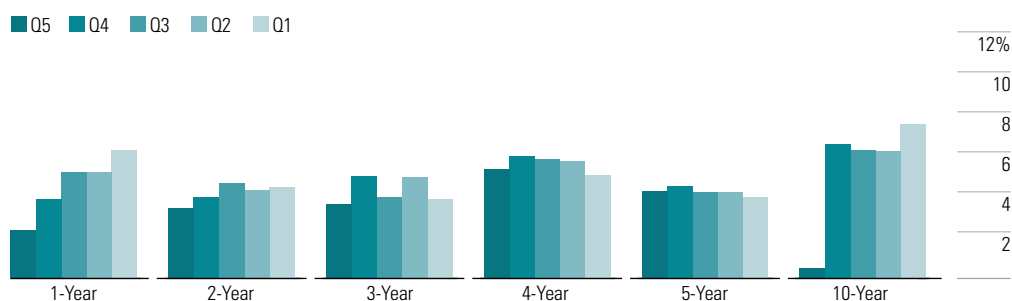
Source: Morningstar. Data as of 12/31/14.

**Exhibit 34** Small Value Annualized Returns % (12/1996-12/2014)

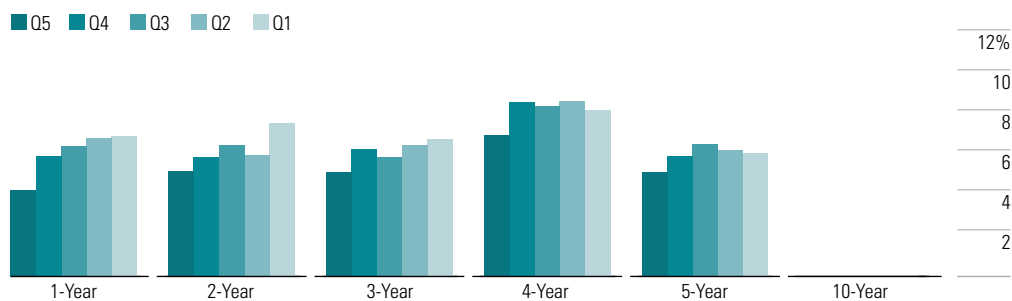
Source: Morningstar. Data as of 12/31/14.

**Exhibit 35** World Bond Annualized Returns % (12/2001-12/2014)

Source: Morningstar. Data as of 12/31/14.

**Exhibit 36** World Stock Annualized Returns % (12/2000-12/2014)

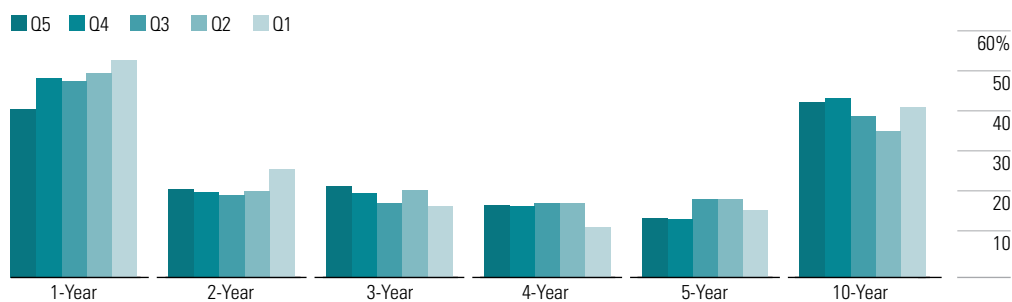
Source: Morningstar. Data as of 12/31/14.

**Exhibit 37** Diversified Emerging Markets Annualized Returns % (12/1999-12/2014)

Source: Morningstar. Data as of 12/31/14.

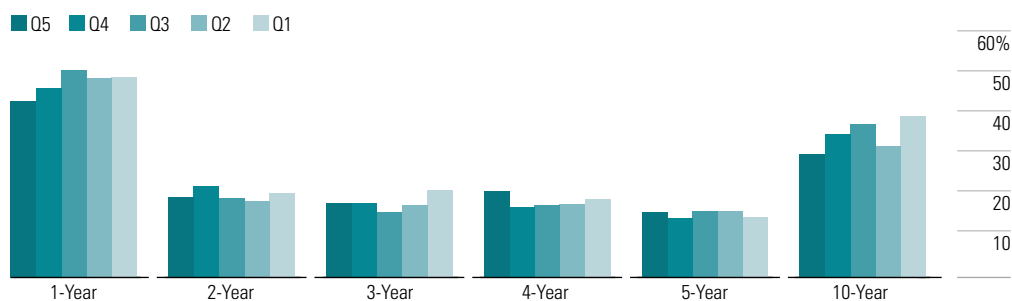
## Appendix D: Success Rate Spreads

**Exhibit 38** High-Yield Bond Success Rate % (12/1996-12/2014)



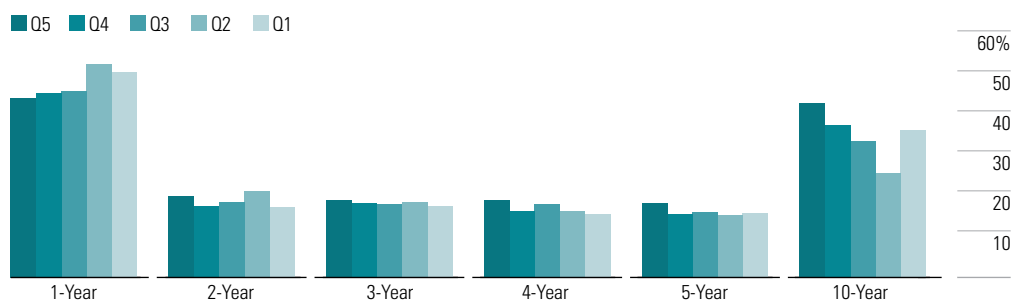
Source: Morningstar. Data as of 12/31/14.

**Exhibit 39** Intermediate-Term Bond Success Rate % (12/1996-12/2014)

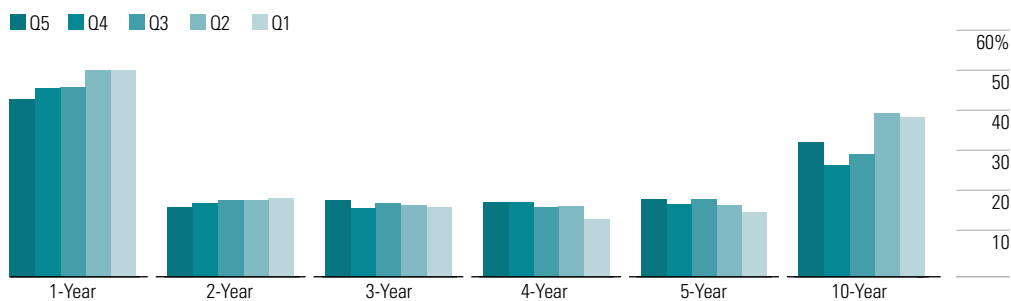


Source: Morningstar. Data as of 12/31/14.

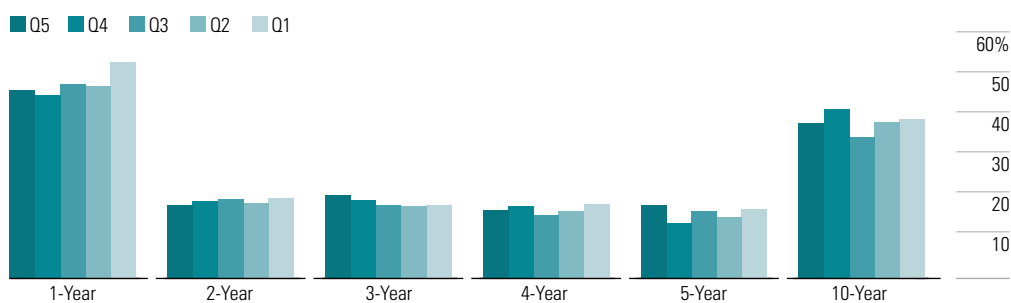
**Exhibit 40** Large Blend Success Rate % (12/1996-12/2014)



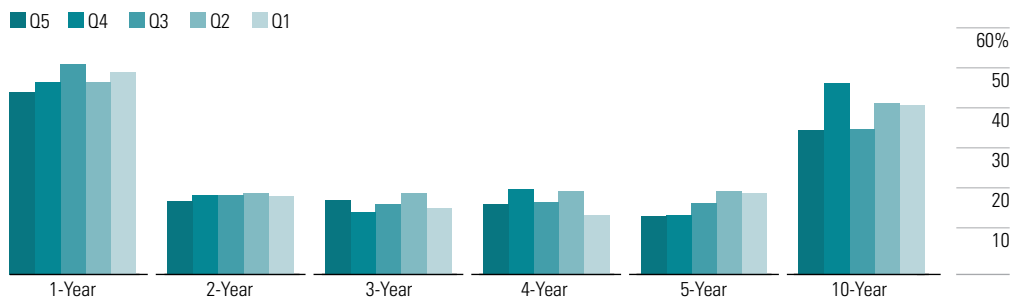
Source: Morningstar. Data as of 12/31/14.

**Exhibit 41** Large Growth Success Rate % (12/1996-12/2014)

Source: Morningstar. Data as of 12/31/14.

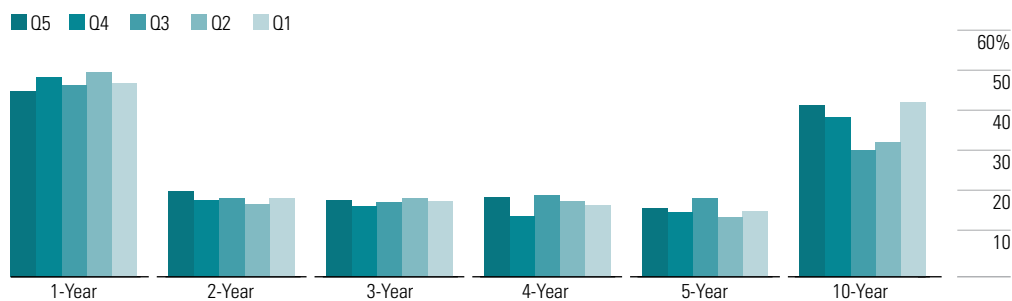
**Exhibit 42** Large Value Success Rate % (12/1996-12/2014)

Source: Morningstar. Data as of 12/31/14.

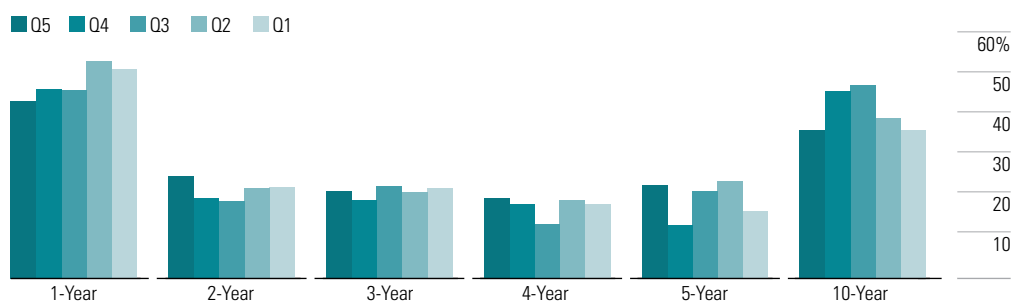
**Exhibit 43** Mid Blend Success Rate % (12/1996-12/2014)

Source: Morningstar. Data as of 12/31/14.

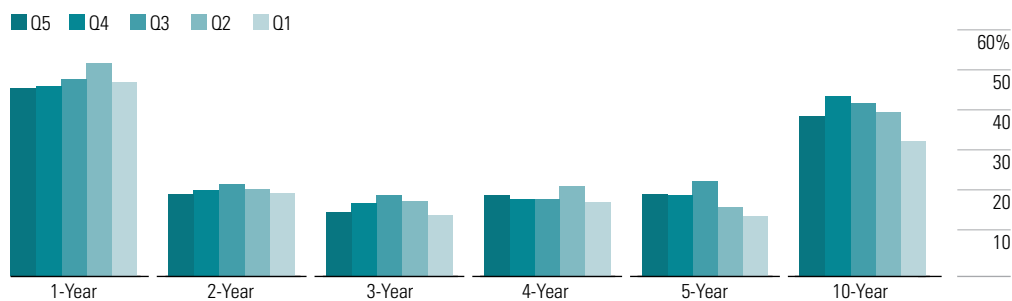


**Exhibit 44** Mid Growth Success Rate % (12/1996-12/2014)

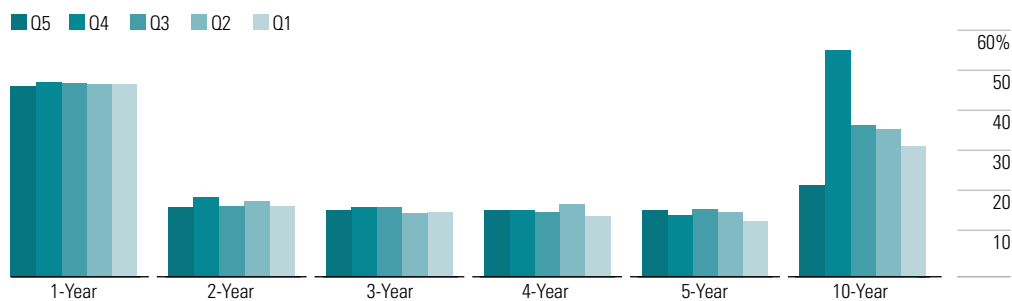
Source: Morningstar. Data as of 12/31/14.

**Exhibit 45** Mid Value Success Rate % (12/1996-12/2014)

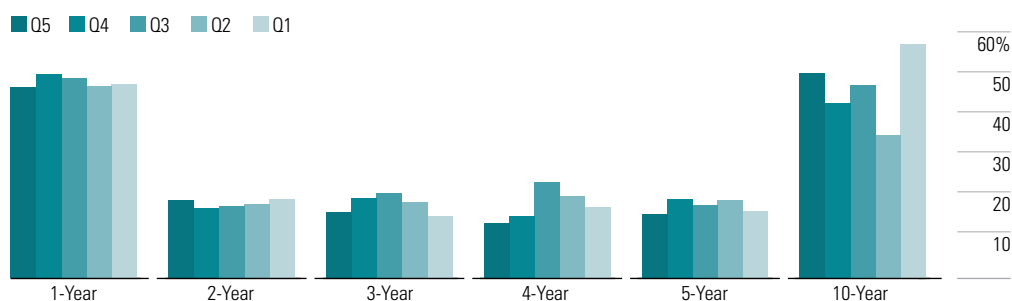
Source: Morningstar. Data as of 12/31/14.

**Exhibit 46** Small Blend Success Rate % (12/1996-12/2014)

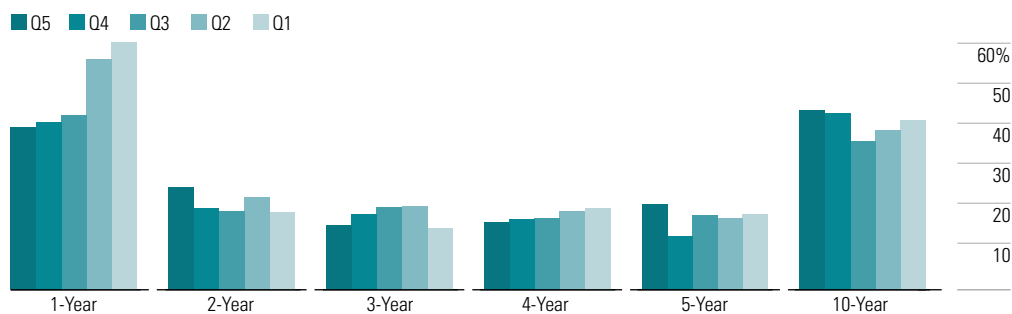
Source: Morningstar. Data as of 12/31/14.

**Exhibit 47** Small Growth Success Rate % (12/1999-12/2014)

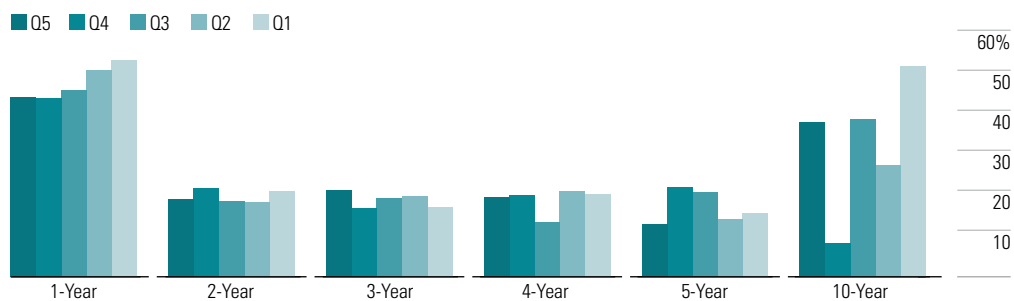
Source: Morningstar. Data as of 12/31/14.

**Exhibit 48** Small Value Success Rate % (12/1999-12/2014)

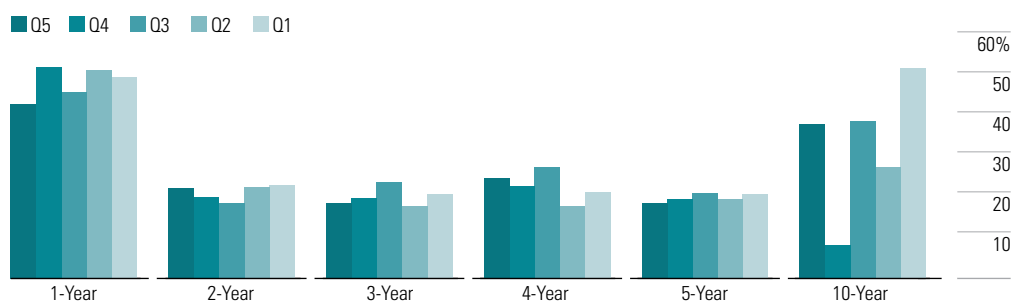
Source: Morningstar. Data as of 12/31/14.

**Exhibit 49** World Bond Success Rate % (12/2001-12/2014)

Source: Morningstar. Data as of 12/31/14.

**Exhibit 50** World Stock Success Rate % (12/2000-12/2014)

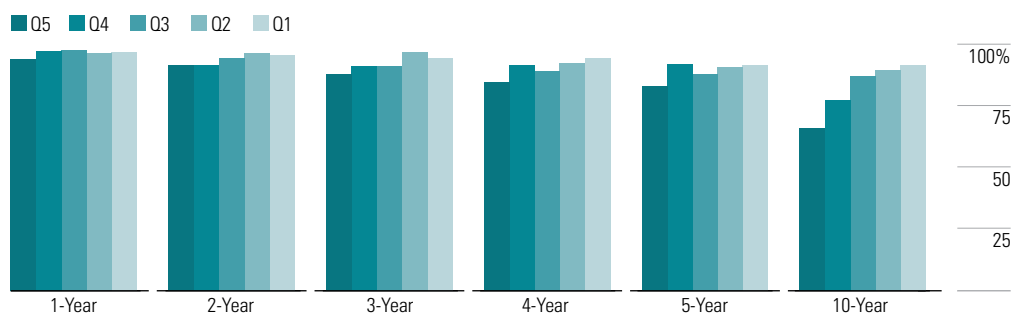
Source: Morningstar. Data as of 12/31/14.

**Exhibit 51** Diversified Emerging Markets Success Rate % (12/1999-12/2014)

Source: Morningstar. Data as of 12/31/14.

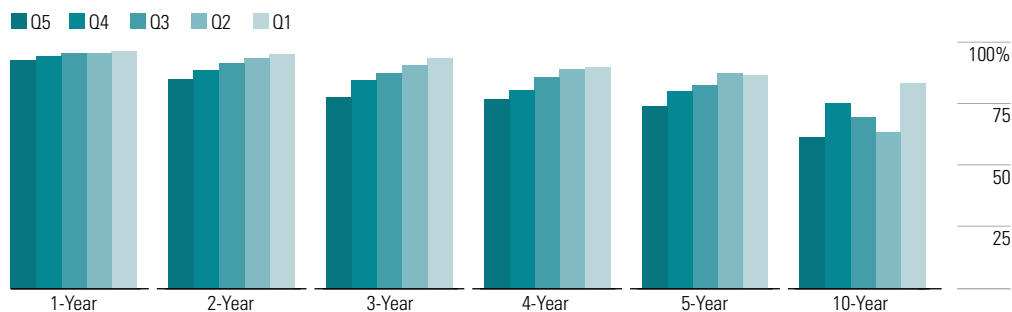
## Appendix E: Survivorship Rate Spreads

**Exhibit 52** High-Yield Bond Survivorship Rate % (12/1996-12/2014)



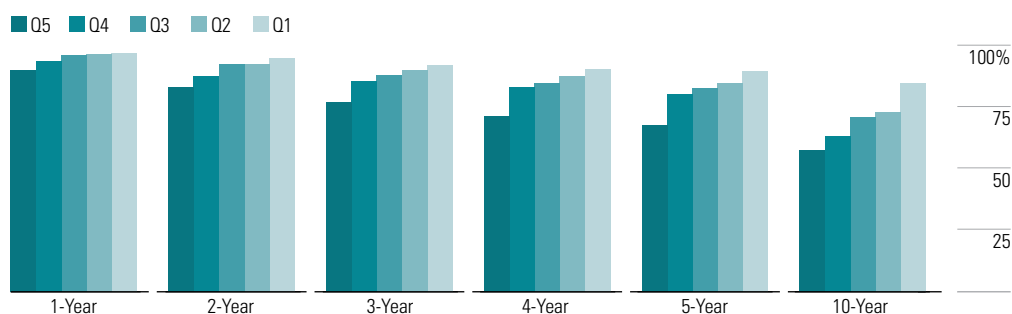
Source: Morningstar. Data as of 12/31/14.

**Exhibit 53** Intermediate-Term Bond Survivorship Rate % (12/1996-12/2014)

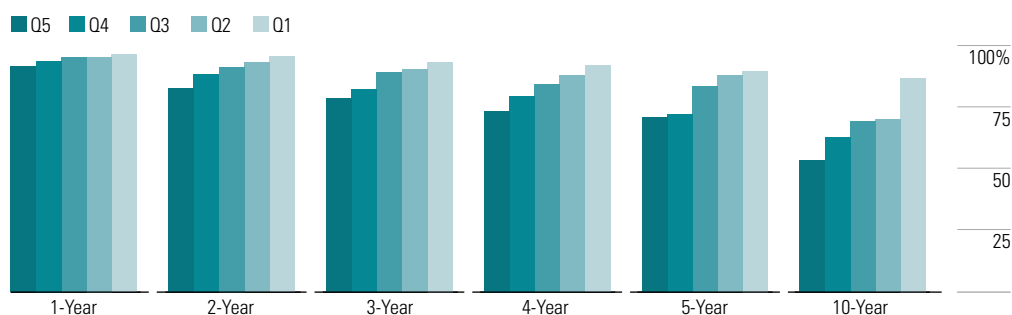


Source: Morningstar. Data as of 12/31/14.

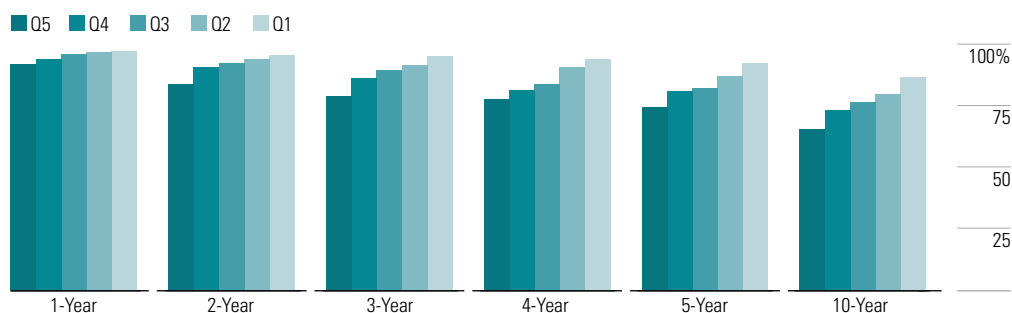
**Exhibit 54** Large Blend Survivorship Rate % (12/1996-12/2014)



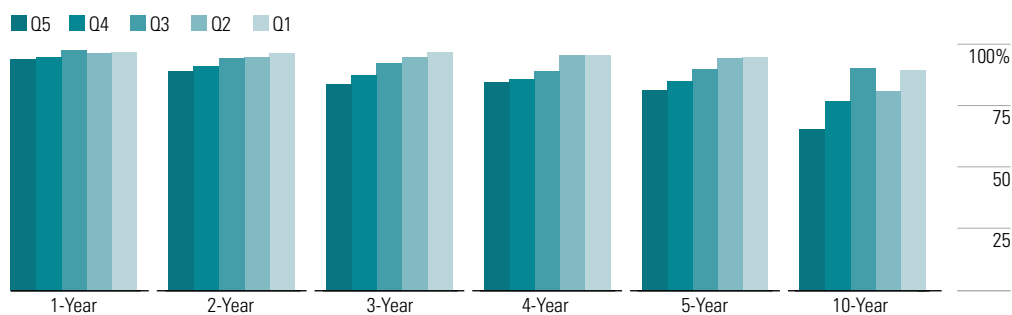
Source: Morningstar. Data as of 12/31/14.

**Exhibit 55** Large Growth Survivorship Rate % (12/1996-12/2014)

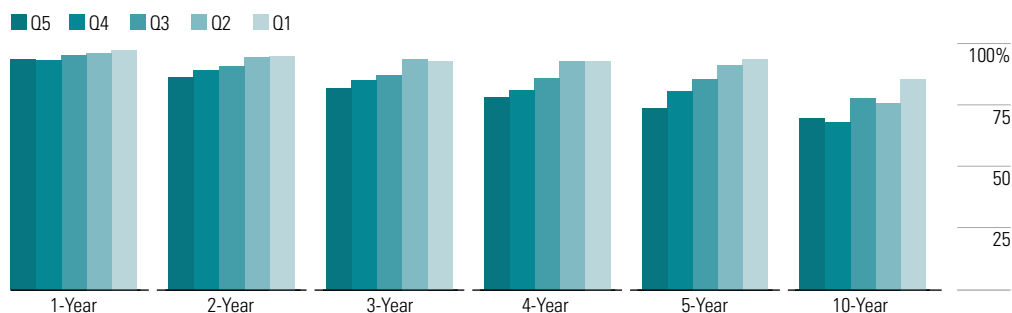
Source: Morningstar. Data as of 12/31/14.

**Exhibit 56** Large Value Survivorship Rate % (12/1996-12/2014)

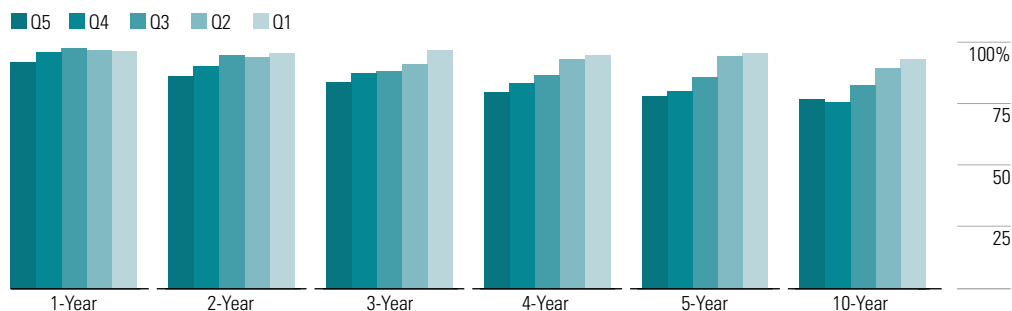
Source: Morningstar. Data as of 12/31/14.

**Exhibit 57** Mid Blend Survivorship Rate % (12/1996-12/2014)

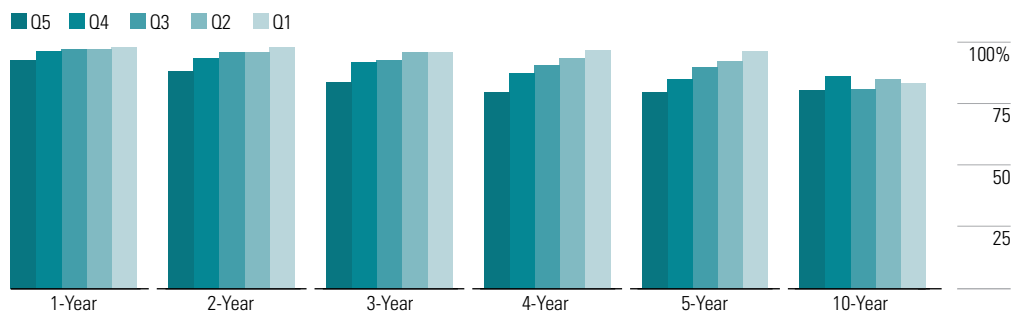
Source: Morningstar. Data as of 12/31/14.

**Exhibit 58** Mid Growth Survivorship Rate % (12/1996-12/2014)

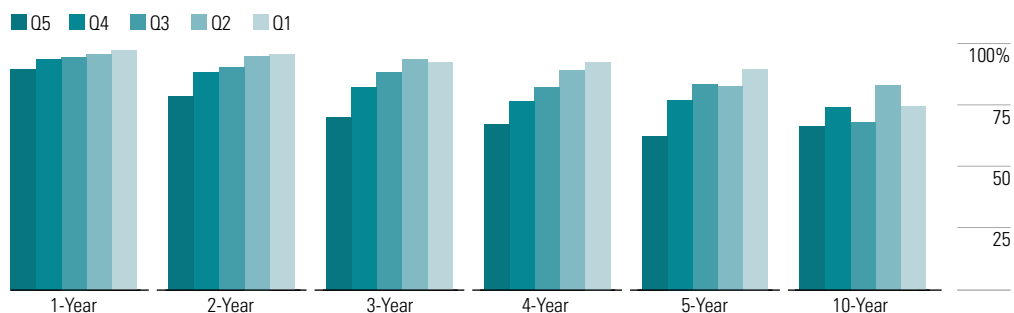
Source: Morningstar. Data as of 12/31/14.

**Exhibit 59** Mid Value Survivorship Rate % (12/1996-12/2014)

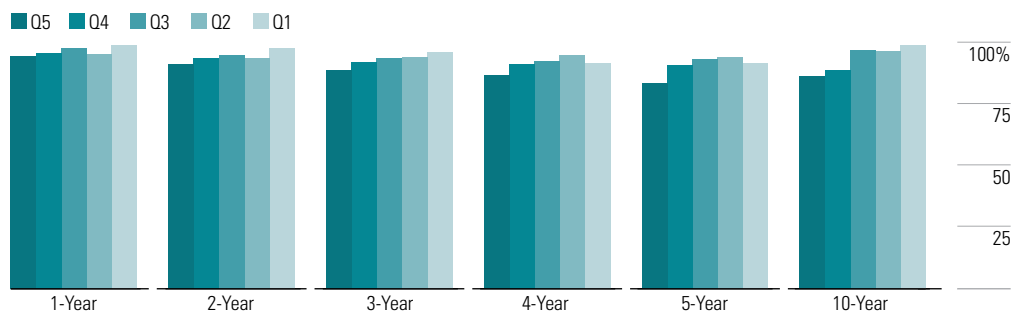
Source: Morningstar. Data as of 12/31/14.

**Exhibit 60** Small Blend Survivorship Rate % (12/1996-12/2014)

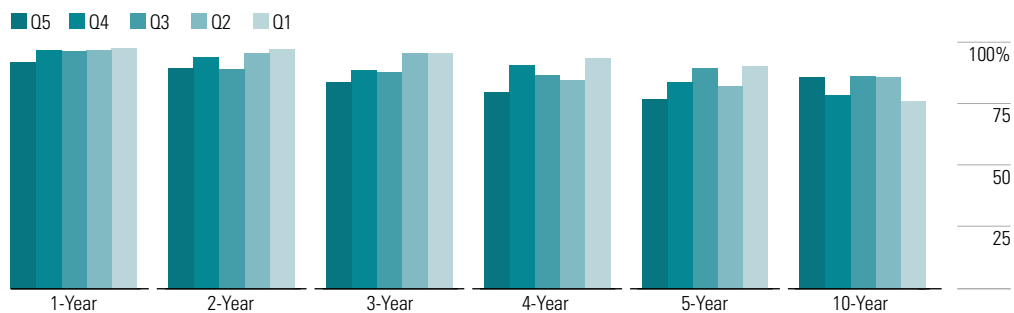
Source: Morningstar. Data as of 12/31/14.

**Exhibit 61** Small Growth Survivorship Rate % (12/1999-12/2014)

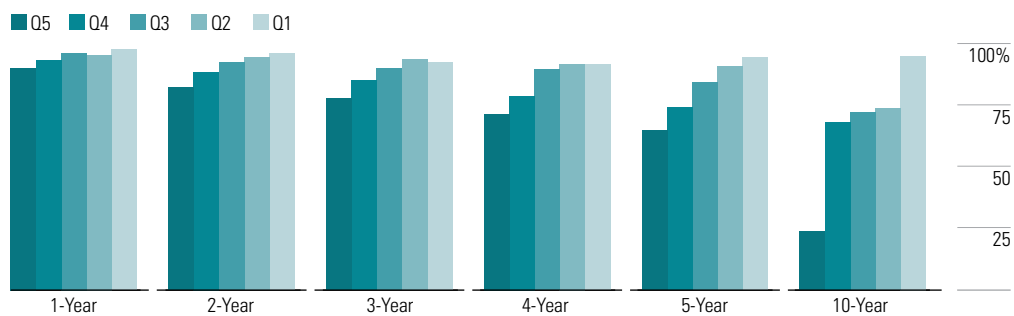
Source: Morningstar. Data as of 12/31/14.

**Exhibit 62** Small Value Survivorship Rate % (12/1996-12/2014)

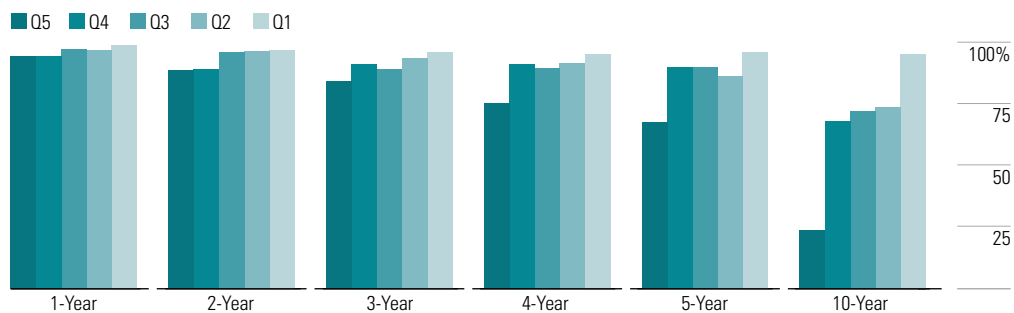
Source: Morningstar. Data as of 12/31/14.

**Exhibit 63** World Bond Survivorship Rate % (12/2001-12/2014)

Source: Morningstar. Data as of 12/31/14.

**Exhibit 64** World Stock Survivorship Rate % (12/2000-12/2014)

Source: Morningstar. Data as of 12/31/14.

**Exhibit 65** World Stock Survivorship Rate % (12/1999-12/2014)

Source: Morningstar. Data as of 12/31/14.