

# Survey of Capital Market Assumptions

## 2013 Edition



### **Introduction**

Horizon Actuarial Services, LLC is proud to serve as the actuary to roughly 80 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.

At Horizon, we are 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 look to our colleagues in the investment advisory community. For each of the past four years, we have surveyed different independent investment advisors and asked them to provide their "capital market assumptions" – their expectations for future risk and returns for different asset classes in which pension funds commonly invest.

The information gathered from this survey can help answer the commonly-asked question: "Is my plan's investment return assumption still reasonable?" Of course, there are many factors to consider when evaluating a plan's investment return assumption, such as its asset allocation and the maturity of its participant population. 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 assumption. Nevertheless, we hope this report will be a useful resource for trustees, actuaries, and investment professionals alike.

***Horizon Actuarial sincerely thanks the 19 investment advisors who participated in this survey.***

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## Summary

When Horizon first conducted this survey in 2010, 8 investment advisors responded with their capital market assumptions. The 2011 survey had 12 respondents, and the 2012 survey had 17 respondents. This 2013 edition of the survey has 19 respondents.

When we focus on the 11 advisors who participated in all three of our surveys from 2011 to 2013, we see that expected returns for equity increased slightly from 2011 to 2013. At the same time, expected returns for fixed income securities decreased each year, as interest rates continued to decline (through early 2013, at least). While the expected volatilities increased for most asset classes from 2011 to 2012, they remained level or decreased from 2012 to 2013.

The survey asked respondents to indicate the investment horizon over which their assumptions apply. Many respondents indicated that their assumptions applied to a 10-year horizon, and some provided assumptions that applied to a horizon of 20 years or more.

When we focus on the 6 advisors that provided both shorter-term and longer-term assumptions, we found that expected returns were generally higher for the long term than for the short term. This difference was more pronounced for fixed income investments, possibly due to the expectation that bond yields (currently at or near historic lows) will rise over time.

For most plans, we believe a 20-year horizon is appropriate for evaluating the reasonableness of the long-term investment return assumption. However, to evaluate changing expected returns over the short term versus over the long term, this 2013 edition of the survey constructs separate expected returns over a 10-year horizon as well as over a 20-year horizon. To contrast, prior editions of the survey blended short-term and long-term assumptions together. To facilitate comparison with prior years, certain exhibits in this survey continue to use the “blended” assumptions.

This 2013 edition of the survey also differs from prior year editions in that it focuses on annualized (geometric) expected returns. Prior editions focused on average annual (arithmetic) returns. This does not affect the underlying conclusions of the survey, but it does affect comparability. See the glossary for more information.

The subject matter of this report can be very technical, and we have attempted to present it in an understandable manner. Still, some topics may benefit from additional explanation or discussion. If you have any questions, please contact your consultant at Horizon Actuarial.

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*Horizon Actuarial Services, LLC is an independent consulting firm specializing in providing actuarial and consulting services to multiemployer benefit plans. For more information, please visit our website at [www.horizonactuarial.com](http://www.horizonactuarial.com).*

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## Survey Respondents

Exhibit 1 (right) lists the 19 investment advisors who responded to the 2013 survey. (One respondent requested to remain anonymous.) This report will not attribute specific assumptions to individual advisors, which was a precondition of the survey.

Exhibit 2 (below) shows the ranges of expected annual returns for the different asset classes that were provided by the respondents. For example, focusing on large cap US equity, the most conservative investment advisor expects annualized returns of 5.8% per year, while the most optimistic advisor expects annualized returns of 9.3% per year. The average expected return for all advisors in the survey is 7.6% per year.

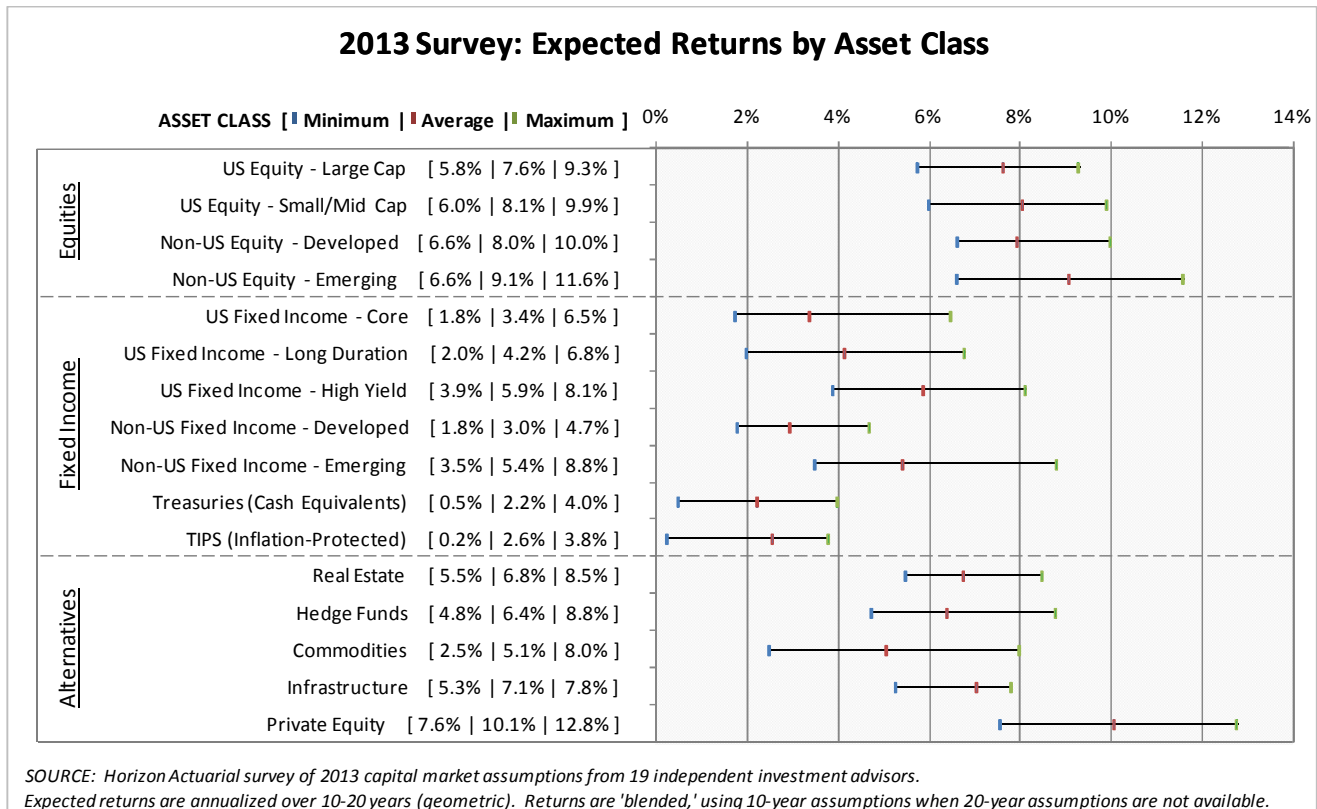
For some asset classes, there are big differences in the expected returns from advisor to advisor. As described later in this report, one reason for the wide ranges is that some investment advisors focus on relatively short time horizons, while others consider the long term. Regardless of the reason, however, it is apparent that different advisors have different opinions regarding future investment returns. As the saying goes, "reasonable people may differ."

## Exhibit 1

2013 Survey Respondents	
<i>BNY Mellon</i>	<i>J.P. Morgan</i>
<i>Callan Associates</i>	<i>New England Pension Consultants (NEPC)</i>
<i>Graystone Consulting / Morgan Stanley</i>	<i>Pension Consulting Alliance (PCA)</i>
<i>Hewitt EnnisKnupp</i>	<i>The PFM Group</i>
<i>Investment Performance Services, LLC (IPS)</i>	<i>SEI</i>
<i>R.V. Kuhns &amp; Associates</i>	<i>Sellwood Consulting</i>
<i>Marco Consulting Group</i>	<i>Towers Watson</i>
<i>Marquette Associates</i>	<i>UBS</i>
<i>Meketa Investment Group</i>	<i>Wurts &amp; Associates</i>
	<i>(Anonymous)</i>

The expected returns shown below are annualized (geometric). The assumptions are "blended," in that they reflect expected returns over 20-year horizon when available, and over a 10-year horizon for advisors who did not provide longer-term assumptions. A summary of the average assumptions from the 2013 survey, including standard deviations and a correlation matrix, can be found in the appendix to this report.

## Exhibit 2



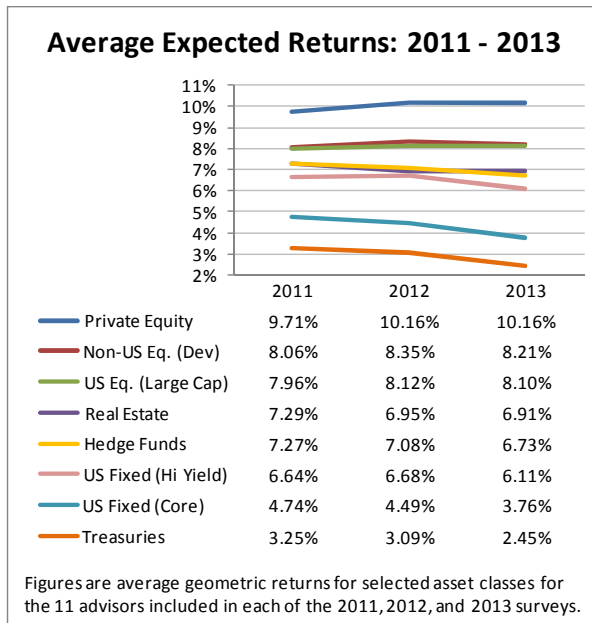
# Survey of Capital Market Assumptions: 2013 Edition

## Changing Expectations, 2011 - 2013

In recent years, there has been much discussion about whether it is reasonable for pension funds to expect future investment returns to be as high as they have been historically. When people look at the market collapse of 2008, high unemployment rates, economic uncertainty, and historically low interest rates, it is understandable if they have a gloomy outlook for future investment returns.

However, when we look at how expected returns in the survey have changed from 2011 through 2013, we do not see declines across the board. Exhibit 3 (below) shows average expected returns for the 11 advisors who participated in each of Horizon's surveys from 2011 to 2013. (These exhibits start with 2011, as that allows for comparison of 11 advisors, as opposed to 5 advisors if they were to begin with 2010.) The selected asset classes shown below are those for which at least 10 of the 11 advisors provided expected returns.

**Exhibit 3**

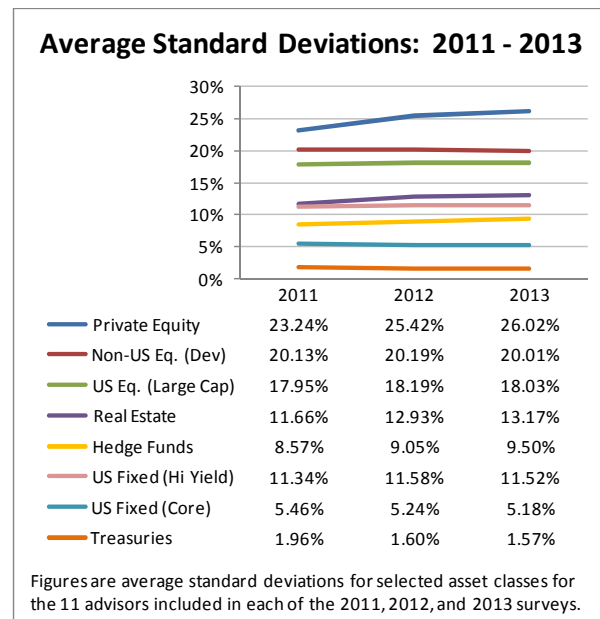


For this subset of respondents, average expected returns increased from 2011 to 2013 for equity-type investments such as US large cap equity, non-US equity, and private equity. However, average expected returns for equities stayed level or decreased slightly from 2012 to 2013. It is important to note that some consultants raised their expected returns, some lowered them, and others kept them the same from 2012 to 2013.

On the other hand, it is no surprise that average expected returns for fixed income-type investments like high yield bonds, core bonds, and US Treasuries have declined, as interest rates have continued to fall (at least through early 2013). Average expected returns for real estate and hedge funds decreased, as well.

In addition to expected returns, it is also important to consider expected volatility (standard deviation). Changes in average standard deviations from 2011 to 2013 are shown in Exhibit 4 (below).

**Exhibit 4**



In general, average standard deviations have stayed relatively level from 2011 to 2013. This may imply that, on average, these 11 advisors expect the financial markets to remain volatile, but they do not necessarily expect volatility to increase.

Note that average standard deviations increased slightly for alternative asset classes such as private equity, real estate, and hedge funds. This was due to a few advisors significantly increasing their volatility expectations for these asset classes, while the other advisors kept them essentially level.

As with Exhibit 2, the assumptions shown in Exhibits 3 and 4 are "blended." That is, they reflect expected returns over 20-year horizon when available, and over a 10-year horizon for advisors who did not provide longer-term assumptions.

# Survey of Capital Market Assumptions: 2013 Edition

## Investment Horizons

When evaluating future investment return expectations, it is important to consider the time horizon to which those expectations apply.

Of the 19 respondents in the survey, 11 indicated that their assumptions applied to a horizon of 10 years, and 2 indicated that their horizon was longer than 10 years. The remaining 6 respondents provided assumptions over both shorter-term (5 to 10 years) and longer-term (20 or 30 years) horizons.

Given current market conditions, advisors may expect returns for certain asset classes to be different in the short term than over the long term. When comparing the expected returns for the 6 respondents who provided both short-term and long-term assumptions, we see some interesting differences. See Exhibit 5 below.

For comparability, the “short-term” expected returns shown below were adjusted as needed to apply to a 10-year investment horizon, and the “long-term” returns were adjusted as needed to apply to a 20-year horizon.

### Exhibit 5

Average Expected Returns: Short-Term vs. Long-Term			
<i>Subset of 6 Survey Respondents</i>			
Asset Class	Short-Term (10 Years)	Long-Term (20 Years)	Difference
US Equity - Large Cap	7.12%	7.96%	0.84%
US Equity - Small/Mid Cap	7.77%	8.74%	0.97%
Non-US Equity - Developed	7.54%	8.29%	0.75%
Non-US Equity - Emerging	9.10%	9.45%	0.34%
US Fixed Income - Core	3.09%	4.79%	1.70%
US Fixed Income - Long Duration	3.86%	5.23%	1.37%
US Fixed Income - High Yield	5.57%	6.54%	0.98%
Non-US Fixed Income - Developed	2.21%	3.51%	1.30%
Non-US Fixed Income - Emerging	5.98%	6.67%	0.69%
Treasuries (Cash Equivalents)	2.17%	3.34%	1.17%
TIPS (Inflation-Protected)	2.84%	3.39%	0.55%
Real Estate	6.01%	6.59%	0.58%
Hedge Funds	6.10%	7.47%	1.37%
Commodities	5.24%	5.97%	0.73%
Infrastructure	6.30%	7.82%	1.52%
Private Equity	10.28%	10.84%	0.56%
Inflation	2.33%	2.55%	0.22%

*The 10-year and 20-year returns shown above are the averages for the 6 advisors who provided both short-term and long-term assumptions. Expected returns are annualized (geometric).*

The consensus among these 6 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. This may be due to the fact that interest rates are currently at historic lows, and presumably they will begin to rise after a few years.

The results shown in Exhibit 5 are based on a small sample size of 6 advisors. If we include all 19 survey respondents, the short term and long term expected returns do not change dramatically. See Exhibit 6 below.

The “short-term” expected returns shown below apply to a 10-year horizon and include responses from the 17 advisors who provided shorter-term assumptions. The “long-term” expected returns apply to a 20-year horizon and include responses from the 8 advisors who provided longer-term assumptions.

### Exhibit 6

Average Expected Returns: Short-Term vs. Long-Term			
<i>All Survey Respondents</i>			
Asset Class	Short-Term (10 Years)	Long-Term (20 Years)	Blended (10-20 Yrs)
US Equity - Large Cap	7.38%	8.04%	7.65%
US Equity - Small/Mid Cap	7.81%	8.55%	8.07%
Non-US Equity - Developed	7.72%	8.40%	7.95%
Non-US Equity - Emerging	8.97%	9.66%	9.10%
US Fixed Income - Core	2.85%	4.48%	3.39%
US Fixed Income - Long Duration	3.47%	5.02%	4.16%
US Fixed Income - High Yield	5.56%	6.46%	5.89%
Non-US Fixed Income - Developed	2.58%	3.34%	2.95%
Non-US Fixed Income - Emerging	5.23%	6.28%	5.43%
Treasuries (Cash Equivalents)	1.85%	2.99%	2.24%
TIPS (Inflation-Protected)	2.48%	3.41%	2.57%
Real Estate	6.59%	6.77%	6.77%
Hedge Funds	5.98%	7.12%	6.41%
Commodities	4.83%	5.87%	5.08%
Infrastructure	6.81%	7.76%	7.06%
Private Equity	9.90%	10.43%	10.09%
Inflation	2.48%	2.54%	2.54%

*Expected returns are annualized (geometric).*

When evaluating long term expected returns for an active, ongoing multiemployer pension fund, it is usually appropriate to consider investment returns over an investment horizon of at least 20 years. A shorter horizon may be more appropriate when dealing with funds that have unusually high negative cash flows relative to their asset values.

Certain exhibits in this survey focus on the “blended” assumptions shown above. (Prior editions focused on blended assumptions as well.) These represent the average of the 20-year expected returns from the 8 advisors who provided longer-term assumptions and the 10-year expected returns from the other 11 advisors.

When evaluating expected returns over a longer horizon, a benefit to using the blended assumptions is that they include all 19 survey respondents, rather than a subset. A drawback is that they may understate expected increases in investment returns after 10 years.

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## Evaluating the Return Assumption

Multiemployer pension plans are usually invested in a well-diversified mix of stocks, bonds, real estate, and alternative investments structured to maximize returns over the long term while minimizing return volatility.

The actuary to a multiemployer pension plan must evaluate 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 value of the benefits promised by the plan to its participants and beneficiaries.

The actuary will often rely on the future return expectations of the plan's investment advisor in developing the plan's investment return assumption. However, as noted earlier, different investment advisors often have very 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.

Here, we will evaluate the investment return assumption for a hypothetical multiemployer pension fund. Exhibit 7 (below) shows the asset allocation for this hypothetical fund. The asset allocations are completely arbitrary, except for the fact that we made sure to include at least a small allocation to every asset class in the survey. Note the long duration US fixed income class, a new addition to the survey for 2013.

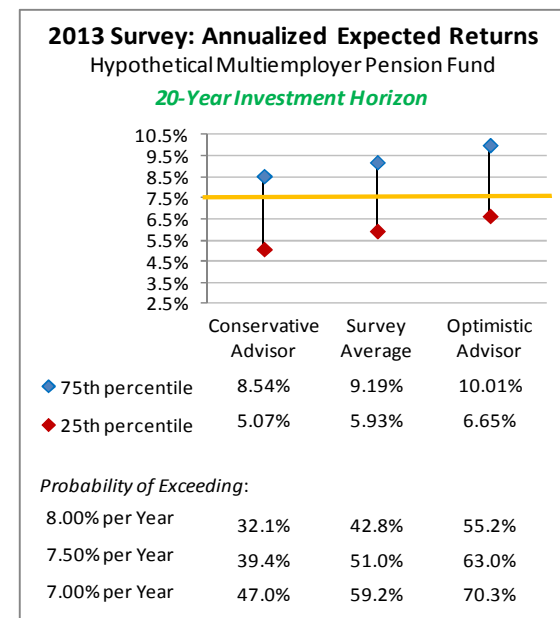
### Exhibit 7

Hypothetical Multiemployer Plan	
Asset Class	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 Fixed Income - Core	7.5%
US Fixed Income - Long Duration	2.5%
US Fixed Income - High Yield	5.0%
Non-US Fixed Income - Developed	5.0%
Non-US Fixed Income - Emerging	2.5%
Treasuries (Cash Equivalents)	5.0%
TIPS (Inflation-Protected)	5.0%
Real Estate	10.0%
Hedge Funds	5.0%
Commodities	2.5%
Infrastructure	2.5%
Private Equity	5.0%
Inflation	N/A
<b>TOTAL PORTFOLIO</b>	<b>100.0%</b>

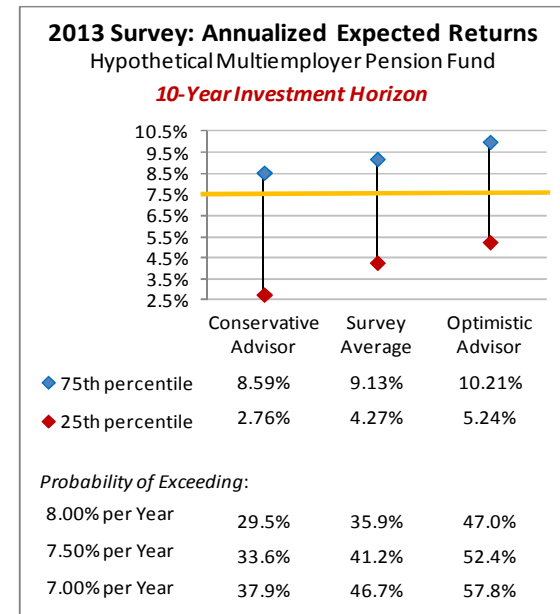
Exhibit 8 (below) evaluates the return expectations for the hypothetical multiemployer pension fund over a 20-year horizon. (Prior surveys evaluated expected returns based on "blended" 10 to 20-year assumptions.) For comparison, Exhibit 9 shows the results over a 10-year horizon rather than a 20-year horizon.

The results in Exhibit 8 are based on assumptions from the 8 survey respondents who provided longer-term assumptions. The results in Exhibit 9 are based on assumptions from the 17 respondents who provided shorter-term assumptions. All expected returns are annualized (geometric) over the applicable horizon.

### Exhibit 8



### Exhibit 9



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It is important to keep in mind that the expected returns shown above apply only to the hypothetical asset allocation shown in Exhibit 7. The expected returns will be different – perhaps very significantly – for different asset allocations.

Note that Exhibit 11 in the appendix to this report shows more detail regarding the derivation of the expected returns for this hypothetical pension fund.

The following are points to consider when reviewing the results in Exhibits 8 and 9:

**Reasonable Range:** When setting the interest rate assumption for pension valuations, actuaries traditionally construct a “reasonable range” of assumptions and then select a best-estimate point within that range. Actuaries often consider the reasonable range to be between the 25<sup>th</sup> and 75<sup>th</sup> percentiles of possible results. Note that under current actuarial standards of practice, it may be difficult for an actuary to justify a return assumption outside of this range.

Based on the average assumptions in this 2013 survey, the reasonable range for this hypothetical pension fund is very wide: 5.93% to 9.19% over the next 20 years. Note that the reasonable range is wider for a 10-year horizon (4.27% to 9.13%) than for a 20-year horizon. This is due to the fact that, while annual returns may be volatile from one year to the next, deviations will be lower when returns are annualized over longer horizons.

**Probability of Beating the Benchmark:** For example, say that the actuary for this hypothetical pension fund expects its net investment returns to be 7.50% per year (represented by the gold lines in Exhibits 8 and 9). Based on the average assumptions in the 2013 survey, there is a 51.0% probability that the fund will beat its 7.50% benchmark return on an annualized basis over a 20-year period. However, the probability is lower, 41.2%, that the fund will beat its benchmark over the next 10 years.

Further, note that over a 20-year period, the probability that the annualized investment return will exceed 8.00% (arbitrarily, 50 basis points above the benchmark return) is 42.8%. The probability that the annualized return will exceed 7.00% (50 basis points below the benchmark) is 59.2%. These probabilities are a bit lower when focusing on a 10-year horizon rather than a 20-year horizon.

**Optimistic and Conservative Assumptions:** As previously noted, different investment advisors have sometimes 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 respondents to the survey.

For this hypothetical asset allocation, the assumptions from the most conservative advisor indicate that the probability of beating the 7.5% assumption over the next 20 years is 39.4%. However, using assumptions from the most optimistic advisor results in a probability of 63.0%. 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 from the respondents.
- Many of the advisors develop their future assumptions based on investment horizons of 10 years or less, and some returns (especially for fixed income) are generally expected to be lower in the short term. The typical pension fund will have an investment horizon that is much longer than 10 years.
- The return expectations included in the survey are based on indexed returns. In other words, they do not reflect any additional returns that may be earned due to active asset managers outperforming the market (“alpha”), net of investment expenses.
- Further, the assumptions do not adjust for fund size. Specifically, they do not take into account the fact that certain investment opportunities are more readily available to larger funds, as well as the fact that larger funds may often receive more favorable investment fee arrangements than smaller funds. 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.

In most cases, adjustments made to account for these limitations tended to slightly lower the expected returns in the survey, for the sake of conservatism.

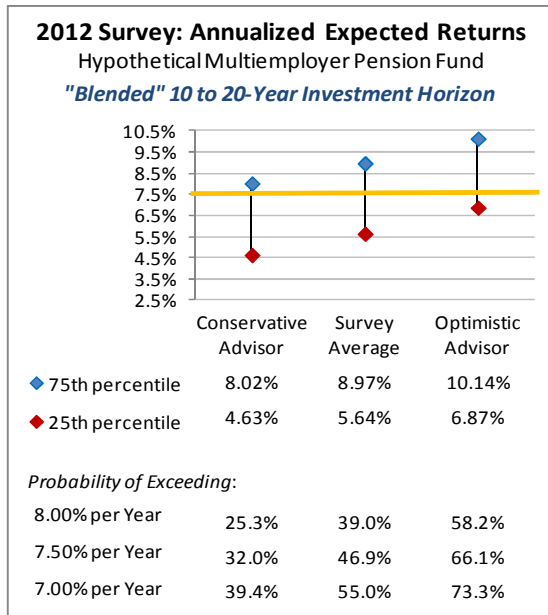
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## Comparison with 2012 Survey

Exhibit 10 (below) evaluates return expectations for a hypothetical multiemployer pension fund very similar to the one in Exhibit 7, but based on the results from the 2012 survey rather than the 2013 survey.

Note that because the 2012 survey did not draw a distinction between shorter-term and longer-term assumptions, the results below are based on “blended” expected returns over a 10 to 20-year horizon. That is, the results reflect expected returns over 20-year horizon when available, and over a 10-year horizon for advisors who did not provide longer-term assumptions. This will make some comparisons difficult.

### Exhibit 10



Based on the average assumptions from the 2013 survey, the reasonable range of expected returns over the next 20 years is 5.93% to 9.19%. Over the next 10 years, the reasonable range of expected returns is lower, 4.27% to 9.13%. Based on the average assumptions from the 2012 survey, the range of expected returns over a 10 to 20-year period was 5.64% to 8.97%.

The midpoint of the range based on average assumptions from the 2012 survey was 7.31%. This is also called the “median” return. This point falls between the median of the ranges for 10-year and 20-year horizons – 6.70% and 7.56%, respectively – based on average assumptions from the 2013 survey.

The most conservative investment advisor in the 2013 survey was a first-time survey respondent. Its median expected return over the next 10 years was 5.67%, 66 basis points (0.66%) lower than the median expected return for the most conservative advisor from the 2012 survey (6.33%). Note that this advisor provided assumptions over only a 10-year horizon.

The most optimistic advisor from the 2012 survey lowered its return expectations for 2013, resulting in a new most optimistic advisor for 2013. The median expected return for the most optimistic advisor in 2013 (8.33% annualized over 20 years) was 17 basis points (0.17%) lower than for the most optimistic advisor in 2012 (8.50% annualized over 20 years). Note that both advisors provided long-term assumptions as well as short-term assumptions.



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## **Glossary**

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

### Expected Return

The *expected return* is the amount that the plan actuary expects the plan to earn on its investments over a period of time. Returns are expressed as a percentage of plan assets and are net of investment fees.

### Arithmetic vs. Geometric Returns

In very simple terms, an *arithmetic* return has a one-year investment horizon. A *geometric* return is annualized over a multi-year period. In general, when evaluating longer-term investment horizons, we find it more appropriate to focus on geometric returns.

The 2013 survey focuses on geometric returns, whereas prior year editions showed arithmetic returns in certain exhibits. Please note the change when comparing results from the 2013 survey to results from prior surveys.

Most advisors provided both arithmetic and geometric expected returns in response to the survey. For advisors who provided only arithmetic returns, we made adjustments to convert them to geometric returns.

### 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

An important aspect of capital market assumptions is the degree to which the returns for two different asset classes move in tandem with one another – this 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 assumptions provided by the respondents to the survey.

### 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 respondent’s capital market assumptions into a standard set of asset classes. In the event that a respondent did not provide assumptions for a given asset class, the average assumptions from the other respondents was used.

### No Adjustment for Alpha

No adjustment was made to reflect the possibility or expectation of an active investment manager outperforming market returns (earning “alpha”).

### Investment Horizons

In the 2013 survey, 11 of the 19 respondents provided assumptions that applied to an investment horizon of up to 10 years. The remaining 8 respondents indicated that their horizons were longer, mostly 20 to 30 years.

6 of the 8 respondents with longer horizons provided *both* short-term and long-term assumptions. We blended the assumptions for those advisors as needed to develop expected returns over 10-year and 20-year horizons.

### 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

Every respondent was given equal weight in developing the average assumptions for the 2013 survey, regardless of factors such as the advisor’s investment time horizon, number of clients common with Horizon Actuarial Services, LLC, total assets of client funds, etc.

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## APPENDIX

### Exhibit 11

The following exhibit evaluates the investment return assumption for a hypothetical multiemployer pension fund. It reflects the same hypothetical asset allocation as shown in Exhibit 7, and it provides more detail than Exhibits 8 and 9. 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 fund has an expected return of 7.50% per year, which is indicated by the gold line in the exhibit below.

Hypothetical Multiemployer Plan					10-Year Horizon			20-Year Horizon			
2013 Capital Market Assumption Survey					Conservative	Survey	Optimistic	Conservative	Survey	Optimistic	
Expected Returns: 10-20 Years (Geometric)					Advisor	Average	Advisor	Advisor	Average	Advisor	
Asset Class	Weight	Minimum	Average	Maximum	Expected Returns						
US Equity - Large Cap	20.0%	5.76%	7.65%	9.30%	Average Annual Return (Arithmetic)						
US Equity - Small/Mid Cap	10.0%	6.01%	8.07%	9.92%	Annualized Return (Geometric)						
Non-US Equity - Developed	7.5%	6.64%	7.95%	10.00%	Annual Volatility (Standard Deviation)						
Non-US Equity - Emerging	5.0%	6.63%	9.10%	11.60%	Range of Expected Annualized Returns						
US Fixed Income - Core	7.5%	1.75%	3.39%	6.49%	75th Percentile						
US Fixed Income - Long Duration	2.5%	2.00%	4.16%	6.79%	25th Percentile						
US Fixed Income - High Yield	5.0%	3.90%	5.89%	8.13%	Probabilities of Exceeding Certain Returns						
Non-US Fixed Income - Developed	5.0%	1.80%	2.95%	4.70%	8.00% per Year, Annualized						
Non-US Fixed Income - Emerging	2.5%	3.50%	5.43%	8.82%	7.50% per Year, Annualized						
Treasuries (Cash Equivalents)	5.0%	0.50%	2.24%	4.00%	7.00% per Year, Annualized						
TIPS (Inflation-Protected)	5.0%	0.25%	2.57%	3.80%							
Real Estate	10.0%	5.50%	6.77%	8.50%							
Hedge Funds	5.0%	4.75%	6.41%	8.80%							
Commodities	2.5%	2.50%	5.08%	8.00%							
Infrastructure	2.5%	5.28%	7.06%	7.82%							
Private Equity	5.0%	7.58%	10.09%	12.78%							
Inflation	N/A	2.30%	2.54%	3.00%							
<b>TOTAL PORTFOLIO</b>	<b>100.0%</b>										

**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 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 survey of 2013 capital market assumptions from 19 independent investment advisors.  
 - Expected returns over a 10-year horizon are based a subset of 17 advisors who provided shorter-term assumptions.  
 - Expected returns over a 20-year horizon are based a subset of 8 respondents who provided longer-term assumptions.

**Range of Expected Annualized Returns**

Horizon	Advisor Type	Return (%)
10-Year Horizon	Conservative Advisor	8.5%
	Survey Average	7.31%
	Optimistic Advisor	8.35%
20-Year Horizon	Conservative Advisor	7.42%
	Survey Average	8.10%
	Optimistic Advisor	8.90%

The chart also shows a gold horizontal line at 7.50% representing the expected return for the hypothetical pension fund.

# Survey of Capital Market Assumptions: 2013 Edition

## APPENDIX (Cont.)

### Exhibit 12

The following exhibit provides the average capital market assumptions for all 19 investment advisors in the 2013 survey. Each of the 19 respondents was given equal weight in determining the average assumptions. For reference, expected returns are shown over 10-year and 20-year horizons, in addition to the "blended" expected returns (10 to 20-year horizon). Expected returns shown below are geometric.

Horizon Actuarial 2013 Survey of Capital Market Assumptions					Correlation Matrix															
Average Assumptions																				
Asset Class	Expected Annualized (Geometric) Returns																			
	Short-Term (10 Years)	Long-Term (20 Years)	'Blended' (10-20 Years)	Standard Deviation	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 US Equity - Large Cap	7.38%	8.04%	7.65%	18.14%	1.00															
2 US Equity - Small/Mid Cap	7.81%	8.55%	8.07%	22.50%	0.88	1.00														
3 Non-US Equity - Developed	7.72%	8.40%	7.95%	20.46%	0.84	0.76	1.00													
4 Non-US Equity - Emerging	8.97%	9.66%	9.10%	27.53%	0.75	0.71	0.80	1.00												
5 US Fixed Income - Core	2.85%	4.48%	3.39%	5.27%	0.20	0.10	0.15	0.13	1.00											
6 US Fixed Income - Long Duration	3.47%	5.02%	4.16%	11.75%	0.33	0.19	0.27	0.15	0.87	1.00										
7 US Fixed Income - High Yield	5.56%	6.46%	5.89%	12.30%	0.65	0.63	0.61	0.62	0.38	0.39	1.00									
8 Non-US Fixed Income - Developed	2.58%	3.34%	2.95%	8.21%	0.19	0.17	0.34	0.26	0.55	0.45	0.26	1.00								
9 Non-US Fixed Income - Emerging	5.23%	6.28%	5.43%	12.42%	0.55	0.50	0.52	0.64	0.51	0.44	0.64	0.41	1.00							
10 Treasuries (Cash Equivalents)	1.85%	2.99%	2.24%	1.76%	(0.04)	(0.20)	(0.06)	(0.15)	0.27	0.18	(0.23)	0.21	0.07	1.00						
11 TIPS (Inflation-Protected)	2.48%	3.41%	2.57%	5.89%	0.05	(0.04)	0.07	0.11	0.65	0.55	0.28	0.46	0.36	0.36	1.00					
12 Real Estate	6.59%	6.77%	6.77%	12.37%	0.33	0.28	0.30	0.25	(0.00)	0.05	0.26	(0.05)	0.07	0.15	0.07	1.00				
13 Hedge Funds	5.98%	7.12%	6.41%	9.35%	0.64	0.64	0.65	0.69	0.20	0.20	0.55	0.24	0.51	0.09	0.18	0.24	1.00			
14 Commodities	4.83%	5.87%	5.08%	18.47%	0.33	0.31	0.40	0.43	0.12	0.07	0.31	0.29	0.30	0.04	0.29	0.22	0.42	1.00		
15 Infrastructure	6.81%	7.76%	7.06%	15.23%	0.60	0.56	0.60	0.58	0.24	0.13	0.59	0.36	0.38	(0.21)	0.20	0.27	0.54	0.37	1.00	
16 Private Equity	9.90%	10.43%	10.09%	26.19%	0.74	0.68	0.67	0.62	0.06	0.20	0.53	0.11	0.44	0.00	0.00	0.38	0.58	0.29	0.55	1.00
Inflation	2.48%	2.54%	2.54%	2.01%																

SOURCE: Horizon Actuarial survey of 2013 capital market assumptions from 19 independent investment advisors.

- Expected returns over a 10-year horizon are based a subset of 17 advisors who provided shorter-term assumptions.
- Expected returns over a 20-year horizon are based a subset of 8 respondents who provided longer-term assumptions.
- 'Blended' expected returns apply to a 10 to 20-year horizon and include assumptions from all 19 respondents. Blended returns use 10-year assumptions when 20-year assumptions are not available.