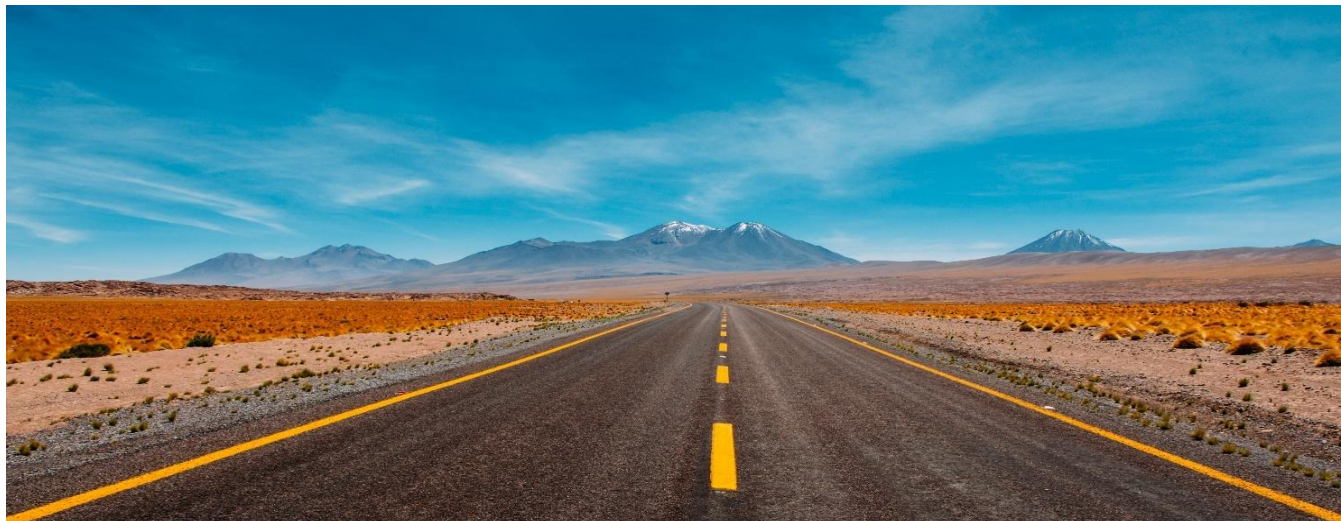




Survey of Capital Market Assumptions

2021 Edition



Horizon Actuarial Services, LLC is proud to serve as the actuary to over 100 multiemployer defined benefit pension plans across the United States and across various industries. As actuary to these plans, we must develop assumptions regarding future investment returns on plan assets. We then use those assumptions as we determine the actuarial values of the benefits promised by these plans to their participants and beneficiaries, as well as to project plan funding and solvency levels years into the future.

At Horizon Actuarial, we are retirement and healthcare actuaries, not investment professionals. Therefore, when developing assumptions as to what returns a pension plan's assets might be expected to earn in the future, we seek input from our colleagues in the investment advisory community. Each year, as part of this survey, we ask different investment firms to provide their "capital market assumptions" – their expectations for future risk and returns for different asset classes in which pension plans commonly invest. The information gathered from this survey can help answer the common question: "Are my plan's investment return assumptions reasonable?"

There are many factors to consider when evaluating a plan's investment return assumptions, such as its asset allocation, the maturity of its participant population, and the purpose of the measurement. Any of these factors can make the expected return for one plan very different from others. Therefore, this report does not opine on the reasonableness of any one plan's investment return assumptions. Nevertheless, we hope this report will be a useful resource for trustees, actuaries, and investment professionals alike.

Horizon Actuarial sincerely thanks the 39 investment advisors who participated in this survey.

Atlanta ■ Cleveland ■ Denver ■ Irvine ■ Los Angeles
Miami ■ San Diego ■ San Francisco ■ Washington, D.C.

Survey of Capital Market Assumptions: 2021 Edition

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Summary

Horizon Actuarial first conducted this survey in 2010, and it included 8 investment advisors. In 2012, we first published a report on the survey results, which included 17 advisors. The survey has expanded considerably in recent years; this 2021 edition of the survey includes assumptions from 39 different investment firms.

Over the last five years, expected returns have declined for all but a few asset classes. The steepest declines have been for fixed income investments such as US corporate bonds and Treasuries, where return expectations have fallen more than 100 basis points since 2019. These declines were driven by recent monetary and fiscal policy interventions, and may have significant implications for multiemployer pension plans. Other asset classes (including both developed market and US equities) have seen significant declines in recent years as well, with the steepest declines generally occurring from 2020 to 2021.

As we have seen in prior surveys, expected returns are noticeably lower over the short term than over the long term. This trend is apparent when we focus on the 24 advisors who provided assumptions for both the short term (up to 10 years) and long term (20 years or more).

For less mature ongoing pension plans without solvency issues, we believe a horizon of 20 years or more is appropriate for evaluating the reasonableness of the long-term investment return assumption. A shorter horizon, such as 10 years, may be more appropriate for evaluating the return assumption for a plan that is more mature or has solvency issues. Even for plans with long-term investment horizons, it is important to understand the potential impact of lower expected returns over the short term. Therefore, this survey shows return expectations over horizons of both 10 years and 20 years.

For illustration, this report also constructs an asset allocation for a hypothetical multiemployer pension plan and uses the results from the survey to develop a range of reasonably expected returns for the plan. Driven by lower expectations across most asset classes, the expected returns for this 2021 edition were 46 basis points lower over a 10-year horizon than they were last year, and 104 basis points lower than they were a mere five years ago. Over a 20-year horizon, the expected returns are 41 basis points lower than last year, and 118 basis points lower than they were five years ago in the 2016 edition of the survey.

If you have questions about how the results of this survey relate to your multiemployer plan, please contact your consultant at Horizon Actuarial or visit the “contact us” page on our website, www.horizonactuarial.com. For questions about the survey itself, please contact Ben Ablin at ben.ablin@horizonactuarial.com.

Horizon Actuarial Services, LLC is an independent consulting firm specializing in providing actuarial and consulting services to multiemployer benefit plans. Horizon Actuarial does not provide investment, legal, or tax advice. Please consult with your investment advisor, legal counsel, or tax advisor for information specific to your plan's investment, legal, or tax implications.

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Survey Participants

Exhibit 1 below lists the 39 investment advisors whose capital market assumptions are included in the 2021 survey. This report does not attribute specific assumptions to individual firms, which is a precondition of the survey.

Originally, this survey was exclusive to the multiemployer plan community; it included only assumptions from investment advisors to multiemployer pension plans. The survey has expanded over the years, and it now includes assumptions from investment advisors outside of the multiemployer plan community.

A complete listing of the firms participating in the survey is provided below.

Exhibit 1

| 2021 Survey Participants | |
|---|---|
| <i>AJ Gallagher</i> | <i>Meketa Investment Group</i> |
| <i>Alan Biller</i> | <i>Mercer</i> |
| <i>AndCo Consulting</i> | <i>Merrill</i> |
| <i>Aon</i> | <i>Milliman</i> |
| <i>The Atlanta Consulting Group</i> | <i>Morgan Stanley Wealth Management</i> |
| <i>Bank of New York Mellon*</i> | <i>NEPC</i> |
| <i>BlackRock*</i> | <i>PFM Asset Management, LLC</i> |
| <i>Callan Associates</i> | <i>Research Affiliates, LLC*</i> |
| <i>Cambridge Associates</i> | <i>Royal Bank of Canada</i> |
| <i>CapTrust</i> | <i>RVK</i> |
| <i>Ellwood Associates</i> | <i>Segal Marco Advisors</i> |
| <i>Envestnet</i> | <i>SEI</i> |
| <i>Goldman Sachs Asset Management</i> | <i>Sellwood Consulting</i> |
| <i>Graystone Consulting</i> | <i>SunTrust</i> |
| <i>Invesco*</i> | <i>UBS</i> |
| <i>Investment Performance Services, LLC (IPS)</i> | <i>The Vanguard Group</i> |
| <i>Janney Montgomery Scott, LLC</i> | <i>Verus</i> |
| <i>J.P. Morgan Asset Management*</i> | <i>Voya Investment Management*</i> |
| <i>Marquette Associates</i> | <i>Willis Towers Watson</i> |
| | <i>Wilshire</i> |

*Assumptions obtained from published white paper.

Investment Horizons

When evaluating the expected return assumption for an active, ongoing multiemployer pension plan, actuaries usually consider investment returns over a long-term investment horizon of 20 years or more. A shorter time horizon, say over the next 10 years, may be more appropriate when evaluating the return assumption for a mature plan, a plan that has high negative cash flows, or a plan that is projected to become insolvent.

It is also important to understand the sensitivity of plan funding to changes in future investment returns. For example, the actuary for an active, ongoing pension plan will typically set the plan's investment return assumption based on expectations over a long-term horizon. However, evaluating the sensitivity of funding results to short-term investment returns that are expected to be higher or lower than the long-term assumption also plays an integral role in the decision-making process.

Advisors provided their most recent capital market assumptions: expected returns for different asset classes, standard deviations (i.e., volatilities) for those expected returns, and a correlation matrix. The advisors also indicated the investment horizon(s) to which their assumptions apply. If the advisor develops separate assumptions for different time horizons, they provided multiple sets of assumptions, one for each time horizon.

In the 2021 edition of the survey, 15 advisors provided one set of assumptions: of which all 15 specified a time horizon of 10 years. The remaining 24 advisors provided assumptions over both shorter-term (5 to 10 years) and longer-term (20 years or more) horizons. Note that two of the advisors rely on the same assumptions as other survey participants. Each assumption set was only counted once, even if it was provided by more than one advisor.

Exhibit 2 below summarizes the time horizons specified by each advisor.

Exhibit 2

| Investment Time Horizons | |
|----------------------------------|-----------|
| Time Horizon | Total |
| 10 Years | 15 |
| <u>Both Short- and Long-Term</u> | <u>24</u> |
| Total | 39 |

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Short-Term vs. Long-Term

As noted in the previous section, survey participants provided expected returns over different time horizons. Given current market conditions, many investment advisors may expect returns for certain asset classes to be different in the short term versus over the long term.

For comparability, this survey groups expected returns into two time horizons: 10 years and 20 years. As pension plan actuaries, we often refer to the 10-year expected returns as “short-term” and the 20-year expected returns as “long-term.” Note, however, that many investment firms consider 10-year expectations to be “long-term.”

When comparing the expected returns for the 24 advisors who provided both short-term and long-term assumptions,¹ we see some interesting differences. See Exhibit 3 below. The expected returns shown below are annualized (geometric) over the indicated time horizons.

Exhibit 3

| Average Expected Returns: Short-Term vs. Long-Term <i>Subset of 24 Survey Respondents</i> | | | |
|--|--------------------|--------------------|------------|
| Asset Class | 10-Year Horizon | 20-Year Horizon | Difference |
| US Equity - Large Cap | 5.94% | 6.65% | 0.71% |
| US Equity - Small/Mid Cap | 6.51% | 7.04% | 0.53% |
| Non-US Equity - Developed | 6.53% | 7.14% | 0.61% |
| Non-US Equity - Emerging | 7.30% | 7.81% | 0.51% |
| US Corporate Bonds - Core | 2.07% | 3.23% | 1.16% |
| US Corporate Bonds - Long Dur. | 2.13% | 3.43% | 1.30% |
| US Corporate Bonds - High Yield | 3.78% | 4.98% | 1.19% |
| Non-US Debt - Developed | 1.33% | 2.25% | 0.93% |
| Non-US Debt - Emerging | 4.46% | 5.32% | 0.86% |
| US Treasuries (Cash Equivalents) | 1.25% | 1.90% | 0.65% |
| TIPS (Inflation-Protected) | 1.59% | 2.38% | 0.79% |
| Real Estate | 5.53% | 6.21% | 0.68% |
| Hedge Funds | 4.66% | 5.33% | 0.67% |
| Commodities | 3.32% | 3.96% | 0.64% |
| Infrastructure | 6.35% | 6.79% | 0.43% |
| Private Equity | 9.13% | 9.65% | 0.52% |
| Private Debt | 6.48% | 6.87% | 0.39% |
| Inflation | 2.14% | 2.23% | 0.09% |

The 10-year and 20-year returns shown above are the averages for the 24 advisors who provided both short-term and long-term assumptions. Expected returns are annualized (geometric).

The consensus among these 24 advisors was that returns are expected to be lower in the short term compared to the long term. In general, the difference between long-

term and short-term returns is more pronounced for fixed income investments. However, the differences are also relatively large for equities and alternative investments such as private equity, real estate, and hedge funds.

As noted earlier, the results shown in Exhibit 3 are based on a subset of 24 advisors. If we include all 39 survey advisors, the differences between short-term and long-term expected returns do not change dramatically for most asset classes. See Exhibit 4 below.

Exhibit 4

| Average Expected Returns: Short-Term vs. Long-Term <i>All Survey Respondents</i> | | | |
|---|--------------------|--------------------|------------|
| Asset Class | 10-Year Horizon | 20-Year Horizon | Difference |
| US Equity - Large Cap | 5.78% | 6.65% | 0.87% |
| US Equity - Small/Mid Cap | 6.27% | 7.04% | 0.77% |
| Non-US Equity - Developed | 6.38% | 7.14% | 0.76% |
| Non-US Equity - Emerging | 7.24% | 7.81% | 0.57% |
| US Corporate Bonds - Core | 2.09% | 3.23% | 1.13% |
| US Corporate Bonds - Long Dur. | 2.18% | 3.43% | 1.25% |
| US Corporate Bonds - High Yield | 3.78% | 4.98% | 1.19% |
| Non-US Debt - Developed | 1.40% | 2.25% | 0.86% |
| Non-US Debt - Emerging | 4.24% | 5.32% | 1.08% |
| US Treasuries (Cash Equivalents) | 1.15% | 1.90% | 0.75% |
| TIPS (Inflation-Protected) | 1.60% | 2.38% | 0.78% |
| Real Estate | 5.50% | 6.21% | 0.71% |
| Hedge Funds | 4.46% | 5.33% | 0.88% |
| Commodities | 3.06% | 3.96% | 0.90% |
| Infrastructure | 6.20% | 6.79% | 0.58% |
| Private Equity | 8.82% | 9.65% | 0.83% |
| Private Debt | 6.45% | 6.87% | 0.42% |
| Inflation | 2.12% | 2.23% | 0.10% |

*10-year horizon results include all 39 survey respondents.
20-year horizon results include a subset of 24 survey respondents.
Expected returns are annualized (geometric).*

The 10-year expected returns shown above include assumptions from all 39 advisors, while the 20-year expected returns include assumptions from only the 24 advisors who provided longer-term assumptions.

Given the significant differences in expected returns over the short term and the long term, it remains important for actuaries to illustrate the effects of near-term underperformance on their clients’ pension funds. Furthermore, it may be appropriate for actuaries to attribute more weight to nearer term expectations when setting the investment return assumption for mature plans whose liabilities have a shorter duration.

¹ In cases where an advisor indicated a time horizon shorter than 10 years, the shorter-term expected returns were combined with the longer-term expected returns to achieve a 10-year horizon. Similarly, if an advisor indicated a time horizon longer than 20 years, the longer-term expected returns were combined with the shorter-term expected returns to achieve a 20-year horizon.

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Differing Opinions

Exhibit 5 below shows the distribution of expected returns and standard deviations (i.e., volatilities) for each asset class in the survey, as provided by the 39 individual advisors in the survey. The expected returns shown are geometric.

Note that the exhibit below focuses on a 10-year horizon in order to include assumptions from all 39 advisors. See Exhibits 16 and 17 in the appendix to this report for a more detailed look at the distribution of expected returns and standard deviations over both 10- and 20-year horizons. The ranges of expected returns by asset class can be found in the appendix as Exhibits 18 and 19.

A summary of the average survey assumptions can be found in the appendix to this report as Exhibit 15. This summary includes expected returns, standard deviations, and a correlation matrix.

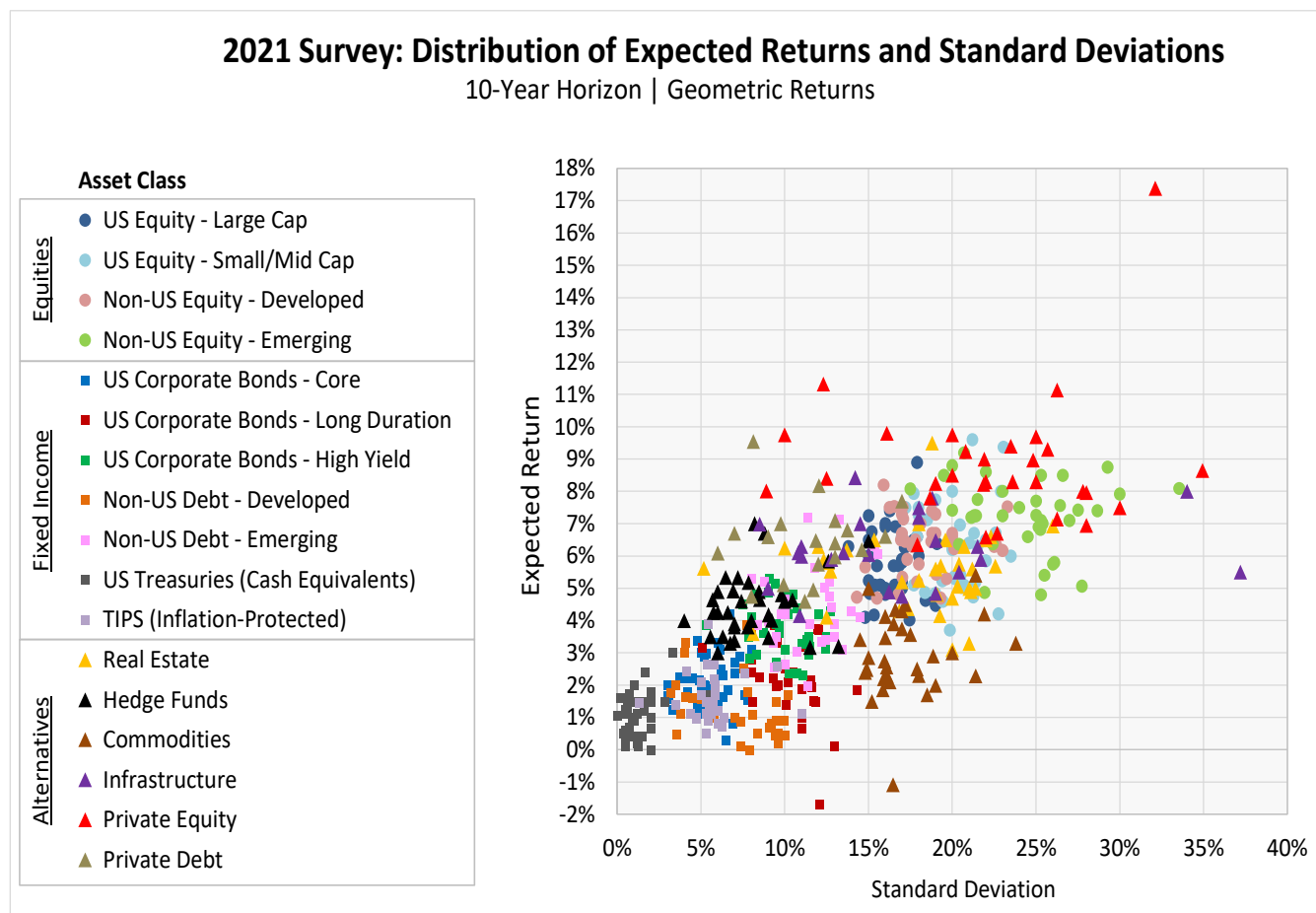
The exhibit below shows that there are significant differences in expected returns and standard deviations among investment advisors. As the saying goes, “reasonable people may differ.”

The distribution of assumptions in the 2021 edition of the survey is wider than ever before, with an expected return of over 17% for private equity from one advisor and an expected return of almost negative 2% for long duration corporate bonds from another advisor.

The differences in assumptions are more pronounced for alternative investments such as real estate, hedge funds, and private equity. A contributing factor may be differences in the underlying strategies different advisors apply to these alternative investments.

To contrast, the differences in expected returns and volatilities are smaller for more traditional investments, such as US equity and US fixed income.

Exhibit 5



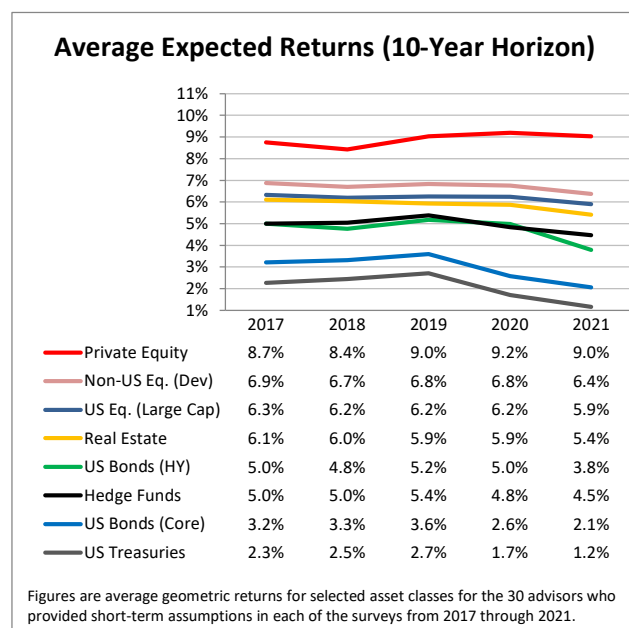
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Changing Outlooks: 2017 to 2021

In recent years, there has been much discussion about whether it is reasonable to expect that future investment returns will be as high as they have been historically. Citing various reasons such as increased equity prices, tightening credit spreads, and the persistence of historically low interest rates, many advisors have lowered their expectations over the last five years.

Exhibit 6 below shows average expected returns over a 10-year horizon for selected asset classes each year from 2017 to 2021. For consistency, this exhibit includes only the 30 advisors who provided short-term assumptions in each of these years.

Exhibit 6



For this subset of advisors, average expected returns over a 10-year horizon have declined for most asset classes. The sharpest declines from 2017 to 2021 were for fixed income investments such as high-yield US bonds (from 5.0% to 3.8%) and core US corporate bonds (from 3.2% to 2.1%).

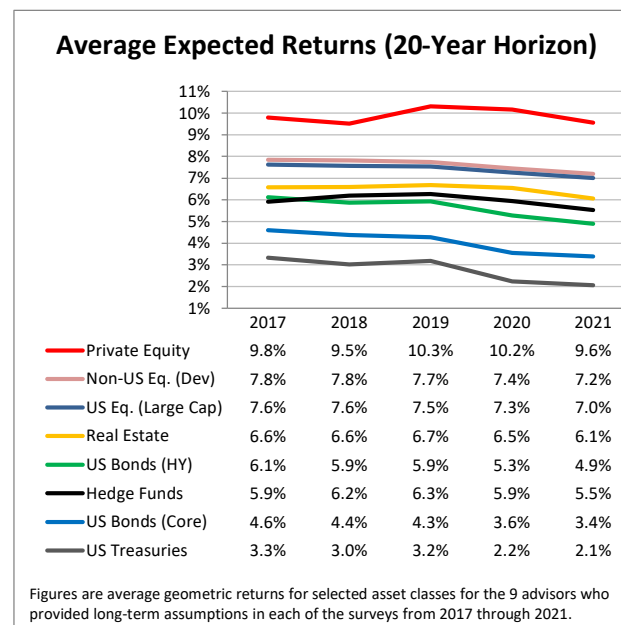
The declines for other asset classes, such as non-US developed market equities, large cap US equities, real estate, and hedge funds have been more gradual, but significant nonetheless, over the 5-year period. The steepest declines generally occurred from 2020 to 2021 for these asset classes.

Expected returns over a 10-year horizon have only increased for one asset class over the 5-year period shown: private equity.

Exhibit 7 below shows how average expected returns have changed for the same asset classes for a subset of 9 advisors who provided assumptions each year from 2017 to 2021 over a 20-year horizon.

Note that the expected returns shown in Exhibits 6 and 7 are not directly comparable with those in other sections or previous surveys because we include only a subset of advisors who participated in each of the last 5 years.

Exhibit 7



Although the expected returns are generally higher over a 20-year horizon than a 10-year horizon, the trends over the 5-year period are very similar.

The overarching theme indicated by the advisors in this 2021 survey is similar to the theme from 2020. Namely, steep declines in return expectations for fixed income investments over both 10-year and 20-year horizons driven by substantial monetary and fiscal policy interventions. These developments remain troubling for defined benefit pension plans. They may not only lead to reduced returns on plan assets, but they may also lead to lower discount rates, resulting in higher present values of promised benefits (liabilities).

Even though multiemployer plans are not required to discount their liabilities using bond yields, they generally have significant allocations to fixed income securities. As a result of these allocations, portfolio level expected returns are likely to decline. For these reasons, the consequences of these interventions on defined benefit pension plans of all types cannot be understated.

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Evaluating the Return Assumption

Multemployer pension plans are usually invested in a well-diversified mix of stocks, bonds, real estate, and alternative investments structured to meet the goals of the Trustees. This typically involves maximizing returns over the long term while minimizing return volatility.

The actuary of a multiemployer pension plan must consider the plan's asset allocation and, based on expectations of future returns, develop an assumption for what plan assets are projected to earn over the long term. This assumption is then used (along with others) to determine the actuarial present value of the benefits promised by the plan to its participants and beneficiaries.

The actuary will often seek input on future return expectations from the plan's investment advisor in developing the plan's investment return assumption. However, as noted earlier, different investment advisors often have widely differing opinions on what future returns will be. Therefore, it can be beneficial to keep in mind other advisors' expectations when setting the investment return assumption.

In the following exhibits, we will evaluate the investment return assumption for a hypothetical multiemployer pension plan. Exhibit 8 below shows the asset allocation for this hypothetical plan. The asset allocations are arbitrary, except for the fact that we made sure to include at least a small allocation to every asset class in the survey.

Exhibit 8

| Asset Class - Hypothetical Plan | Weight |
|------------------------------------|---------------|
| US Equity - Large Cap | 20.0% |
| US Equity - Small/Mid Cap | 10.0% |
| Non-US Equity - Developed | 7.5% |
| Non-US Equity - Emerging | 5.0% |
| US Corporate Bonds - Core | 7.5% |
| US Corporate Bonds - Long Duration | 2.5% |
| US Corporate Bonds - High Yield | 5.0% |
| Non-US Debt - Developed | 5.0% |
| Non-US Debt - Emerging | 2.5% |
| US Treasuries (Cash Equivalents) | 5.0% |
| TIPS (Inflation-Protected) | 5.0% |
| Real Estate | 7.5% |
| Hedge Funds | 5.0% |
| Commodities | 2.5% |
| Infrastructure | 2.5% |
| Private Equity | 5.0% |
| Private Debt | 2.5% |
| TOTAL PORTFOLIO | 100.0% |

Exhibit 9 shows expected annualized (geometric) returns for the hypothetical plan over a 10-year horizon. These results may be appropriate for modeling sensitivities of future funding results to short-term investment returns, or for evaluating the return assumption for a plan with severely negative cash flows or solvency issues.

Exhibit 9

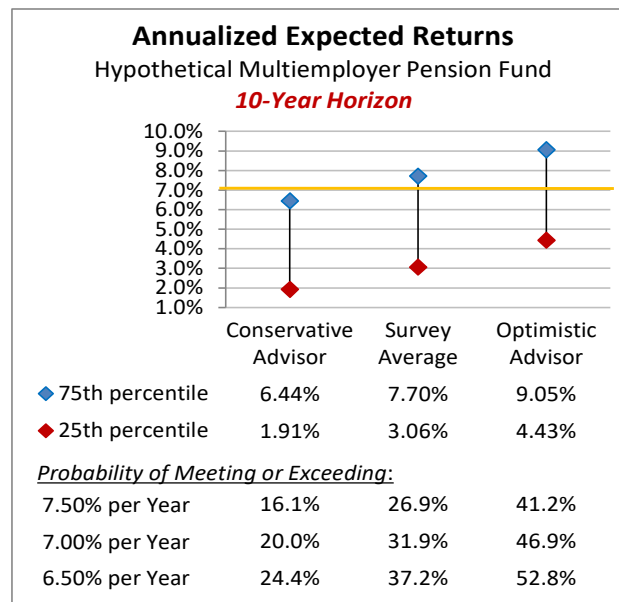
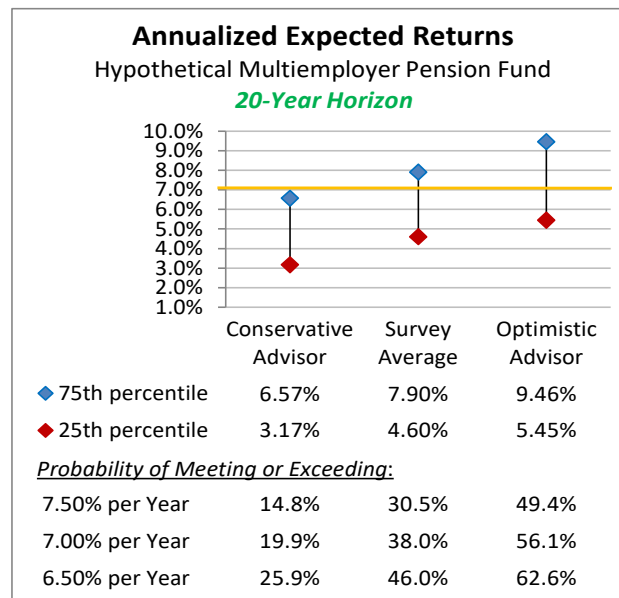


Exhibit 10 shows expected annualized (geometric) returns for the hypothetical plan over a 20-year horizon based on assumptions from the 24 advisors who provided longer-term assumptions. These results may be more appropriate for evaluating the return assumption for a less mature plan with no projected solvency issues.

Exhibit 10



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Evaluating the Return Assumption (cont.)

It is important to keep in mind that the expected returns shown in Exhibits 9 and 10 apply only to the hypothetical asset allocation shown in Exhibit 8. The expected returns will be different – perhaps significantly – for different asset allocations. The following are points to consider when reviewing the results in Exhibits 9 and 10:

Range of Reasonable Assumptions: When setting the investment return assumption for pension valuations, actuaries traditionally constructed a range of reasonable assumptions and then selected a best-estimate point within that range. Actuaries would often consider the reasonable range to be the middle 50 percent of possible results, bounded by the 25th and 75th percentiles.

The applicable actuarial standards of practice were updated in 2013, and the updated standards de-emphasize use of the reasonable range when setting the investment return assumption. Nevertheless, considering this range remains instructive; it may be difficult for an actuary to justify an assumption outside of this range.

Based on the average assumptions in this 2021 survey, the middle 50 percent range for this hypothetical pension plan is very wide: 4.60% to 7.90% over the next 20 years. Note that the range is even wider for a 10-year horizon: 3.06% to 7.70%. This is due to the fact that, while returns may be volatile from one year to the next, deviations will be lower when returns are annualized (in other words, smoothed out) over longer horizons.

Probability of Meeting/Exceeding the Benchmark: For example, say that the actuary for this hypothetical pension plan expects its investment returns to be 7.00% per year, represented by the gold lines in Exhibits 9 and 10. Based on the average assumptions in this 2021 survey, there is a 38.0% probability the plan will meet or beat its 7.00% benchmark on an annualized basis over a 20-year period. The probability is lower, 31.9%, that the plan will meet or beat its benchmark over the next 10 years.

Also note that over a 20-year period, the probability that the annualized investment return will exceed 7.50% (arbitrarily, 50 basis points above the benchmark return) is 30.5%. The probability that the annualized return will exceed 6.50% (50 basis points below the benchmark) is 46.0%. These probabilities are a bit lower when focusing on a 10-year horizon rather than a 20-year horizon.

Purpose of the Measurement: It is important to note that this survey focuses on the investment return assumption, which may (or may not) be the same as the assumption used to discount a plan's projected benefit payments to measure its liabilities. The applicable standards of practice emphasize that the actuary should consider the purpose of the measurement (e.g., contribution budgeting, defeasance or settlement, market

measurements, pricing) as a primary factor in choosing a discount rate.

Optimistic and Conservative Assumptions: As previously noted, different investment advisors may have widely varying future capital market expectations. Therefore, it may also be interesting to consider the range of expected returns based on the assumptions provided by the most conservative and most optimistic advisors in the survey.

For this hypothetical asset allocation, the assumptions from the most conservative advisor indicate that the probability of beating the 7.00% benchmark assumption over the next 20 years is 19.9%. Using assumptions from the most optimistic advisor results in a probability of 56.1%. Again, reasonable people may differ.

Limitations: The following are some important limiting factors to keep in mind when reviewing these results.

- The asset classes in this survey do not always align perfectly with the asset classes provided by the investment advisors. Adjustments were made to standardize the different asset classes provided.
- Many of the advisors develop their future assumptions based on investment horizons of no more than 10 years, and returns are generally expected to be lower in the short term. The typical multiemployer pension plan will have an investment horizon that is much longer than 10 years.
- The return expectations are generally based on market returns. In other words, they do not reflect any additional returns that may be earned due to active asset managers outperforming the market ("alpha").
- The return expectations do not adjust for plan size. Specifically, they do not take into account the fact that certain investment opportunities are more readily available to larger plans, as well as the fact that larger plans may often receive more favorable investment fee arrangements than smaller plans.
- The ranges of expected annualized returns were constructed using basic, often simplified, formulas and methodologies. More sophisticated investment models – which may consider various economic scenarios, non-normal distributions, etc. – could produce significantly different results.

Use of the Survey: This survey is not intended to be a substitute for the expectations of individual portfolio managers, advisors, or actuaries performing their own independent analyses. The actuarial standards of practice provide for various methods of selecting and supporting the investment return assumption. This survey is intended to be used in conjunction with these methods, with appropriate weighting of various resources based on the plan actuary's professional judgment.

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Comparison with Prior Surveys

Exhibits 6 and 7 showed how expected returns for certain asset classes have changed over the past few years. Similarly, Exhibits 11 and 12 below show how return expectations for the hypothetical multiemployer pension plan whose asset allocation is shown in Exhibit 8 have changed from 2017 to 2021. (Note that the allocation was changed slightly to include private debt for the first time in 2019.)

Both exhibits show the probabilities that the hypothetical pension plan will meet or exceed its 7.00% benchmark return on an annualized basis over the given time horizon. Exhibit 11 focuses on expected returns over a 10-year period, and Exhibit 12 focuses on expected returns over a 20-year period. Probabilities are shown for the survey average for each year from 2017 through 2021. For comparison, probabilities are also shown for the most conservative and optimistic advisors in each survey.

Exhibit 11

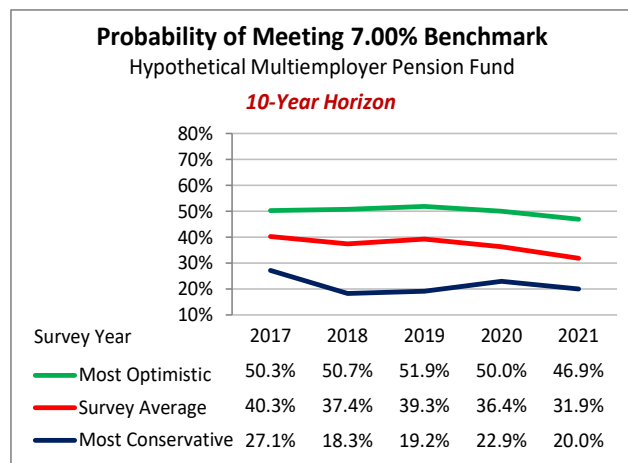
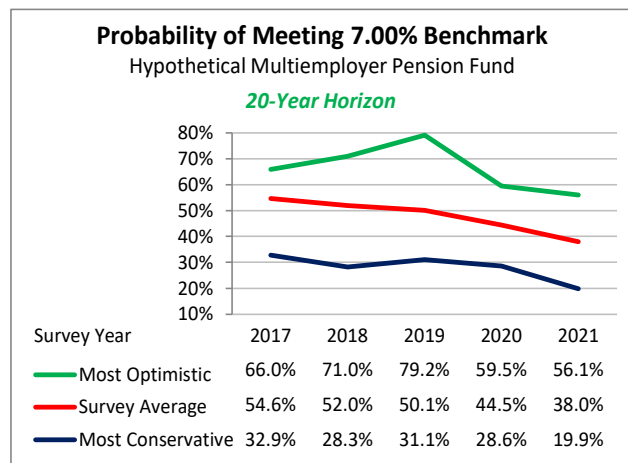


Exhibit 12



As shown in Exhibits 11 and 12, the probabilities that this hypothetical pension plan would meet or beat a benchmark return of 7.00% have generally decreased from 2017 to 2021.

For example:

- Based on the average assumptions from the 2021 survey, the probability of this hypothetical plan meeting or exceeding an annualized return of 7.00% over the next 10 years is 31.9%. The probability was considerably higher (40.3%) five years ago when the 2017 survey was conducted.
- Based on the average assumptions from the 2021 survey, the probability of this hypothetical plan meeting or exceeding an annualized return of 7.00% over the next 20 years is 38.0%. This represents a steep decline from 2017 when the probability was 54.6%, with the majority of the decline occurring in the last two years. The decrease in probability from 2019 to 2020 was driven primarily by lower expected returns for fixed income investments, while the decline from 2020 to 2021 was driven by lower expectations across asset classes.

Other points of note when comparing the results from the 2021 survey to those from prior years:

- The results for the most conservative advisor over a 10-year horizon reached their lowest point in 2018 when there was an 18.3% probability of meeting the 7.00% benchmark, and have hovered around 20.0% since 2019. Over a 20-year horizon, the results for the most conservative advisor hovered close to 30.0% from 2017 through 2020, and then declined significantly to just below 20.0% in 2021. For 2021, the most conservative advisors over both 10- and 20-year horizons project only a 1 in 5 chance of meeting the 7.00% benchmark.
- The results for the most optimistic advisor in each survey have also declined in recent years. Over a 10-year horizon, the probability of meeting the 7.00% benchmark reached an all-time low of 46.9% in 2021. Over a 20-year horizon, the results are more pronounced. After reaching a high of 79.2% in 2019, the most optimistic advisor in the 2021 survey projects 56.1% chance of meeting the 7.00% benchmark over the long term.
- Note that the most conservative and most optimistic advisors are not necessarily the same from year to year or for different time horizons.

Survey of Capital Market Assumptions: 2021 Edition

Glossary

The following are basic definitions of some of the investment terminology used in this report.

Expected Return

The *expected return* is the amount, as a percentage of assets, that an investment is expected to earn over a period of time. Expected returns in this survey are generally market returns that do not reflect value added or fees due to active management. Returns for asset classes where passive investments are not available (e.g., hedge funds and private equity) are generally net of fees.

Arithmetic vs. Geometric Returns

An *arithmetic* return is the average return in any one year. A *geometric* return is the annualized return over a multi-year period. In general, it is more appropriate to focus on geometric returns when evaluating expected returns over multi-year horizons. However, arithmetic returns are also important. For example, the expected return of a portfolio is calculated as the weighted average of arithmetic returns, not geometric returns.

This survey focuses on geometric returns. Many advisors provide both arithmetic and geometric expected returns. For advisors who provided expected returns only on an arithmetic basis, we converted them to geometric returns for consistency. The following formula was used to make this conversion.

$$E[R_G] = ((1 + E[R_A])^2 - \text{VAR}[R])^{1/2} - 1$$

In this formula, $E[R_G]$ is the expected geometric return, $E[R_A]$ is the expected arithmetic return, and $\text{VAR}[R]$ is the variance of the expected annual (arithmetic) return.

Standard Deviation

The *standard deviation* is a measure of the expected volatility in the returns. Generally, the standard deviation expresses how much returns may vary in any one year. Assuming that returns are “normally distributed,” there is about a 68% probability that the actual return for a given year will fall within one standard deviation (higher or lower) of the expected return. There is about a 95% probability that the actual return will fall within two standard deviations of the expected return.

Correlation

The degree to which the returns for two different asset classes move in tandem with one another is their *correlation*. For example, if two asset classes are perfectly correlated, their correlation coefficient will be 1.00; in other words, if one asset class has a return of X% in a given market environment, then the other asset class is expected to also have a return of X%. A portfolio becomes better diversified as its asset classes have lower (or even negative) correlations with each other.

Methodology

The following is a high-level description of the methodology used in compiling the survey results.

Standardized Asset Classes

Not all investment advisors use the same asset classes when developing their capital market assumptions. Some are very specific (more asset classes), while others keep things relatively simple (fewer asset classes).

We exercised judgment in classifying each advisor’s capital market assumptions into a standard set of asset classes. In the event that an advisor did not provide assumptions for a given asset class, the average assumptions from the other advisors was used when developing expected returns for that advisor.

Investment Horizons

This survey considers “short-term” expected returns to apply to a 10-year investment horizon, and “long-term” expected returns to apply to a 20-year horizon.

In this 2021 edition of the survey, 15 of the 39 advisors provided only short-term assumptions, indicating a horizon of no more than 10 years. Included in this group is one advisor who provided assumptions over a horizon of seven years.

All 24 advisors who provided long-term assumptions over horizons of 20 years or more also provided short-term assumptions. In cases where such an advisor indicated a horizon shorter than 10 years, the shorter-term expected returns were combined with the longer-term expected returns to achieve a 10-year horizon. If an advisor indicated a time horizon longer than 20 years, the longer-term expected returns were combined with the shorter-term expected returns to achieve a 20-year horizon.

No Adjustment for Alpha

No adjustment was made to reflect the possible value added by an active investment manager outperforming market returns (earning “alpha”).

Normally-Distributed Returns

This survey assumes that investment returns will be normally distributed according to the capital market assumptions provided. The survey also assumes that the investment return in one year does not affect the investment return in the following year.

Equal Weighting

Each assumption set was given equal weight in developing the average assumptions for the survey, regardless of factors such as total assets under advisement, research methodology, etc.

Exhibit 13

The following exhibit evaluates the investment return assumption for a hypothetical multiemployer pension plan. It reflects the same hypothetical asset allocation as shown in Exhibit 8, and it provides more detail than Exhibits 9 and 10. Note that the most conservative and optimistic advisors for the 10-year horizon are not necessarily the same as the most conservative and optimistic advisors for the 20-year horizon. This hypothetical pension plan has a benchmark return of 7.00% per year, which is indicated by the gold line in the exhibit below.

Hypothetical Multiemployer Plan 2021 Survey of Capital Market Assumptions

| Asset Class | Portfolio Weight | Average Survey Assumptions | | |
|------------------------------------|------------------|--|-----------------|--------------------|
| | | 10-Year Horizon | 20-Year Horizon | Standard Deviation |
| US Equity - Large Cap | 20.0% | 5.78% | 6.65% | 16.42% |
| US Equity - Small/Mid Cap | 10.0% | 6.27% | 7.04% | 20.17% |
| Non-US Equity - Developed | 7.5% | 6.38% | 7.14% | 18.32% |
| Non-US Equity - Emerging | 5.0% | 7.24% | 7.81% | 24.33% |
| US Corporate Bonds - Core | 7.5% | 2.09% | 3.23% | 5.52% |
| US Corporate Bonds - Long Duration | 2.5% | 2.18% | 3.43% | 10.39% |
| US Corporate Bonds - High Yield | 5.0% | 3.78% | 4.98% | 9.88% |
| Non-US Debt - Developed | 5.0% | 1.40% | 2.25% | 7.18% |
| Non-US Debt - Emerging | 2.5% | 4.24% | 5.32% | 11.26% |
| US Treasuries (Cash Equivalents) | 5.0% | 1.15% | 1.90% | 1.30% |
| TIPS (Inflation-Protected) | 5.0% | 1.60% | 2.38% | 5.64% |
| Real Estate | 7.5% | 5.50% | 6.21% | 17.62% |
| Hedge Funds | 5.0% | 4.46% | 5.33% | 8.09% |
| Commodities | 2.5% | 3.06% | 3.96% | 17.31% |
| Infrastructure | 2.5% | 6.20% | 6.79% | 17.04% |
| Private Equity | 5.0% | 8.82% | 9.65% | 22.25% |
| Private Debt | 2.5% | 6.45% | 6.87% | 11.42% |
| Inflation | N/A | 2.12% | 2.23% | 2.05% |
| TOTAL PORTFOLIO | 100.0% | <i>Expected returns are geometric.</i> | | |

Considerations and Limitations

- Allocations may be approximated if certain asset classes are not included in the survey.
- Many investment advisors provided only shorter-term assumptions (10 years or less).
- Assumptions are generally based on indexed returns and do not reflect anticipated alpha.
- Assumptions do not reflect investment opportunities or fee considerations available to larger funds.

SOURCE: Horizon Actuarial 2021 Survey of Capital Market Assumptions

Expected returns over a 10-year horizon include all 39 survey participants.

Expected returns over a 20-year horizon are based a subset of 24 survey participants who provided long-term assumptions.

| | 10-Year Horizon | | | 20-Year Horizon | | |
|---|----------------------|----------------|--------------------|----------------------|----------------|--------------------|
| | Conservative Advisor | Survey Average | Optimistic Advisor | Conservative Advisor | Survey Average | Optimistic Advisor |
| Expected Returns | | | | | | |
| Average Annual Return (Arithmetic) | 4.71% | 5.94% | 7.29% | 5.48% | 6.82% | 8.27% |
| Annualized Return (Geometric) | 4.18% | 5.38% | 6.74% | 4.87% | 6.25% | 7.45% |
| Annual Volatility (Standard Deviation) | 10.60% | 10.89% | 10.83% | 11.27% | 10.94% | 13.30% |
| Range of Expected Annualized Returns | | | | | | |
| ◆ 75th Percentile | 6.44% | 7.70% | 9.05% | 6.57% | 7.90% | 9.46% |
| ◆ 25th Percentile | 1.91% | 3.06% | 4.43% | 3.17% | 4.60% | 5.45% |
| Probabilities of Exceeding Certain Returns | | | | | | |
| 7.50% per Year, Annualized | 16.1% | 26.9% | 41.2% | 14.8% | 30.5% | 49.4% |
| 7.00% per Year, Annualized | 20.0% | 31.9% | 46.9% | 19.9% | 38.0% | 56.1% |
| 6.50% per Year, Annualized | 24.4% | 37.2% | 52.8% | 25.9% | 46.0% | 62.6% |

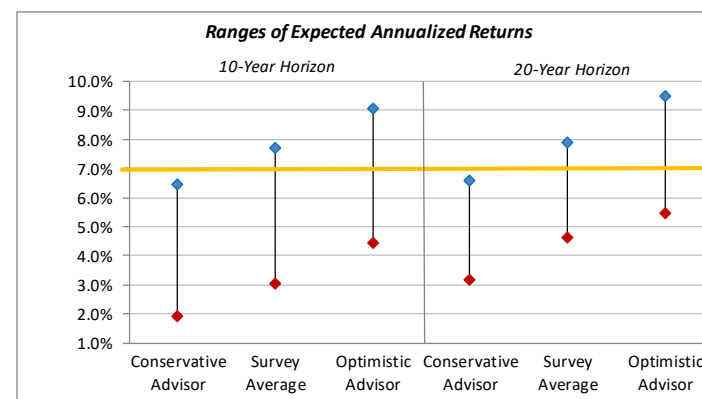


Exhibit 14

The following exhibit shows the distribution of expected annualized returns and annual standard deviations for the same hypothetical asset allocation that is shown in Exhibit 13. The expected annualized return and annual standard deviation of the hypothetical asset allocation are shown separately for each advisor who participated in the survey. Individual advisors are grouped by investment horizon, and the survey average assumptions are shown in red. Similar to Exhibit 13, the benchmark return of 7.00% for this hypothetical plan is indicated by the gold line. The exhibit shows that there are a wide variety of investment return assumptions that could be considered to be reasonable for any given asset allocation.

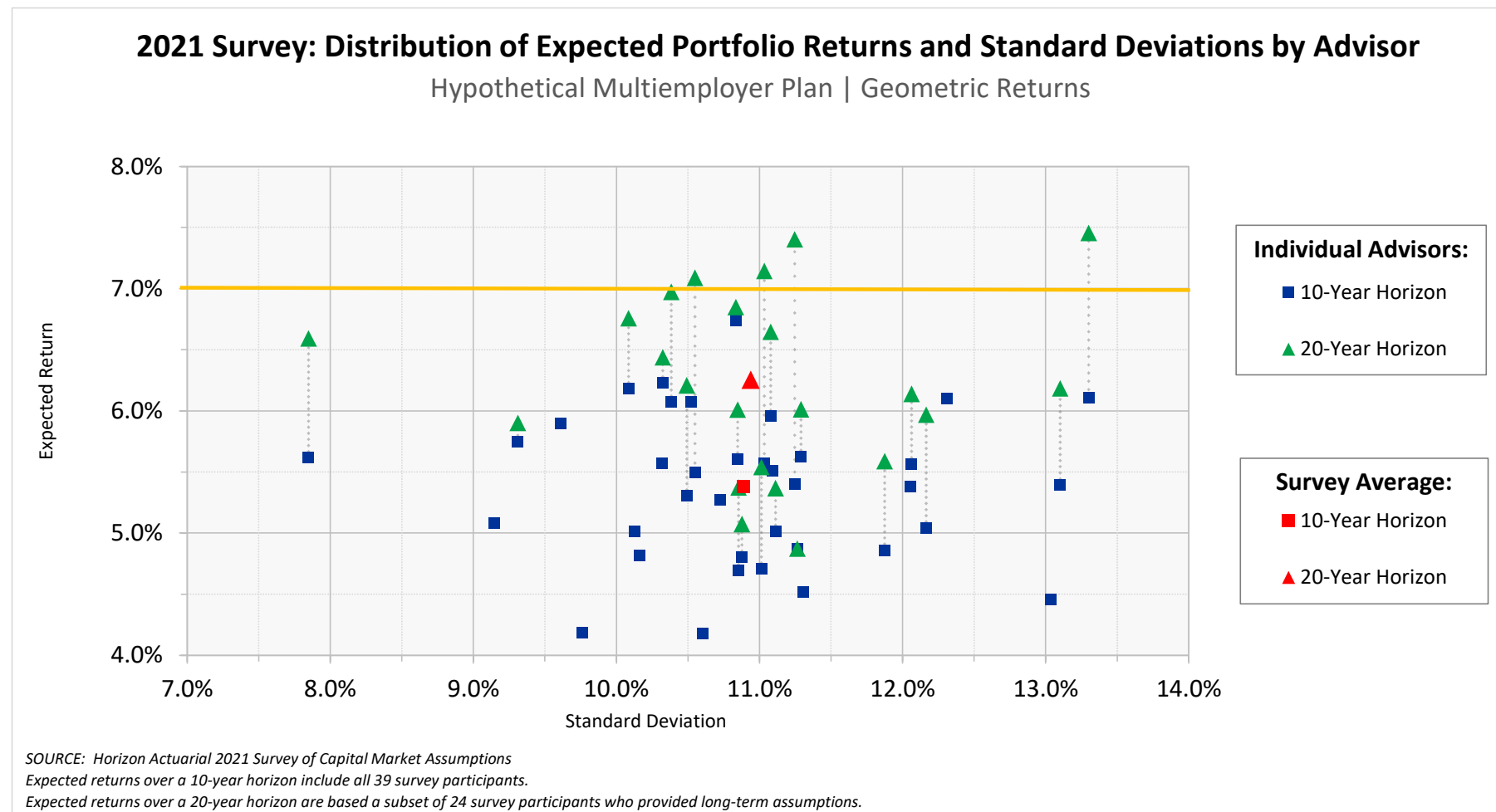


Exhibit 15

The following exhibit provides the average capital market assumptions for all 39 investment advisors in the 2021 survey. Each of the 39 advisors was given equal weight in determining the average assumptions. For reference, expected returns are shown over 10-year and 20-year horizons. Expected returns are also provided on both an arithmetic basis (one-year average) and geometric basis (multi-year annualized). The standard deviations (volatilities) and correlations apply to both arithmetic and geometric expected returns.

Horizon Actuarial 2021 Survey of Capital Market Assumptions

Average Survey Assumptions

| | | Expected Returns | | | | Standard Deviation | Correlation Matrix | | | | | | | | | | | | | | | | |
|-------------|------------------------------------|------------------|-------|-----------------|-------|--------------------|--------------------|--------|--------|--------|------|------|--------|------|------|--------|------|------|------|------|------|------|------|
| | | 10-Year Horizon | | 20-Year Horizon | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| Asset Class | | Arith. | Geom. | Arith. | Geom. | | | | | | | | | | | | | | | | | | |
| 1 | US Equity - Large Cap | 7.05% | 5.78% | 7.96% | 6.65% | 16.42% | 1.00 | | | | | | | | | | | | | | | | |
| 2 | US Equity - Small/Mid Cap | 8.18% | 6.27% | 9.01% | 7.04% | 20.17% | 0.90 | 1.00 | | | | | | | | | | | | | | | |
| 3 | Non-US Equity - Developed | 7.97% | 6.38% | 8.79% | 7.14% | 18.32% | 0.82 | 0.77 | 1.00 | | | | | | | | | | | | | | |
| 4 | Non-US Equity - Emerging | 10.01% | 7.24% | 10.78% | 7.81% | 24.33% | 0.72 | 0.70 | 0.80 | 1.00 | | | | | | | | | | | | | |
| 5 | US Corporate Bonds - Core | 2.25% | 2.09% | 3.38% | 3.23% | 5.52% | 0.19 | 0.15 | 0.20 | 0.18 | 1.00 | | | | | | | | | | | | |
| 6 | US Corporate Bonds - Long Duration | 2.74% | 2.18% | 3.97% | 3.43% | 10.39% | 0.18 | 0.13 | 0.18 | 0.15 | 0.86 | 1.00 | | | | | | | | | | | |
| 7 | US Corporate Bonds - High Yield | 4.26% | 3.78% | 5.46% | 4.98% | 9.88% | 0.63 | 0.63 | 0.62 | 0.62 | 0.43 | 0.36 | 1.00 | | | | | | | | | | |
| 8 | Non-US Debt - Developed | 1.63% | 1.40% | 2.53% | 2.25% | 7.18% | 0.15 | 0.10 | 0.30 | 0.26 | 0.55 | 0.51 | 0.24 | 1.00 | | | | | | | | | |
| 9 | Non-US Debt - Emerging | 4.86% | 4.24% | 5.99% | 5.32% | 11.26% | 0.48 | 0.45 | 0.52 | 0.61 | 0.49 | 0.43 | 0.60 | 0.41 | 1.00 | | | | | | | | |
| 10 | US Treasuries (Cash Equivalents) | 1.13% | 1.15% | 1.91% | 1.90% | 1.30% | (0.06) | (0.06) | (0.04) | (0.03) | 0.12 | 0.09 | (0.10) | 0.16 | 0.01 | 1.00 | | | | | | | |
| 11 | TIPS (Inflation-Protected) | 1.77% | 1.60% | 2.56% | 2.38% | 5.64% | 0.05 | 0.02 | 0.07 | 0.12 | 0.66 | 0.59 | 0.27 | 0.47 | 0.35 | 0.13 | 1.00 | | | | | | |
| 12 | Real Estate | 7.06% | 5.50% | 7.65% | 6.21% | 17.62% | 0.60 | 0.62 | 0.55 | 0.49 | 0.28 | 0.26 | 0.52 | 0.24 | 0.43 | (0.01) | 0.19 | 1.00 | | | | | |
| 13 | Hedge Funds | 4.79% | 4.46% | 5.71% | 5.33% | 8.09% | 0.68 | 0.68 | 0.68 | 0.65 | 0.22 | 0.17 | 0.59 | 0.19 | 0.48 | (0.01) | 0.12 | 0.45 | 1.00 | | | | |
| 14 | Commodities | 4.43% | 3.06% | 5.45% | 3.96% | 17.31% | 0.34 | 0.34 | 0.42 | 0.44 | 0.08 | 0.02 | 0.38 | 0.21 | 0.33 | 0.02 | 0.18 | 0.25 | 0.40 | 1.00 | | | |
| 15 | Infrastructure | 7.77% | 6.20% | 8.09% | 6.79% | 17.04% | 0.62 | 0.59 | 0.65 | 0.58 | 0.29 | 0.32 | 0.56 | 0.32 | 0.50 | (0.03) | 0.19 | 0.50 | 0.52 | 0.41 | 1.00 | | |
| 16 | Private Equity | 11.23% | 8.82% | 12.27% | 9.65% | 22.25% | 0.74 | 0.74 | 0.69 | 0.61 | 0.10 | 0.10 | 0.51 | 0.11 | 0.38 | (0.03) | 0.01 | 0.50 | 0.59 | 0.33 | 0.54 | 1.00 | |
| 17 | Private Debt | 7.10% | 6.45% | 7.52% | 6.87% | 11.42% | 0.54 | 0.55 | 0.54 | 0.52 | 0.26 | 0.29 | 0.71 | 0.15 | 0.44 | (0.04) | 0.11 | 0.46 | 0.56 | 0.37 | 0.50 | 0.54 | 1.00 |
| | Inflation | 2.13% | 2.12% | 2.24% | 2.23% | 2.05% | | | | | | | | | | | | | | | | | |

Expected returns over a 10-year horizon include all 39 survey participants.

Expected returns over a 20-year horizon are based a subset of 24 survey participants who provided long-term assumptions.

Exhibit 16

Earlier in this report, Exhibit 5 showed the distribution of expected returns and standard deviations for all 39 advisors who provided short-term assumptions. The exhibit below shows the same distribution, broken out by asset type: equities, fixed income, and alternatives. Note that the average expected return and standard deviation from the 2021 survey are listed in brackets for each asset class. Also note that every advisor did not provide expectations for every asset class.

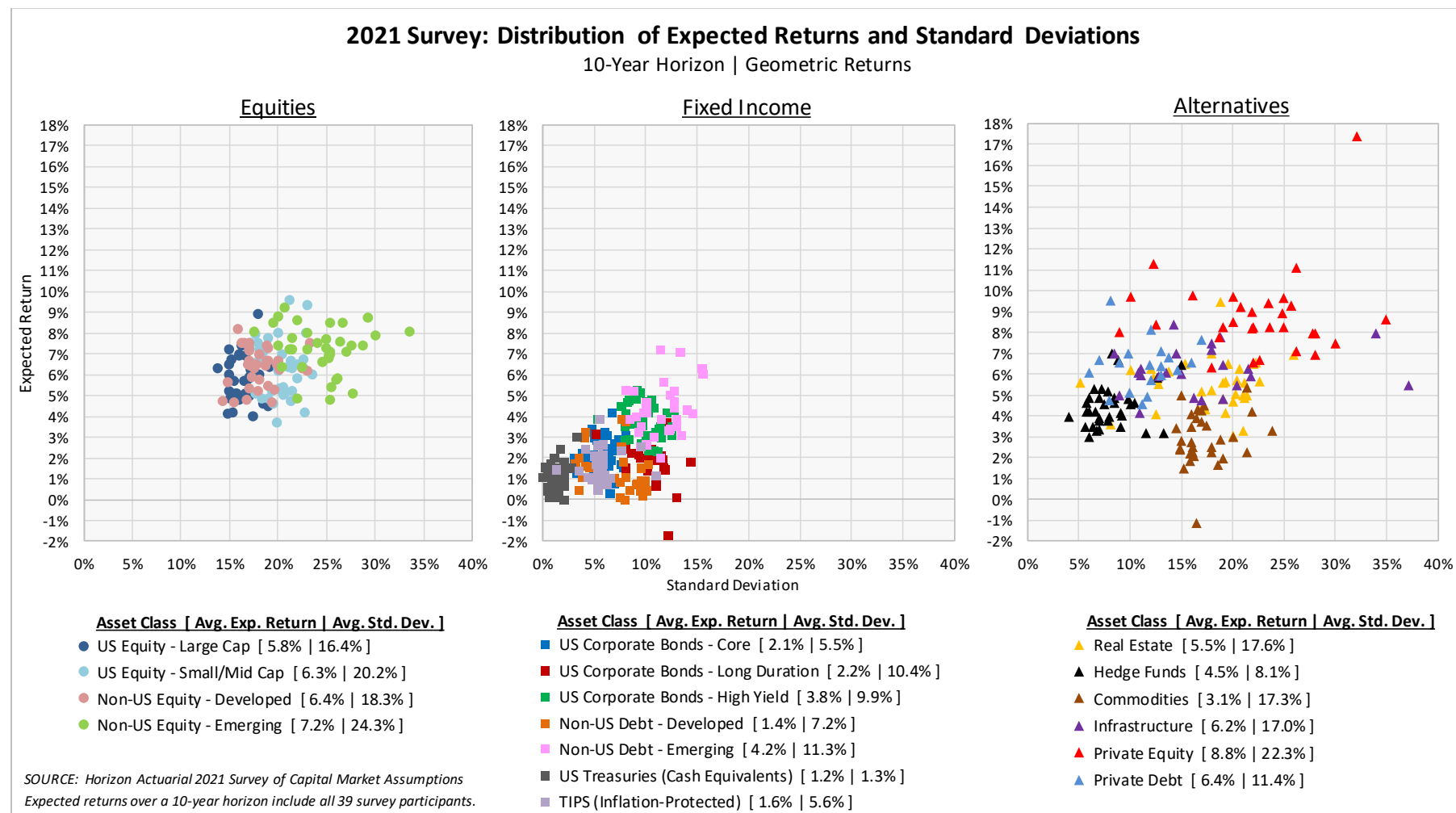


Exhibit 17

Exhibit 16 showed the distribution of expected returns and standard deviations over an investment horizon of 10 years. The exhibit below shows the same distribution, but for a horizon of 20 years. Note that while Exhibit 16 included all 39 advisors in the survey, the exhibit below only includes assumptions for the 24 advisors who provided longer-term assumptions (horizons of 20 years or more). Also note that every advisor did not provide expectations for every asset class.

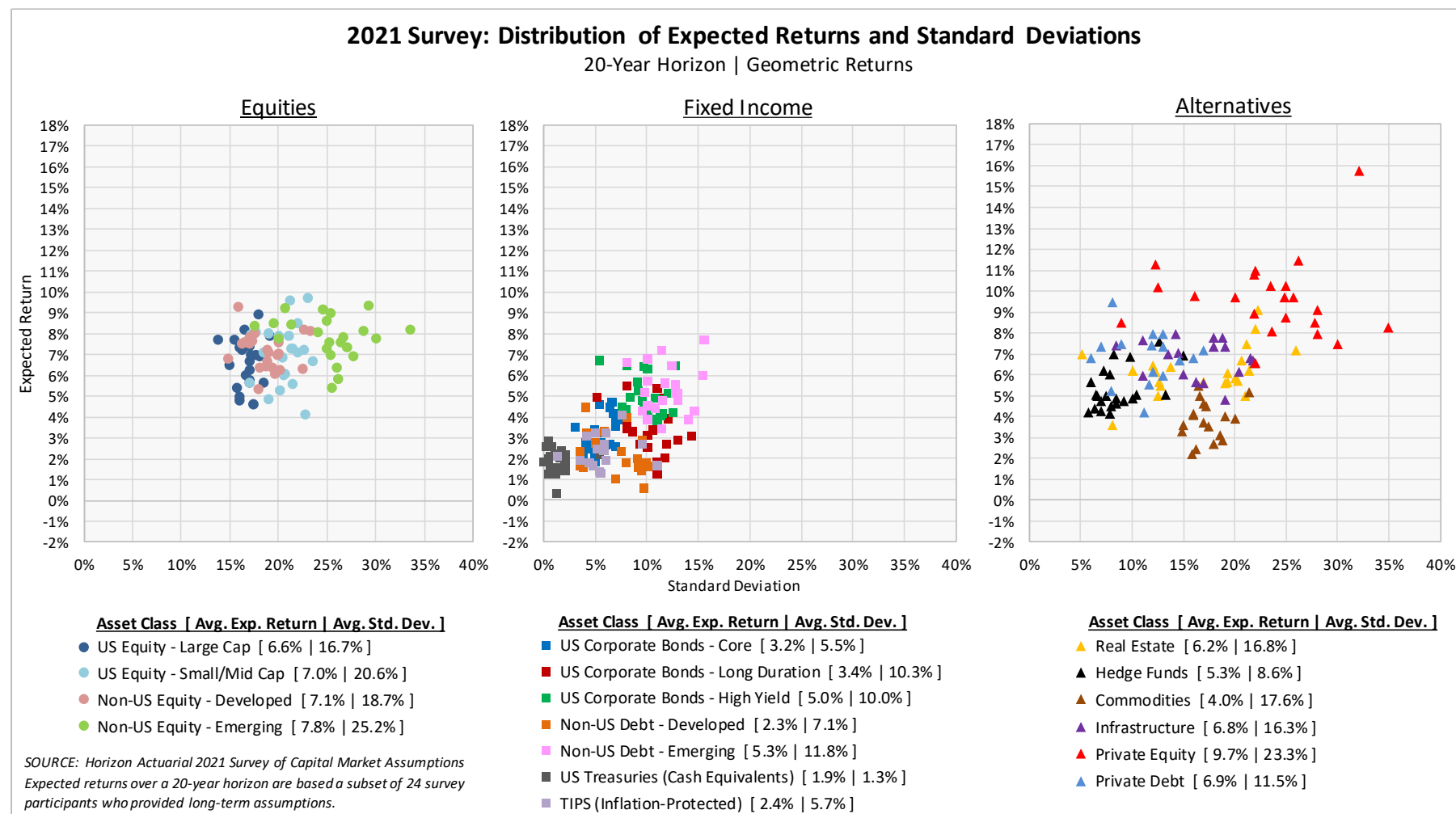


Exhibit 18

The exhibit below shows the ranges of expected annual returns for different asset classes over a 10-year investment horizon. The ranges shown below include assumptions for all the 39 advisors in the 2021 survey. Expected returns shown below are annualized (geometric).

To illustrate the distribution of expected returns, the exhibit shows the range of the middle 50 percent of results: the range between the 25th and 75th percentiles. It also shows the median expected return for each asset class: the 50th percentile. Note that the expected returns for the *median* advisor shown below are not the same as the *average* expected returns shown elsewhere in the report. In most cases, however, the differences between median and average expected returns are relatively small.

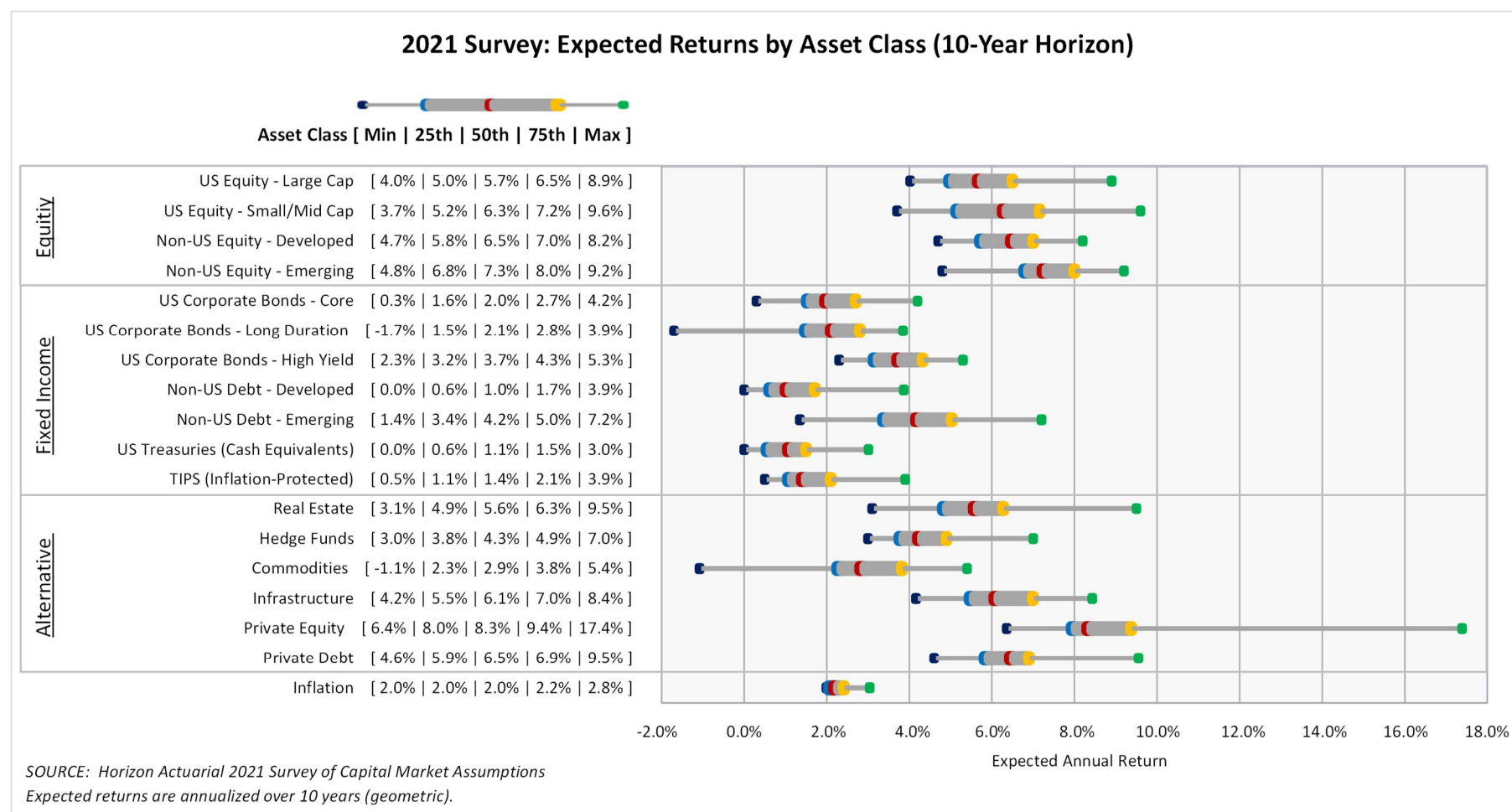


Exhibit 19

The exhibit below shows the ranges of expected annual returns for different asset classes over a 20-year investment horizon. The ranges shown below are based on the assumptions for 24 advisors who provided longer-term assumptions (horizons of 20 years or more). Expected returns shown below are annualized (geometric). Note that the ranges of expected returns are somewhat narrower when the investment horizon is longer.

To illustrate the distribution of expected returns, the exhibit shows the range of the middle 50 percent of results: the range between the 25th and 75th percentiles. It also shows the median expected return for each asset class: the 50th percentile. Note that the expected returns for the *median* advisor shown below are not the same as the *average* expected returns shown elsewhere in the report. In most cases, however, the differences between median and average expected returns are relatively small.

