

# 2014 Capital Market Assumptions

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Sellwood  
CONSULTING LLC

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## INTRODUCTION

Sellwood Consulting updates its capital markets assumptions on an annual basis. Our 2014 assumptions reflect information as of December 31, 2013, unless otherwise noted. Our assumptions are forward-looking in nature and reflect a ten-year horizon.

This report documents our process for creating these capital markets assumptions, and we provide detailed methodology for each. Several over-arching principles, however, inform all of our analysis:

1. We believe that forward-looking capital market assumptions are an important, but far from the only important, input for properly constructing portfolios. Great care should be taken not to rely only on mean-variance analysis when constructing portfolios. Generally speaking, an analysis that relies only on mean-variance analysis will over-allocate to assets with insignificantly superior risk/return estimates, and assets that are less liquid or less frequently priced.
2. Our assumptions utilize a build-up approach based on the current values of the individual drivers of expected return that are unique to each asset class.
3. For asset classes where the market provides a current view of forward-looking returns, our assumptions heavily weight the market view.
4. Where possible, all of our assumptions incorporate current valuations. We assume reversion toward a long-term valuation mean over the prospective ten-year period. Where we have identified a current valuation and its long-term mean, our estimates consider a 50% reversion from the current valuation level to its long-term mean over the prospective ten-year period.
5. Our assumptions are presented in nominal terms. Where we have used historical returns in our input analysis, we have always transformed them to real, after-inflation, returns, so as to strip out historical inflation and current expected inflation. At the end of the build-up process, where appropriate, we add the market's current measure of forward-looking inflation back to the assumptions to create nominal forward-looking return assumptions.
6. Our base calculations are of and for compound returns. After calculating a compound return and a risk assumption, we combine the two mathematically to calculate an arithmetic average expected return, which is a necessary input for mean-variance analysis.
7. Our assumptions are passive in nature and assume no active management.
8. Our approach to modeling the expected risk of each asset category is multi-faceted. First, we examine the historical standard deviation of the returns for a proxy index for the asset category (both the full history and most recent 10 years). Next, we examine the historical worst-case annual return experience (or in the case of asset categories that are not priced to

market, the maximum two-year peak-to-trough experience) for the asset class. If necessary, we adjust our risk estimates upward to ensure that the actual worst-case experience had at least a 2% probability of occurring (once every 50 years) under our assumed return and risk distribution parameters. Finally, for asset classes where our confidence in the data available for examination is limited, we qualitatively adjust our risk assumption to reflect this uncertainty.

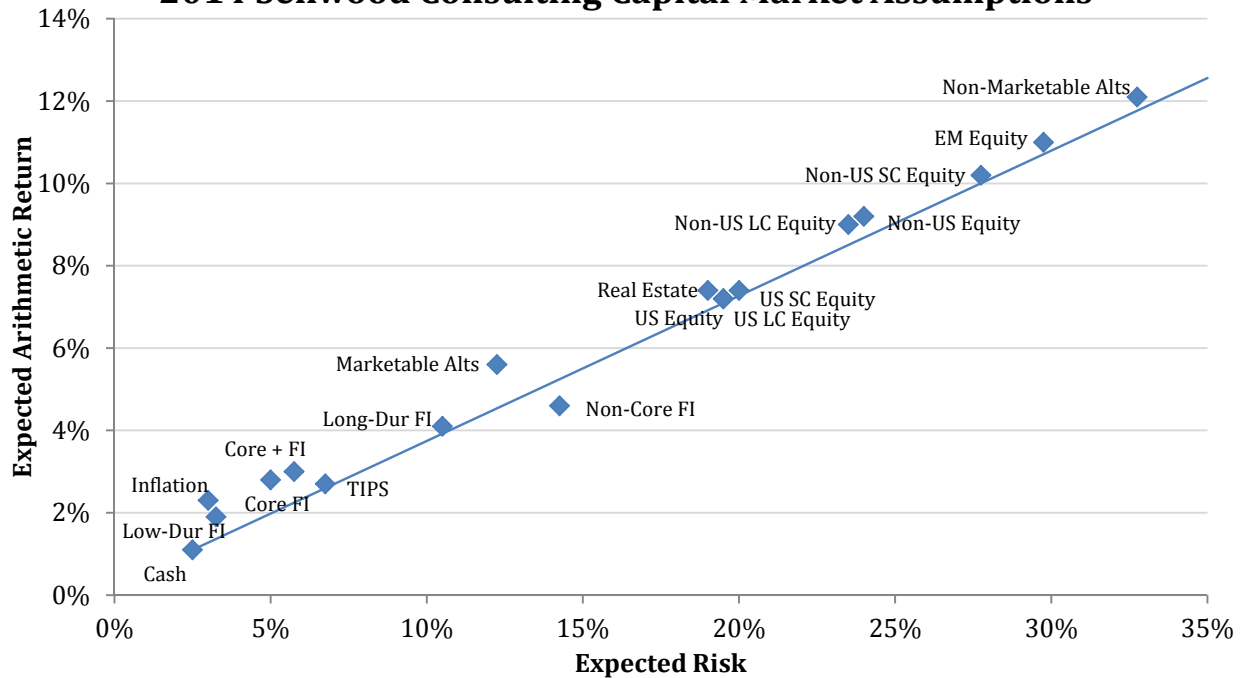
9. Our correlation coefficient assumptions are mostly derived from history, with an emphasis on the recent past. We seek a proxy for each asset category we have modeled with as long a history as possible, and then calculate our correlation assumptions using a simple average of the following, for each pair of asset categories:
  - Longest-term correlation
  - 10-year correlation
  - 5-year correlation
  - 3-year correlation

This approach purposefully overweights the recent past, while acknowledging the long-term past. It is also a more conservative measure for correlation benefit to a portfolio, because recent correlations have been higher than they have been historically.

10. We round our assumptions to the nearest 10 basis points, in the case of arithmetic average return, and nearest 25 basis points, in the case of risk.

In summary form, our 2014 forward-looking assumptions follow on the next page.

## 2014 Sellwood Consulting Capital Market Assumptions



|                             | Nominal<br>Compound<br>Return | Nominal<br>Risk | Nominal<br>Arithmetic<br>Return | Sharpe<br>Ratio |
|-----------------------------|-------------------------------|-----------------|---------------------------------|-----------------|
| Inflation                   | 2.24%                         | 3.00%           | 2.30%                           | ---             |
| Cash Equivalents            | 1.04%                         | 2.50%           | 1.10%                           | ---             |
| Low-Duration Fixed Income   | 1.87%                         | 3.25%           | 1.90%                           | 0.25            |
| Core Fixed Income           | 2.66%                         | 5.00%           | 2.80%                           | 0.32            |
| Core-Plus Fixed Income      | 2.86%                         | 5.75%           | 3.00%                           | 0.32            |
| Non-Core Fixed Income       | 3.64%                         | 14.25%          | 4.60%                           | 0.18            |
| Long-Duration Fixed Income  | 3.60%                         | 10.50%          | 4.10%                           | 0.24            |
| TIPS                        | 2.52%                         | 6.75%           | 2.70%                           | 0.22            |
| US Equity                   | 5.45%                         | 19.50%          | 7.20%                           | 0.23            |
| US Large-Cap Equity         | 5.42%                         | 19.50%          | 7.20%                           | 0.22            |
| US Small/Mid-Cap Equity     | 5.55%                         | 20.00%          | 7.40%                           | 0.23            |
| Non-US Equity               | 6.65%                         | 24.00%          | 9.20%                           | 0.23            |
| Non-US Large-Cap Equity     | 6.60%                         | 23.50%          | 9.00%                           | 0.24            |
| Non-US Small-Cap Equity     | 6.85%                         | 27.75%          | 10.20%                          | 0.21            |
| Emerging Markets Equity     | 7.25%                         | 29.75%          | 11.00%                          | 0.21            |
| Real Estate                 | 5.80%                         | 19.00%          | 7.40%                           | 0.25            |
| Marketable Alternatives     | 4.89%                         | 12.25%          | 5.60%                           | 0.31            |
| Non-Marketable Alternatives | 7.55%                         | 32.75%          | 12.10%                          | 0.20            |

## INFLATION

*Modeled: US CPI-U Inflation*  
*Compound Return: 2.24%*  
*Arithmetic Average Return: 2.30%*  
*Risk: 3.00%*

The market tells us its expectation for forward-looking ten-year inflation, and our assumption reflects that market assumption.

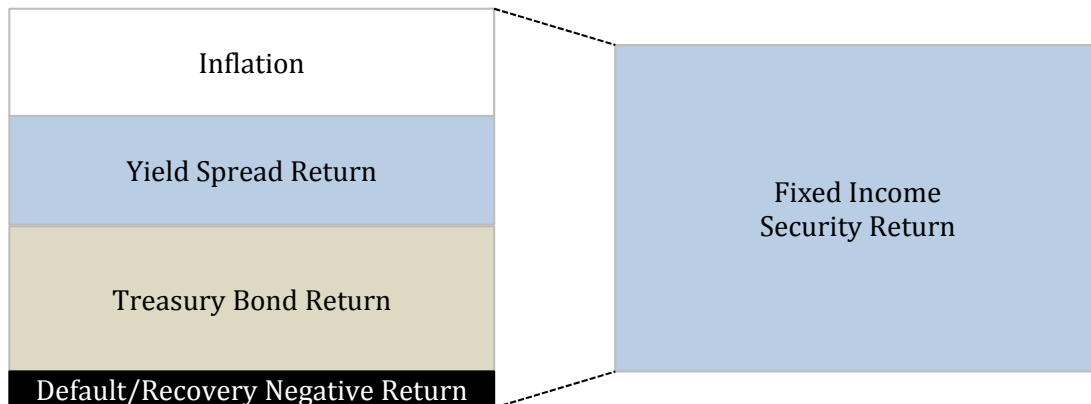
On December 31, 2013, the market's yield for a 10-Year US Treasury Bond was 3.04%, and the real yield for a 10-Year TIPS security was 0.80%. The difference between the two is an approximation of the market's inflation expectation over the next ten years, 2.24%.

## FIXED INCOME

All of our fixed income assumptions use an identical building-block model as our base analysis, but we have made some qualitative adjustments to the analysis, where noted.

Our building block model begins with the fixed income asset class's current real yield (or nominal yield spread) and duration (or spread duration). We then examine the long-term average of the yield or spread measure, and assume that over the prospective ten-year period, the asset's yield (spread) reverts halfway to that average. We assume that long-term average default and recovery rates will persist into the prospective ten-year period. Given these inputs, we can calculate the asset's forward-looking 10-year return.

Rather than relying on historical return and yield information, this approach has the advantage of being responsive to the changing composition of several indexes we model.



In most cases, we have used the 5-Year Treasury Bond as our first fixed income building block – the block upon which we add yield spreads and inflation. To calculate its forward-looking five-year return, we begin with today's real yield, 0.06%. We assume ten-year reversion halfway to the long-

term average mean real yield of 2.20%. In order to capture the longest time horizon possible, we calculate all real yields by adjusting the nominal yield by an inflation series<sup>1</sup>. We assume that the reversion to a mean real yield will occur in even increments in each of the future ten years. We assume further that the security's duration will stay constant over the ten-year period. The last building block, though it is assumed to be zero for a Treasury security, is an assumed default rate, adjusted for an assumed recovery rate. Finally, because all of this analysis is calculated in real terms, we add back the market's inflation assumption to arrive at a nominal return assumption.

Following is our calculation for the 5-Year US Treasury Bond. Our assumptions are:

|                                     |                                                    |
|-------------------------------------|----------------------------------------------------|
| Maturity:                           | 5 years                                            |
| Current Real Yield:                 | 0.06%                                              |
| Duration:                           | 4.88 years                                         |
| Long-Term Average Real Yield:       | 2.20%                                              |
| Cumulative Yield Change (10 Years): | +1.07% (halfway from current to long-term average) |
| Expected Default Rate:              | 0%                                                 |
| Expected Default Recovery Rate:     | N/A                                                |

| 5-Year Treasurys -- Total Return |       |        |        |        |        |        |         |         |         |         |         |                                 |              |
|----------------------------------|-------|--------|--------|--------|--------|--------|---------|---------|---------|---------|---------|---------------------------------|--------------|
| Year                             | 0     | 1      | 2      | 3      | 4      | 5      | 6       | 7       | 8       | 9       | 10      | Cumulative                      | Annualized   |
| Starting Real Yield              | 0.06% | 0.17%  | 0.27%  | 0.38%  | 0.49%  | 0.60%  | 0.70%   | 0.81%   | 0.92%   | 1.02%   | 1.13%   |                                 |              |
| Duration                         | 4.88  | 4.88   | 4.88   | 4.88   | 4.88   | 4.88   | 4.88    | 4.88    | 4.88    | 4.88    | 4.88    |                                 |              |
| Parallel Yield Change            |       | 0.11%  | 0.11%  | 0.11%  | 0.11%  | 0.11%  | 0.11%   | 0.11%   | 0.11%   | 0.11%   | 0.11%   | 1.07%                           |              |
| 12-month return                  |       | -0.46% | -0.36% | -0.25% | -0.14% | -0.03% | 0.07%   | 0.18%   | 0.29%   | 0.39%   | 0.50%   |                                 |              |
| Compound Factor                  |       | 99.54% | 99.64% | 99.75% | 99.86% | 99.97% | 100.07% | 100.18% | 100.29% | 100.39% | 100.50% | 0.19%                           | 0.02%        |
|                                  |       |        |        |        |        |        |         |         |         |         |         | market 10-year inflation        | 2.24%        |
|                                  |       |        |        |        |        |        |         |         |         |         |         | nominal 10-yr annualized return | <b>2.26%</b> |

Under the assumptions we have outlined, the security expects to earn a real annualized compound return of 0.02% over the next 10 years. Adding our inflation assumption, we arrive at a compound return assumption for the security: 2.26% annualized.

We have made similar calculations for 10- and 20-year Treasury bonds, which are relevant to calculations of forecasts for certain bonds of longer maturities. Those calculations are as follows:

### 10-Year Treasury Bonds

Assumptions (10-Year Treasury):

|                               |            |
|-------------------------------|------------|
| Maturity:                     | 10 years   |
| Current Real Yield:           | +0.80%     |
| Duration:                     | 8.90 years |
| Long-Term Average Real Yield: | 2.47%      |

<sup>1</sup> Since 2003, our real yields are based on the constant maturity TIPS yields calculated by the Federal Reserve. Prior to 2003, in order to calculate real yields we adjusted the applicable yield with the prior 12-month CPI-U. For example, for a 5-year Treasury bond, we calculate a historical real yield series by subtracting prior 12-month CPI-U from historical 5-year Treasury bond yields prior to 2003, and by subtracting the then-current 5-year TIPS breakeven yield after 2003. All current real yields are calculated by subtracting the current relevant TIPS breakeven yield that matches the maturity of the Treasury instrument.

Cumulative Yield Change (10 Years): +0.83% (halfway from current to long-term average)  
 Expected Default Rate: 0%  
 Expected Default Recovery Rate: N/A

10-Year Treasurys -- Total Return

| Year                  | 0     | 1       | 2       | 3       | 4       | 5       | 6       | 7       | 8       | 9       | 10      | Cumulative                      | Annualized   |
|-----------------------|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------------------------------|--------------|
| Starting Real Yield   | 0.80% | 0.88%   | 0.97%   | 1.05%   | 1.13%   | 1.22%   | 1.30%   | 1.38%   | 1.47%   | 1.55%   | 1.63%   |                                 |              |
| Duration              | 8.90  | 8.90    | 8.90    | 8.90    | 8.90    | 8.90    | 8.90    | 8.90    | 8.90    | 8.90    | 8.90    |                                 |              |
| Parallel Yield Change |       | 0.08%   | 0.08%   | 0.08%   | 0.08%   | 0.08%   | 0.08%   | 0.08%   | 0.08%   | 0.08%   | 0.08%   | 0.83%                           |              |
| 12-month return       |       | 0.06%   | 0.14%   | 0.22%   | 0.31%   | 0.39%   | 0.47%   | 0.56%   | 0.64%   | 0.72%   | 0.81%   |                                 |              |
| Compound Factor       |       | 100.06% | 100.14% | 100.22% | 100.31% | 100.39% | 100.47% | 100.56% | 100.64% | 100.72% | 100.81% | 4.41%                           | 0.43%        |
|                       |       |         |         |         |         |         |         |         |         |         |         | market 10-year inflation        | 2.24%        |
|                       |       |         |         |         |         |         |         |         |         |         |         | nominal 10-yr annualized return | <b>2.67%</b> |

Our projected nominal 10-year annualized return is 2.67%.

20-Year Treasury Bonds

Assumptions (20-Year Treasury):

Maturity: 20 years  
 Current Real Yield: 1.36%  
 Duration: 13.58 years  
 Long-Term Average Real Yield: 2.67%  
 Cumulative Yield Change (10 Years): +0.65% (halfway from current to long-term average)  
 Expected Default Rate: 0%  
 Expected Default Recovery Rate: N/A

20-Year Treasurys -- Total Return

| Year                  | 0     | 1       | 2       | 3       | 4       | 5       | 6       | 7       | 8       | 9       | 10      | Cumulative                      | Annualized   |
|-----------------------|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------------------------------|--------------|
| Starting Real Yield   | 1.36% | 1.43%   | 1.49%   | 1.56%   | 1.62%   | 1.69%   | 1.75%   | 1.82%   | 1.88%   | 1.95%   | 2.01%   |                                 |              |
| Duration              | 13.58 | 13.58   | 13.58   | 13.58   | 13.58   | 13.58   | 13.58   | 13.58   | 13.58   | 13.58   | 13.58   |                                 |              |
| Parallel Yield Change |       | 0.07%   | 0.07%   | 0.07%   | 0.07%   | 0.07%   | 0.07%   | 0.07%   | 0.07%   | 0.07%   | 0.07%   | 0.65%                           |              |
| 12-month return       |       | 0.47%   | 0.54%   | 0.60%   | 0.67%   | 0.73%   | 0.80%   | 0.86%   | 0.93%   | 1.00%   | 1.06%   |                                 |              |
| Compound Factor       |       | 100.47% | 100.54% | 100.60% | 100.67% | 100.73% | 100.80% | 100.86% | 100.93% | 101.00% | 101.06% | 7.94%                           | 0.77%        |
|                       |       |         |         |         |         |         |         |         |         |         |         | market 10-year inflation        | 2.24%        |
|                       |       |         |         |         |         |         |         |         |         |         |         | nominal 10-yr annualized return | <b>3.01%</b> |

Our projected nominal 10-year annualized return is 3.01%.

Cash Equivalents

*Modeled: 91-Day T-Bills*  
*Compound Return: 1.04%*  
*Arithmetic Average Return: 1.10%*  
*Risk: 2.50%*

Our model is nearly identical for Cash Equivalents. Our only adjustment to the model is to have 91-day T-Bill yields revert halfway to their long-term mean in the last five years of the ten-year period, rather than evenly over the ten-year period. This adjustment reflects the Federal Reserve's guidance that short-term interest rates will be low for an extended period of time.

Assumptions:

Maturity: 91 days



Current Real Yield: -1.40%  
 Duration: 0.25 years  
 Long-Term Average Real Yield: 0.94%  
 Cumulative Yield Change (10 Years): +1.17% (halfway from current to long-term average)  
 Expected Default Rate: 0%  
 Expected Default Recovery Rate: N/A

These assumptions yield a nominal compound return expectation of 1.04%:

91-Day T-Bills -- Total Return

| Year                  | 0      | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 10     | Cumulative                      | Annualized |
|-----------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------------------------------|------------|
| Starting Real Yield   | -1.40% | -1.40% | -1.40% | -1.40% | -1.40% | -1.40% | -1.17% | -0.93% | -0.70% | -0.46% | -0.23% |                                 |            |
| Duration              | 0.25   | 0.25   | 0.25   | 0.25   | 0.25   | 0.25   | 0.25   | 0.25   | 0.25   | 0.25   | 0.25   |                                 |            |
| Parallel Yield Change |        | 0.00%  | 0.00%  | 0.00%  | 0.00%  | 0.00%  | 0.23%  | 0.23%  | 0.23%  | 0.23%  | 0.23%  | 1.17%                           |            |
| 12-month return       |        | -1.40% | -1.40% | -1.40% | -1.40% | -1.40% | -1.46% | -1.22% | -0.99% | -0.76% | -0.52% |                                 |            |
| Compound Factor       |        | 98.60% | 98.60% | 98.60% | 98.60% | 98.60% | 98.54% | 98.78% | 99.01% | 99.24% | 99.48% | -11.33%                         | -1.20%     |
|                       |        |        |        |        |        |        |        |        |        |        |        | market 10-year inflation        | 2.24%      |
|                       |        |        |        |        |        |        |        |        |        |        |        | nominal 10-yr annualized return | 1.04%      |

**Low-Duration Fixed Income**

*Modeled: 1-3 Year Aggregate Fixed Income*  
*Compound Return: 1.87%*  
*Arithmetic Average Return: 1.90%*  
*Risk: 3.25%*

We use our base model for Low-Duration Fixed Income.

Assumptions for 2-Year US Treasury Bond:

Maturity: 2 years  
 Current Real Yield: -1.09%  
 Duration: 1.99 years  
 Long-Term Average Real Yield: 1.89%  
 Cumulative Yield Change (10 Years): +1.49% (halfway from current to long-term average)

These assumptions yield a nominal compound return expectation of 1.52%:

2-Year Treasurys -- Total Return

| Year                  | 0      | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 10     | Cumulative                      | Annualized |
|-----------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------------------------------|------------|
| Starting Real Yield   | -1.09% | -0.94% | -0.80% | -0.65% | -0.50% | -0.35% | -0.20% | -0.05% | 0.10%  | 0.25%  | 0.40%  |                                 |            |
| Duration              | 1.99   | 1.99   | 1.99   | 1.99   | 1.99   | 1.99   | 1.99   | 1.99   | 1.99   | 1.99   | 1.99   |                                 |            |
| Parallel Yield Change |        | 0.15%  | 0.15%  | 0.15%  | 0.15%  | 0.15%  | 0.15%  | 0.15%  | 0.15%  | 0.15%  | 0.15%  | 1.49%                           |            |
| 12-month return       |        | -1.39% | -1.24% | -1.09% | -0.94% | -0.79% | -0.64% | -0.50% | -0.35% | -0.20% | -0.05% |                                 |            |
| Compound Factor       |        | 98.61% | 98.76% | 98.91% | 99.06% | 99.21% | 99.36% | 99.50% | 99.65% | 99.80% | 99.95% | -6.97%                          | -0.72%     |
|                       |        |        |        |        |        |        |        |        |        |        |        | market 10-year inflation        | 2.24%      |
|                       |        |        |        |        |        |        |        |        |        |        |        | nominal 10-yr annualized return | 1.52%      |

To this Treasury Bond yield, we add a spread for 1-3 year corporate bonds:

Assumptions:

Proportion in Corporates: 50%

Current Spread: 0.71%  
 Long-Term Average Spread: 1.37%  
 Spread Duration: 1.50 years  
 Cumulative Spread Change (10 Yrs): +0.33% (halfway from current to long-term average)

1-3 Year Corporates -- Spread Effect (over Treasurys)

| Year                  | 0     | 1       | 2       | 3       | 4       | 5       | 6       | 7       | 8       | 9       | 10      | Cumulative            | Annualized |
|-----------------------|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|-----------------------|------------|
| Starting Spread       | 0.71% | 0.74%   | 0.78%   | 0.81%   | 0.84%   | 0.88%   | 0.91%   | 0.94%   | 0.98%   | 1.01%   | 1.04%   |                       |            |
| Duration              | 1.50  | 1.50    | 1.50    | 1.50    | 1.50    | 1.50    | 1.50    | 1.50    | 1.50    | 1.50    | 1.50    |                       |            |
| Parallel Yield Change |       | 0.03%   | 0.03%   | 0.03%   | 0.03%   | 0.03%   | 0.03%   | 0.03%   | 0.03%   | 0.03%   | 0.03%   | 0.33%                 |            |
| 12-month return       |       | 0.66%   | 0.69%   | 0.73%   | 0.76%   | 0.79%   | 0.83%   | 0.86%   | 0.89%   | 0.93%   | 0.96%   |                       |            |
| Compound Factor       |       | 100.66% | 100.69% | 100.73% | 100.76% | 100.79% | 100.83% | 100.86% | 100.89% | 100.93% | 100.96% | 8.40%                 | 0.81%      |
|                       |       |         |         |         |         |         |         |         |         |         |         | Proportion            | 50.00%     |
|                       |       |         |         |         |         |         |         |         |         |         |         | Spread Effect (Total) | 0.40%      |

Finally, we make assumptions for the expected default rate and recovery rate for defaulted securities. These figures represent the historical average for the asset class:

Assumptions:

Expected Default Rate: 0.10%  
 Expected Default Recovery Rate: 45%

In summary:

2-Year Treasury Return 1.52%  
 Spread Effect +0.40%  
 Default Effect -0.06%  
 Return Assumption **1.87%**

Combining the 2-Year Treasury Bond return and the expected return from spread, and then subtracting the expected default rate after adjusting for recovery, yields our return assumption of 1.87% in compound terms.

**Core Fixed Income**

*Modeled: US Investment-Grade Aggregate and Hedged Non-US Aggregate Fixed Income*  
 Compound Return: 2.66%  
 Arithmetic Average Return: 2.80%  
 Risk: 5.00%

The base level of our building-block approach for Core Fixed Income is the 5-Year Treasury Bond, outlined above. To this expected return, we add an expectation for spread return:

Current Spread (BC Aggregate): 0.45%  
 Long-Term Average Spread: 0.57%  
 Spread Duration: 3.19 years  
 Cumulative Spread Change (10 Yrs): +0.06% (halfway from current to long-term average)

| BC Aggregate -- Spread Effect (over Treasuries) |       |         |         |         |         |         |         |         |         |         |         | Cumulative | Annualized   |
|-------------------------------------------------|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|------------|--------------|
| Year                                            | 0     | 1       | 2       | 3       | 4       | 5       | 6       | 7       | 8       | 9       | 10      |            |              |
| Starting Spread                                 | 0.45% | 0.46%   | 0.46%   | 0.47%   | 0.47%   | 0.48%   | 0.49%   | 0.49%   | 0.50%   | 0.50%   | 0.51%   |            |              |
| Duration                                        | 3.19  | 3.19    | 3.19    | 3.19    | 3.19    | 3.19    | 3.19    | 3.19    | 3.19    | 3.19    | 3.19    |            |              |
| Parallel Yield Change                           |       | 0.01%   | 0.01%   | 0.01%   | 0.01%   | 0.01%   | 0.01%   | 0.01%   | 0.01%   | 0.01%   | 0.01%   | 0.06%      |              |
| 12-month return                                 |       | 0.43%   | 0.44%   | 0.44%   | 0.45%   | 0.45%   | 0.46%   | 0.47%   | 0.47%   | 0.48%   | 0.48%   |            |              |
| Compound Factor                                 |       | 100.43% | 100.44% | 100.44% | 100.45% | 100.45% | 100.46% | 100.47% | 100.47% | 100.48% | 100.48% | 4.67%      | <b>0.46%</b> |

Our assumptions for default and recovery rates are in line with history. We subtract a default contribution based on these input variables:

Assumptions:

|                                 |       |
|---------------------------------|-------|
| Expected Default Rate:          | 0.10% |
| Expected Default Recovery Rate: | 45%   |

In summary:

|                        |               |
|------------------------|---------------|
| 5-Year Treasury Return | 2.26%         |
| Spread Effect          | +0.46%        |
| Default Effect         | <u>-0.06%</u> |
| Return Assumption      | <b>2.66%</b>  |

Adding the 5-Year US Treasury Bond return, the expected spread return, and adjusting for defaults yields a compound return expectation of 2.66%.

We believe that this approach works equally well for US Aggregate fixed income and for Non-US Aggregate fixed income where the currency exposure is hedged back to the US dollar. By stripping out currency exposure, the Non-US fixed income investor is left with a portfolio of fixed income securities expecting similar characteristics to the US fixed income portfolio.

### Non-Core Fixed Income

*Modeled: US and Non-US Below-Investment-Grade & Emerging Markets Fixed Income*  
*Compound Return: 3.64%*  
*Arithmetic Average Return: 4.60%*  
*Risk: 14.25%*

Our Non-Core Fixed Income assumption combines US below-investment-grade (high yield) bonds and emerging markets sovereign bonds. We assume a 50% weighting to each asset class.

### High Yield Bonds

For high yield bonds, we begin with the expected nominal return for 7.5-Year US Treasury Bonds outlined above, and then add our spread building block, and subtract a default building block. We calculate a spread over the average of expected returns for 5- and 10-year US Treasury Bonds, because the maturity of their index is currently approximately 7.5 years.

|           |           |
|-----------|-----------|
| Maturity: | 7.5 years |
|-----------|-----------|

Current Spread: 4.00%  
 Long-Term Average Spread: 5.95%  
 Spread Duration: 3.92 years  
 Cumulative Spread Change (10 Yrs): +0.97% (halfway from current to long-term average)  
 Expected Default Rate: 4.00%  
 Expected Default Recovery Rate: 38%

**High Yield -- Spread Effect (over Treasuries)**

| Year                  | 0     | 1       | 2       | 3       | 4       | 5       | 6       | 7       | 8       | 9       | 10      | Cumulative            | Annualized |
|-----------------------|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|-----------------------|------------|
| Starting Spread       | 4.00% | 4.10%   | 4.19%   | 4.29%   | 4.39%   | 4.49%   | 4.58%   | 4.68%   | 4.78%   | 4.88%   | 4.97%   |                       |            |
| Duration              | 3.92  | 3.92    | 3.92    | 3.92    | 3.92    | 3.92    | 3.92    | 3.92    | 3.92    | 3.92    | 3.92    |                       |            |
| Parallel Yield Change |       | 0.10%   | 0.10%   | 0.10%   | 0.10%   | 0.10%   | 0.10%   | 0.10%   | 0.10%   | 0.10%   | 0.10%   | 0.97%                 |            |
| 12-month return       |       | 3.62%   | 3.72%   | 3.81%   | 3.91%   | 4.01%   | 4.11%   | 4.20%   | 4.30%   | 4.40%   | 4.50%   |                       |            |
| Compound Factor       |       | 103.62% | 103.72% | 103.81% | 103.91% | 104.01% | 104.11% | 104.20% | 104.30% | 104.40% | 104.50% | 48.83%                | 4.06%      |
|                       |       |         |         |         |         |         |         |         |         |         |         | Proportion            | 50.00%     |
|                       |       |         |         |         |         |         |         |         |         |         |         | Spread Effect (Total) | 2.03%      |

Our assumed return contribution from high yield spread effect, before accounting for defaults, is 2.03%.

*Emerging Markets Debt*

For emerging markets sovereign bonds, we calculate a spread over the average of expected returns for 10- and 20-year US Treasury Bonds, because the maturity of their index is currently approximately 15 years. Further, to reflect the fact that credit quality amongst the universe of emerging markets sovereign issuers has improved substantially relative to history, we assume only ¼ reversion to historical average spreads. In this sense, we forecast that the forward-looking average spread for emerging markets sovereign spreads will be lower than its history.

Maturity: 15 years  
 Current Spread: 2.69%  
 Long-Term Average Spread: 4.20%  
 Spread Duration: 6.31 years  
 Cumulative Spread Change (10 Yrs): +0.38% (1/4 from current to long-term average)  
 Expected Default Rate: 3.7%  
 Expected Default Recovery Rate: 40%

These assumptions yield an assumption for return contribution from emerging markets debt spread, before accounting for defaults, of 1.31%:

**EMD -- Spread Effect (over Treasuries)**

| Year                  | 0     | 1       | 2       | 3       | 4       | 5       | 6       | 7       | 8       | 9       | 10      | Cumulative            | Annualized |
|-----------------------|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|-----------------------|------------|
| Starting Spread       | 2.69% | 2.73%   | 2.76%   | 2.80%   | 2.84%   | 2.88%   | 2.91%   | 2.95%   | 2.99%   | 3.03%   | 3.07%   |                       |            |
| Duration              | 6.31  | 6.31    | 6.31    | 6.31    | 6.31    | 6.31    | 6.31    | 6.31    | 6.31    | 6.31    | 6.31    |                       |            |
| Parallel Yield Change |       | 0.04%   | 0.04%   | 0.04%   | 0.04%   | 0.04%   | 0.04%   | 0.04%   | 0.04%   | 0.04%   | 0.04%   | 0.38%                 |            |
| 12-month return       |       | 2.45%   | 2.49%   | 2.52%   | 2.56%   | 2.60%   | 2.64%   | 2.68%   | 2.71%   | 2.75%   | 2.79%   |                       |            |
| Compound Factor       |       | 102.45% | 102.49% | 102.52% | 102.56% | 102.60% | 102.64% | 102.68% | 102.71% | 102.75% | 102.79% | 29.50%                | 2.62%      |
|                       |       |         |         |         |         |         |         |         |         |         |         | Proportion            | 50.00%     |
|                       |       |         |         |         |         |         |         |         |         |         |         | Spread Effect (Total) | 1.31%      |

Historical long-term average cumulative ten-year default rates for emerging markets issuers are 6.36% for speculative issuers, and 0.67% for investment-grade issuers.<sup>2</sup> Currently, approximately 54% of the universe of issuers is speculative grade, and 46% investment grade. Applying these weights to historical default experience yields an assumed 3.7% expected default rate.

Our final building block is an adjustment for expected default and recovery rates. We subtract the expected unrecovered default from the total yield:

|            | <u>Default Rate</u> | <u>Recovery Rate</u> | <u>Unrecovered Rate</u> | <u>Default Effect on Return</u> |
|------------|---------------------|----------------------|-------------------------|---------------------------------|
| High Yield | 4.0%                | 38%                  | 62%                     | -2.46%                          |
| EM Debt    | 3.7%                | 40%                  | 60%                     | -2.23%                          |

In summary:

|                   | <u>High Yield</u> | <u>EM Debt</u> | <u>Combined</u> |
|-------------------|-------------------|----------------|-----------------|
| Treasury Return   | 2.47%             | 2.84%          | ---             |
| Spread Effect     | +4.06%            | +2.62%         | ---             |
| Default Effect    | <u>-2.46%</u>     | <u>-2.23%</u>  | ---             |
| Return Assumption | 4.06%             | 3.23%          | <b>3.64%</b>    |

We average the High Yield and Emerging Markets Debt assumptions to arrive at our forward-looking compound return expectation for non-core fixed income, 3.64%.

### Core-Plus Fixed Income

*Modeled: 80% US Investment-Grade Aggregate; 20% Non-Core Plus Sectors*  
*Compound Return: 2.86%*  
*Arithmetic Average Return: 3.00%*  
*Risk: 5.75%*

This return assumption expects a return calculated as follows:

80% of the expected return of Core Fixed Income  
+ 20% of the expected return of Non-Core Fixed Income

This process yields an expected compound return of 2.86%.

### Long-Duration Fixed Income

*Modeled: US Long-Term Government/Credit Fixed Income*  
*Compound Return: 3.60%*  
*Arithmetic Average Return: 4.10%*  
*Risk: 10.50%*

<sup>2</sup> Moodys, [https://www.moodys.com/researchdocumentcontentpage.aspx?docid=PBC\\_151031](https://www.moodys.com/researchdocumentcontentpage.aspx?docid=PBC_151031) and [https://www.moodys.com/researchdocumentcontentpage.aspx?docid=PBC\\_151031](https://www.moodys.com/researchdocumentcontentpage.aspx?docid=PBC_151031).

Our model assumes 50% each in (i) 10- and 20-Year US Treasury Bonds and (ii) long-duration US investment-grade corporate bonds. While the composition of most long-duration fixed income indexes differs slightly from this approach, we believe that most differences will cancel each other out.

*Treasury Component*

For the Treasury component, we use our basic model to average the expected returns for 10- and 20-year Treasury Bonds (outlined above). This average expected return for the Treasury component is 2.84%.

*Spread Component*

We add a spread component consisting of long-term US investment-grade corporate bonds:

Assumptions:

|                                    |                                                   |
|------------------------------------|---------------------------------------------------|
| Proportion in Corporates:          | 50%                                               |
| Current Spread:                    | 1.64%                                             |
| Long-Term Average Spread:          | 1.71%                                             |
| Spread Duration:                   | 10.42 years                                       |
| Cumulative Spread Change (10 Yrs): | 0.04% (halfway from current to long-term average) |
| Expected Default Rate:             | 0.10%                                             |
| Expected Default Recovery Rate:    | 45%                                               |

| Long Corporates -- Spread Effect (over Treasurys) after Reversion |       |         |         |         |         |         |         |         |         |         |         |                       |              |
|-------------------------------------------------------------------|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|-----------------------|--------------|
| Year                                                              | 0     | 1       | 2       | 3       | 4       | 5       | 6       | 7       | 8       | 9       | 10      | Cumulative            | Annualized   |
| Starting Spread                                                   | 1.64% | 1.64%   | 1.65%   | 1.65%   | 1.65%   | 1.66%   | 1.66%   | 1.66%   | 1.67%   | 1.67%   | 1.68%   |                       |              |
| Duration                                                          | 10.42 | 10.42   | 10.42   | 10.42   | 10.42   | 10.42   | 10.42   | 10.42   | 10.42   | 10.42   | 10.42   |                       |              |
| Parallel Yield Change                                             |       | 0.00%   | 0.00%   | 0.00%   | 0.00%   | 0.00%   | 0.00%   | 0.00%   | 0.00%   | 0.00%   | 0.00%   | 0.04%                 |              |
| 12-month return                                                   |       | 1.60%   | 1.61%   | 1.61%   | 1.61%   | 1.62%   | 1.62%   | 1.62%   | 1.63%   | 1.63%   | 1.64%   |                       |              |
| Compound Factor                                                   |       | 101.60% | 101.61% | 101.61% | 101.61% | 101.62% | 101.62% | 101.62% | 101.63% | 101.63% | 101.64% | 17.43%                | 1.62%        |
|                                                                   |       |         |         |         |         |         |         |         |         |         |         | Proportion            | 50.00%       |
|                                                                   |       |         |         |         |         |         |         |         |         |         |         | Spread Effect (Total) | <b>0.81%</b> |

In summary:

|                   |                                              |
|-------------------|----------------------------------------------|
| Treasury Return   | 2.84% (average of 10- and 20-year Treasurys) |
| Spread Effect     | +0.81% (50% proportion)                      |
| Default Effect    | <u>-0.05%</u>                                |
| Return Assumption | <b>3.60%</b>                                 |

Our return assumption for the combined Treasury and corporate Long-Duration Fixed Income basket assumes 50% in each. This compound return assumption is 3.60%.

## US Treasury Inflation Protected Securities (TIPS)

*Modeled: US TIPS*  
*Compound Return: 2.52%*  
*Arithmetic Average Return: 2.70%*  
*Risk: 6.75%*

Given that the first TIPS issue was in 1997, we are hesitant to rely on any “long-term” yield or spread averages to further model the asset class. Instead, we model the Barclays US TIPS Index, which currently has a maturity of 8.1 years.

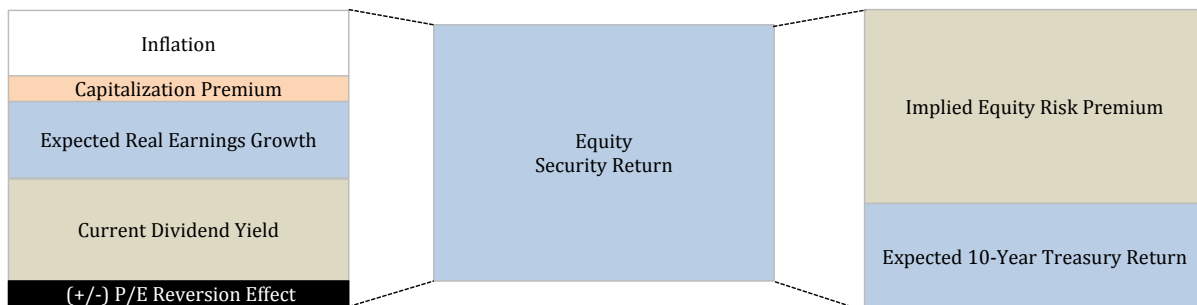
A portfolio of 38% 5-year Treasury bonds, and 62% 10-year Treasury bonds results in a hypothetical Treasury bond with 8.1-year maturity. Assuming our inflation expectation of 2.24% per year for the prospective 10-year period, the expected TIPS return is simply a weighted average of our return expectations for the nominal 10-year and 5-year Treasury bonds.

Applying these weights to our return projections for those bonds results in a 10-year TIPS return assumption of 2.52%:

$$(38\% \times 2.26\%) + (62\% \times 2.67\%) = 2.52\%.$$

## EQUITY

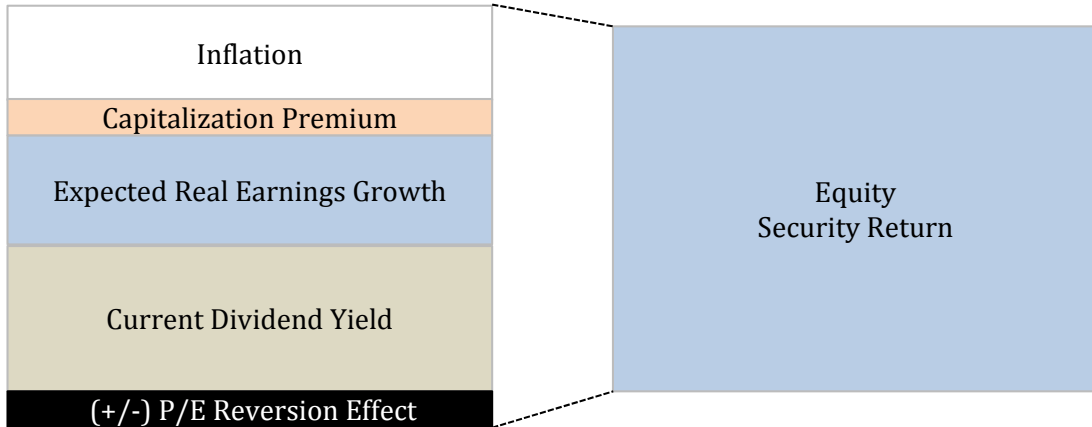
To derive our equity return assumptions, we evaluate two methodologies: (i) a building-block approach using the so-called Shiller price-to-earnings (P/E) measure and (ii) an equity risk premium estimate that averages the current implied equity risk premium based on the Damodaran free cash flow to equity model and the historical geometric average equity risk premium.



Where our building blocks call for a P/E measure, we assume that this current valuation metric will revert halfway to its long-term mean over the prospective ten-year period. Our approach employs “Shiller earnings,” which represent a ten-year average, adjusted for inflation. We believe that this approach appropriately smoothes the impact of year-to-year earnings volatility.

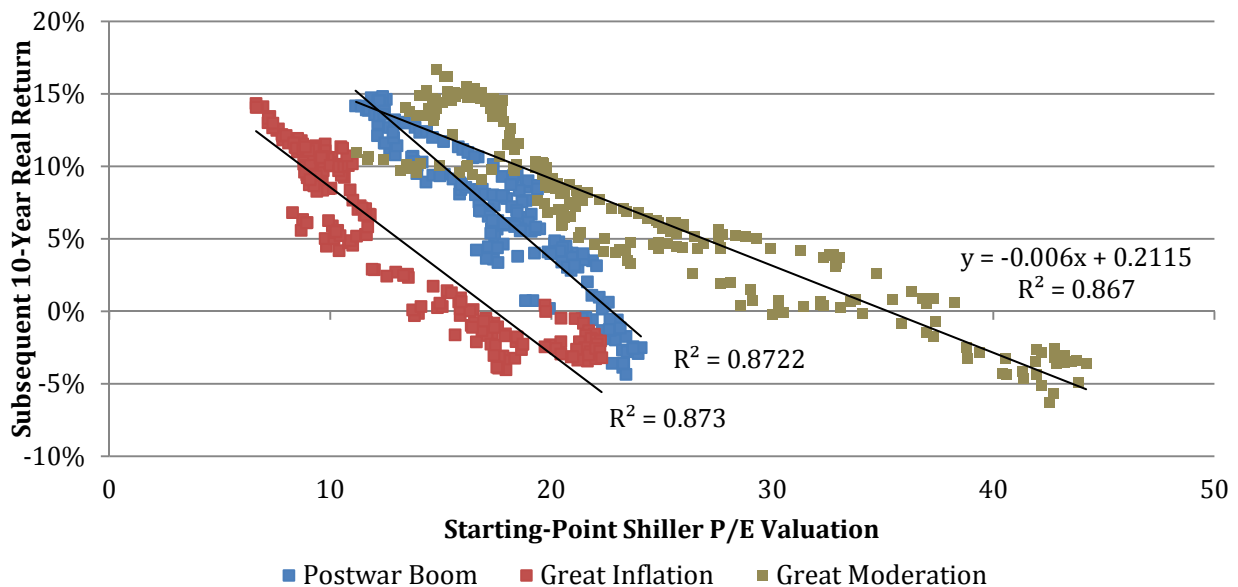
Our building block approach is consistent across equity categories:

- Assumed (Expected) US Inflation
- + Current Dividend Yield
- + Expected Real Earnings Growth
- + Reversion effect of P/E (halfway to long-term mean, over 10 years)
- + Capitalization Premium (if applicable)



We find the Shiller P/E metric to be the most useful of various valuation metrics from the perspective of utility in forecasting returns. The following chart depicts the Shiller P/E metric for the US market, since 1951 (the post-WWII period). The Shiller P/E at a given point in time is depicted on the horizontal axis, and the subsequent 10-year inflation-adjusted return is depicted on the vertical axis. We have decomposed the data array into three economic regimes – the post-war boom (in blue; 1951-1965); the great inflationary period (in red; 1966-1984); and the great moderation (in tan; 1985-2013). Examining the data this way yields useful insights and, importantly, high predictive power for the Shiller P/E metric over subsequent real return. The S&P 500's current position on the chart is indicated by the bold vertical line.

**Long-Term Shiller P/E versus 10-yr Inflation-Adjusted Returns  
By Economic Regime, Since 1951 (Postwar period)**





For the implied equity risk premium, we reference and modify a discounted free cash flow model created by Professor Aswath Damodaran of the Stern School of Business that uses a free cash flow to equity approach to account for dividends as well as stock buybacks.

Our modified free-cash-flow-to-equity model employs several input variables:

|                                                      |                           |
|------------------------------------------------------|---------------------------|
| Beginning S&P 500 level =                            | 1848.36                   |
| Base year free cash flow to equity, S&P 500 =        | \$84.17 <sup>3</sup>      |
| Expected S&P 500 earnings growth over next 5 years = | 3.70% <sup>4</sup>        |
| Expected S&P 500 earnings growth for years 5-10 =    | 2.24% (assumed inflation) |

We apply a standard discounted cash flow methodology to these variables and solve for the rate of growth that makes the discounted forecasted value of the S&P 500 identical to today's value.

$$1848.36 = \frac{84.17(1.037)^1}{(1+r)^1} + \frac{84.17(1.037)^2}{(1+r)^2} + \frac{84.17(1.037)^3}{(1+r)^3} + \frac{84.17(1.037)^4}{(1+r)^4} + \frac{84.17(1.037)^5}{(1+r)^5} + \frac{84.17(1.037)^5(1.0224)}{(r-0.037)(1+r)^5}$$

Solving for  $r$  yields the expected nominal return for the S&P 500 over the next 10 years, under these assumptions. That rate of return is 7.45%. Subtracting the current 10-year Treasury yield of 3.04% results in an expected equity risk premium of 4.41%.

We then take the average of the current implied forward-looking equity risk premium (4.41%) and the long-term historical geometric average equity risk premium (4.20%) to derive an equity risk premium estimate of 4.30% for US Large-Cap Equity.

These inputs are available with reliable and robust data for the US large-cap stock market, but not for US small/mid-cap equities or for global equities. For this reason, we have chosen to anchor our US small/mid-cap and global equity assumptions to our US large-cap equity assumption in various ways.

| US Large-Cap Equity                                       |
|-----------------------------------------------------------|
| <i>Modeled: US Mid- and Large-Capitalization Equities</i> |
| <i>Compound Return: 5.42%</i>                             |
| <i>Arithmetic Average Return: 7.20%</i>                   |
| <i>Risk: 19.50%</i>                                       |

Our return assumptions for US large-cap equity are the average of two separate approaches: a valuation-based building-block approach, and a modified Damadoran free cash flow to equity model.

### *Building Block Approach*

<sup>3</sup> 2013 S&P 500 Dividends = \$34.12 + buybacks = \$49.85.

<sup>4</sup> I/B/E/S analyst consensus earnings growth over the next year is 4.28%. Historically, the I/B/E/S consensus analyst forecast has overstated subsequent actual earnings growth by 15.6%. We reduce our assumption by 13.5% (1-(1/1.156)) accordingly.

For the valuation-based building block approach, we create our building blocks from the S&P 500 Index:

- 2.24% Inflation
- 1.94% Current Dividend Yield
- 1.73% Long-Term Compound Average Real Earnings Growth (Since 1871)

We measure expected P/E reversion halfway to long-term mean:

|                         | <u>Shiller P/E</u> |                                |
|-------------------------|--------------------|--------------------------------|
| Current                 | 25.05              |                                |
| Long-Term Average       | 16.51              |                                |
| Annual reversion effect | -2.04%             | (halfway to long-term average) |

The building blocks approach results in an expected compound return for US Large-Cap Equity of 3.87%.

#### *Equity Risk Premium / Discounted Cash Flow Model*

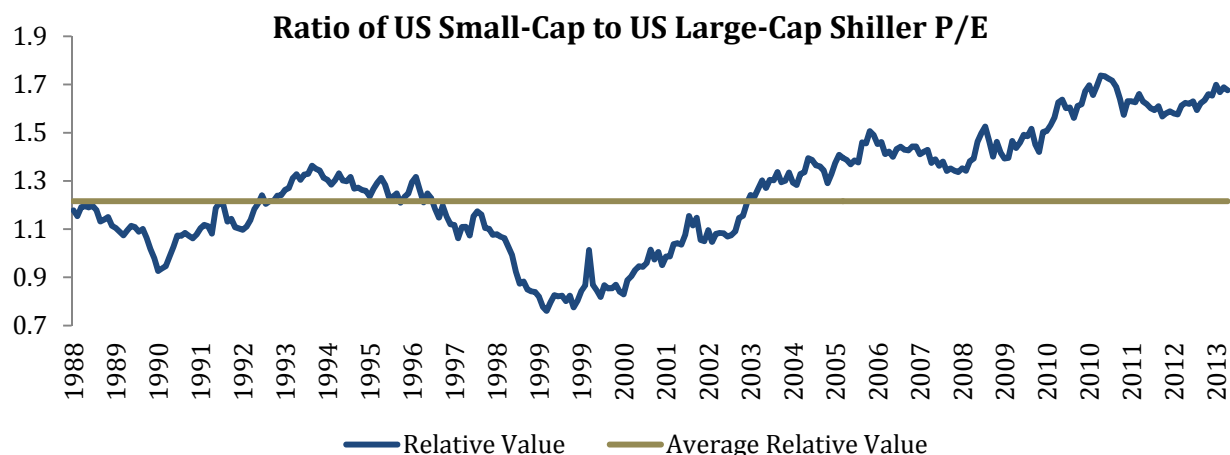
Our equity risk premium estimate for US Large-Cap Equity is derived by taking the average of the implied equity risk premium, from the free cash flow to equity model, for the S&P 500 index as of the end of 2013 (4.41%) and the long-term historical geometric average equity premium (4.20%), which equals 4.30%. Adding back our expected 10-year US Treasury forecasted compound return of 2.67% results in an expected compound return of 6.97%.

Averaging these two methodologies yields an expected compound return of 5.42%.

#### **US Small/Mid-Cap Equity**

*Modeled: US Small- and Mid-Capitalization Equities*  
*Compound Return: 5.55%*  
*Arithmetic Average Return: 7.40%*  
*Risk: 20.00%*

To our US Large-Cap Equity assumption, we add a small/mid-cap compound return premium. Historically, small-cap securities have seen a premium of 0.25%. US small-cap stocks have also historically traded at a higher average valuation than US large-cap stocks – in a ratio of approximately 1.2:1, as indicated by the horizontal line in the following chart. The current valuation premium, as indicated by the blue line, is higher at approximately 1.7:



While we are disinclined to read too much into this valuation metric, given its limited history (since 1979), we do use this valuation insight to reduce our expectation for small-cap return premium by half. As such, we add 0.125% to our large-cap equity assumption to yield a compound return assumption for US small/mid-cap equity securities of 5.55%.

| US Equity                                                                                                                                                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><i>Modeled: US Equities, All Capitalizations</i><br/> <i>Compound Return: 5.45%</i><br/> <i>Arithmetic Average Return: 7.20%</i><br/> <i>Risk: 19.50%</i></p> |

Our return assumption for US Equity is intended to model the entire US equity market. It assumes the current weighting of large- and small/mid-capitalization equities in the US equity market – 81% large, and 19% small/mid<sup>5</sup>. These weights are applied to the underlying US Large-Cap and US Small/Mid-Cap Equity assumptions to yield 5.45% in compound terms:

$$(81\% \times 5.42\%) + (19\% \times 5.55\%) = 5.45\%.$$

| Non-US Large-Cap Equity                                                                                                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><i>Modeled: Non-US Large-Capitalization Equities, Developed and Emerging</i><br/> <i>Compound Return: 6.60%</i><br/> <i>Arithmetic Average Return: 9.00%</i><br/> <i>Risk: 23.50%</i></p> |

We build separate assumptions for developed and emerging non-US markets, and then weigh them according to current market weights to come up with our Non-US Large-Cap Equity assumption, which is intended to model equities of both developed and emerging markets. Because of data limitations, we have relied less on actual historical experience for international markets than we have on qualitative adjustments to more robust US-market data.

For developed markets, our assumed building blocks are as follows:

<sup>5</sup> Russell, [http://www.russell.com/indexes/documents/US\\_Indexes\\_comparison.pdf](http://www.russell.com/indexes/documents/US_Indexes_comparison.pdf).

- 2.24% Inflation
- 2.96% Current Dividend Yield
- 1.94% Compound Average Real Earnings Growth (Since 1988)

We measure expected P/E reversion halfway to long-term mean:

|                         | <u>Shiller P/E</u>                    |
|-------------------------|---------------------------------------|
| Current                 | 16.30                                 |
| Long-Term Average       | 14.10 <sup>6</sup>                    |
| Annual reversion effect | -0.72% (halfway to long-term average) |

This approach yields an expected compound return for developed non-US large-capitalization equities of 6.42%.

Our emerging markets equity approach is detailed below. Its current compound return assumption is 7.25%.

As of the end of 2013, developed markets comprised 79%, and emerging markets 21%, of the non-US total equity market capitalization. Applying those weights to our developed and emerging markets assumptions yields a non-US large-capitalization compound return assumption of 6.60%.

### Non-US Small-Cap Equity

*Modeled: Non-US Small-Capitalization Equities, Developed and Emerging*  
*Compound Return: 6.85%*  
*Arithmetic Average Return: 10.20%*  
*Risk: 27.75%*

To our Non-US Large-Cap Equity assumption, we add a compound return premium building block of 0.25%, the same historical premium we used for US small-cap equities. This yields a compound return assumption of 6.85%. Given very limited data for non-US small-capitalization equities, we are not inclined to make a valuation adjustment based on reversion to an average.

### Emerging Markets Equity

*Modeled: Emerging Markets Equity*  
*Compound Return: 7.25%*  
*Arithmetic Average Return: 11.00%*  
*Risk: 29.75%*

Our assumed building blocks are as follows:

<sup>6</sup> Over the longest common period for which we have both US (S&P 500) and Developed Non-US (MSCI EAFE) earnings series (since 1995), EAFE has traded at an average valuation level approximately 85.5% of the level of the S&P 500. We apply this fraction to our assumption for the long-term P/E of US large-capitalization stocks to arrive at our assumed long-term average valuation level to which we expect non-US large-capitalization stocks to revert.

2.24% Inflation  
 2.60% Current Dividend Yield  
 2.20% Real Earnings Growth<sup>7</sup>

We measure expected P/E reversion halfway to long-term mean:

|                         | <u>Shiller P/E</u> |                                |
|-------------------------|--------------------|--------------------------------|
| Current                 | 14.50              |                                |
| Long-Term Average       | 15.10 <sup>8</sup> |                                |
| Annual reversion effect | 0.20%              | (halfway to long-term average) |

Adding this P/E reversion measure to the other building blocks yields an expected compound return of 7.25%.

| <b>Non-US Equity</b>                                               |
|--------------------------------------------------------------------|
| <i>Modeled: Non-US Equities, All Regions &amp; Capitalizations</i> |
| <i>Compound Return: 6.65%</i>                                      |
| <i>Arithmetic Average Return: 9.20%</i>                            |
| <i>Risk: 24.00%</i>                                                |

Our return assumption for Non-US Equity is intended to model the entire Non-US equity market. It assumes the current weighting of large-cap and small-cap markets equities in the international equity market – 80% large-cap and 20% small-cap. These weights are applied to the underlying Non-US Large-Cap Equity and Non-US Small-Cap Equity assumptions. This weighting yields a compound return assumption of 6.65%:

$$(80\% \times 6.60\%) + (20\% \times 6.85\%) = \mathbf{6.65\%}.$$

## ALTERNATIVES

Alternative assets share a common element of not easily being modeled with public-market index proxies. As well, we are more reluctant to rely on their long-term history, given growth in their assets under management over the last several decades and the dynamic nature of strategies employed.

<sup>7</sup> Over the longest common period for which we have data on developed (MSCI EAFE) and emerging (MSCI EM) markets earnings (1995), the emerging markets have averaged 113% of the earnings growth rate of developed markets. We apply this proportion to our assumed long-term earnings growth rate for developed markets to yield an assumed emerging markets earnings growth rate of 2.20%.

<sup>8</sup> Since 1995, the longest data series available for non-US market earnings, the average Shiller P/E ratio for emerging markets has been 21.5. We note that the period since 1995 has globally been a period of higher valuations than have historically been experienced. For this reason, we do not assume that emerging markets earnings will revert to the relatively high level of 21.5 – instead, we assume that because of higher growth rates, emerging markets will command an average P/E ratio 1.00 higher than developed non-US markets will.

## Real Estate

*Modeled: Public (REITs) and Open-Ended Private Core Real Estate*

*Compound Return: 5.80%*

*Arithmetic Average Return: 7.40%*

*Risk: 19.00%*

Our expected return reflects going-in cap rates for core private real estate, based on the Urban Land Institute consensus estimate of the NCREIF capitalization rate as of December 31, 2013: 5.8% in compound terms.

This cap rate reflects current income return on an unlevered basis and excludes capital appreciation. We note that the primary driver of return for core real estate over the long term has been income, not appreciation.

## Marketable Alternatives

*Modeled: Hedge Funds of Funds, Global GTAA, Daily-Valued Alternative Strategies*

*Compound Return: 4.89%*

*Arithmetic Average Return: 5.60%*

*Risk: 12.25%*

We assume a diversified portfolio that will tend to approximate the following market exposures over time:

- 30% US Equity
- 30% Non-US Equity
- 20% Core Fixed Income
- 20% Non-Core Fixed Income

Weighting those assumptions accordingly results in a compound return assumption of 4.89%.

## Non-Marketable Alternatives

*Modeled: Venture Capital, Private Equity, Distressed Credit, in Lockup Vehicles*

*Compound Return: 7.55%*

*Arithmetic Average Return: 12.10%*

*Risk: 32.75%*

We assume a diversified portfolio that will tend to approximate the following market exposures over time, plus a premium for leverage and illiquidity:

- 50% US Equity
- 50% Non-Core Fixed Income
- + 3.00% illiquidity/leverage premium

Weighting those assumptions accordingly results in a compound return assumption of 7.55%

## RISK

Our risk assumptions are mostly derived from history, but we have enhanced historical metrics with qualitative overlays in several asset categories.

For each asset category, we began by examining the following historical annual returns:

|                             |                                                                                                                                                                         |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Inflation                   | US CPI                                                                                                                                                                  |
| Cash Equivalents            | 91-Day T-Bills                                                                                                                                                          |
| Low-Duration Fixed Income   | Barclays 1-3 Year Government/Credit                                                                                                                                     |
| Core Fixed Income           | Barclays US Aggregate                                                                                                                                                   |
| Non-Core Fixed Income       | 50% ML High Yield Master II, 50% JP Morgan EMBI back to 1994;<br>100% ML High Yield Master II before 1994                                                               |
| Long-Duration Fixed Income  | Barclays Long Government/Credit                                                                                                                                         |
| TIPS                        | Barclays US TIPS                                                                                                                                                        |
| US Equity                   | Russell 3000 back to 1979; S&P 500 before 1979                                                                                                                          |
| US Large-Cap Equity         | Russell 1000 back to 1979; S&P 500 before 1979                                                                                                                          |
| US Small-Cap Equity         | Russell 2000                                                                                                                                                            |
| Non-US Equity               | MSCI ACWI ex US IMI back to 1994; MSCI EAFE before 1994                                                                                                                 |
| Non-US Large-Cap Equity     | MSCI ACWI ex US back to 2001; MSCI EAFE before 2001                                                                                                                     |
| Non-US Small-Cap Equity     | MSCI ACWI ex US Small Cap                                                                                                                                               |
| Emerging Markets Equity     | MSCI Emerging Markets                                                                                                                                                   |
| Real Estate                 | FTSE NAREIT, NCREIF Property, and NCREIF ODCE (separately)                                                                                                              |
| Marketable Alternatives     | HFRI Fund of Funds; and 30% our US Equity series, 30% our Non-US Equity series, 20% our Core Fixed Income series, and 20% our Non-Core Fixed Income series (separately) |
| Non-Marketable Alternatives | Average of 2x our US Equity series and 2x our Non-Core Fixed Income series                                                                                              |

In each case, we calculated the longest-term standard deviation of returns possible for the category. Then, we calculated the standard deviation of annual returns over the last ten years. The average of these two figures represents our base-case risk assumption.

Next, we examined the worst annual return for each proxy index, going back as far as possible into history. We assumed this return as the worst-case scenario. In some cases, the normal return distribution implied by our return and risk assumptions suggested that the worst-case scenario had less than a 2% probability (1 in 50 years) of occurring. In those cases, we adjusted our risk assumption upward until the worst-case scenario had at least a 2% probability of occurring under our assumed normal return distribution. To perform this probability analysis for private real estate, we examined rolling two-year periods to account for the fact that declines, as measured by appraisals and illiquidity, occur more slowly than in public markets.

Finally, based on this analysis and our qualitative assessment of the quality and longevity of our return data, we made several qualitative adjustments, where noted.

The results of this risk analysis follow.

The following table depicts actual standard deviations of annual return, measured in the long term (as far back as history will allow), for the last ten years, and the average of those two figures.

Adding or subtracting our qualitative adjustment results in the Risk Assumption at the far right.

|                             | <u>Standard Deviation of Returns</u> |                 |                | Risk                          |                             |
|-----------------------------|--------------------------------------|-----------------|----------------|-------------------------------|-----------------------------|
|                             | <u>Long Term</u>                     | <u>10 Years</u> | <u>Average</u> | <u>Qualitative Adjustment</u> | <u>Assumption (Rounded)</u> |
| Inflation                   | 4.98%                                | 1.17%           | 3.08%          |                               | 3.00%                       |
| Cash Equivalents            | 3.18%                                | 1.93%           | 2.55%          |                               | 2.50%                       |
| Low-Duration Fixed Income   | 4.48%                                | 1.99%           | 3.24%          |                               | 3.25%                       |
| Core Fixed Income           | 6.96%                                | 2.81%           | 4.88%          |                               | 5.00%                       |
| Core-Plus Fixed Income      | 5.40%                                | 4.12%           | 4.76%          | 1.00%                         | 5.75%                       |
| Non-Core Fixed Income       | 13.21%                               | 15.23%          | 14.22%         |                               | 14.25%                      |
| Long-Duration Fixed Income  | 11.15%                               | 7.84%           | 9.50%          | 1.00%                         | 10.50%                      |
| TIPS                        | 6.39%                                | 7.00%           | 6.70%          |                               | 6.75%                       |
| US Equity                   | 17.74%                               | 19.36%          | 18.55%         | 1.00%                         | 19.50%                      |
| US Large-Cap Equity         | 17.79%                               | 19.30%          | 18.55%         | 1.00%                         | 19.50%                      |
| US Small/Mid-Cap Equity     | 18.69%                               | 21.45%          | 20.07%         |                               | 20.00%                      |
| Non-US Equity               | 23.26%                               | 24.59%          | 23.93%         |                               | 24.00%                      |
| Non-US Large-Cap Equity     | 22.73%                               | 24.10%          | 23.42%         |                               | 23.50%                      |
| Non-US Small-Cap Equity     | 27.24%                               | 30.32%          | 28.78%         | -1.00%                        | 27.75%                      |
| Emerging Markets Equity     | 35.35%                               | 35.69%          | 35.52%         | -5.75%                        | 29.75%                      |
| Real Estate                 | 19.35%                               | 23.08%          | 21.22%         | -2.25%                        | 19.00%                      |
| Marketable Alternatives     | 10.31%                               | 10.11%          | 10.21%         | 2.01%                         | 12.25%                      |
| Non-Marketable Alternatives | 30.95%                               | 34.59%          | 32.77%         |                               | 32.75%                      |



The following table examines the probability of the actual experienced worst case occurring under our assumed normal distribution of returns, as implied by our expected return and standard deviation of returns.

We measure the actual worst-case scenario in “sigmas,” or standard deviations from our assumed mean return. Measuring this way, we ask, “how likely was the actual experienced worst case, according to the distribution parameters we have assumed?” The implied probability of the worst case occurring represents the area to the left of the actual worst-case event under our assumed return distribution. We have qualitatively adjusted several asset classes to ensure that this probability is always greater than 2%, meaning we assume that the actual experienced worst case has at least a one-in-fifty-year chance of happening under our assumptions.

|                                                                       | Worst Year       | Actual Worst Case, in Sigmas from Assumption | Implied Probability of Actual Worst Case Occurring |
|-----------------------------------------------------------------------|------------------|----------------------------------------------|----------------------------------------------------|
| Cash Equivalents                                                      | 0.04% (2011)     | 0.40                                         | 68.59%                                             |
| Low-Duration Fixed Income                                             | 0.55% (1994)     | 0.42                                         | 67.17%                                             |
| Core Fixed Income                                                     | -2.92% (1994)    | 1.21                                         | 22.73%                                             |
| Core-Plus FI                                                          | -4.26% (1994)    | 1.32                                         | 18.75%                                             |
| Non-Core Fixed Income                                                 | -18.86% (2008)   | 1.70                                         | 8.85%                                              |
| Long-Duration Fixed Income                                            | -8.83% (2013)    | 1.33                                         | 18.42%                                             |
| TIPS                                                                  | -8.61% (2013)    | 1.79                                         | 7.38%                                              |
| US Equity                                                             | -37.31% (2008)   | 2.30                                         | 2.15%                                              |
| US Large-Cap Equity                                                   | -37.60% (2008)   | 2.31                                         | 2.08%                                              |
| US Small/Mid-Cap Equity                                               | -36.79% (2008)   | 2.22                                         | 2.63%                                              |
| Non-US Equity                                                         | -45.99% (2008)   | 2.31                                         | 2.11%                                              |
| Non-US Large-Cap Equity                                               | -45.24% (2008)   | 2.32                                         | 2.05%                                              |
| Non-US Small-Cap Equity                                               | -50.01% (2008)   | 2.17                                         | 3.02%                                              |
| Emerging Markets Equity                                               | -53.33% (2008)   | 2.16                                         | 3.06%                                              |
| Real Estate                                                           | -37.34% (1974)   | 2.36                                         | 1.82%                                              |
| Marketable Alternatives                                               | -21.37% (2008)   | 2.23                                         | 2.56%                                              |
| Non-Marketable Alternatives                                           | -56.17% (2008)   | 2.10                                         | 3.58%                                              |
| Alternate benchmarks for Real Estate and Non-Marketable Alternatives: |                  |                                              |                                                    |
| NCREIF Property (2 Years)                                             | -22.23% (2008-9) | 1.56                                         | 11.78%                                             |
| NCREIF ODCE (2 Years)                                                 | -36.79% (2008-9) | 2.33                                         | 1.97%                                              |
| Marketable Alternatives (build-up)                                    | -27.71% (2008)   | 2.75                                         | 0.59%                                              |

Our qualitative adjustments to Risk were as follows:

#### Core-Plus Fixed Income (+1.00%)

While long-term volatility for our modeled Core-Plus series has been lower than that for Core Fixed Income, because of diversification effects, recent (last 10 years) volatility has been almost twice as high. Our modest adjustment further weighs our calculation toward the recent past.

#### Long-Duration Fixed Income (+1.00%)

We adjusted the risk expectation upward by 100 basis points. Recent volatility (last ten years: 7.84%) has been lower than long-term average volatility (11.15%), in a mostly declining rate environment. Our adjustment acknowledges the potential for rising rates.

#### US Equity, US Large-Cap Equity (+1.00%, +1.00%)

These categories were adjusted upward to make their actual worst-case experience greater than a 2% probability of occurring under the assumed distribution.

#### Non-US Small-Cap Equity (-1.00%)

Given the limited history for a public-market proxy for this asset class, we are reluctant to rely too heavily on historically measured volatility. As such, we adjusted the risk downward such that its actual worst-case (2008) represents an approximately 3% probability of occurrence under the assumed distribution.

#### Emerging Markets Equity (-5.75%)

Given the limited history for a public-market proxy for this asset class, we are reluctant to rely too heavily on historically measured volatility. As such, we adjusted the risk downward such that its actual worst-case (2008) represents an approximately 3% probability of occurrence under the assumed distribution.

#### Real Estate (-2.25%)

This downward adjustment acknowledges that the public market proxy we have chosen to represent Core Real Estate includes some riskier non-core elements. We have adjusted the assumption such that the 2008 experience for REITs, and the combined 2008/2009 experience for core open-ended private real estate funds, represents an approximate 2% probability of occurrence under our assumed distribution. Under this revised risk assumption, the NCREIF ODCE's actual 2008/2009 experience had a 1.97% probability of occurring (approximately 1 in 50 years).

#### Marketable Alternatives (+2.01%)

This adjustment averages our two approaches for modeling the history for this asset category. The upward adjustment makes the risk assumption halfway between the historically measured volatility of each approach.

## CORRELATION COEFFICIENTS

Our forward-looking correlation assumptions are mostly derived from long-term history but emphasize the recent past. Our process first identifies a reasonable proxy for each asset category, typically an index that represents the asset class. For several asset classes, we have used our judgment to construct a proxy return stream for the asset class that either has a longer history for evaluation, or to construct a marketable proxy for a non-marketable asset.

Our correlation assumptions are based on these return streams:

|                             |                                                                                                           |
|-----------------------------|-----------------------------------------------------------------------------------------------------------|
| Inflation                   | US CPI                                                                                                    |
| Cash Equivalents            | 91-Day T-Bills                                                                                            |
| Low-Duration Fixed Income   | Barclays 1-3 Year Government/Credit                                                                       |
| Core Fixed Income           | Barclays US Aggregate                                                                                     |
| Non-Core Fixed Income       | 50% ML High Yield Master II, 50% JP Morgan EMBI back to 1994;<br>100% ML High Yield Master II before 1994 |
| Long-Duration Fixed Income  | Barclays Long Government/Credit                                                                           |
| TIPS                        | Barclays US TIPS                                                                                          |
| US Equity                   | Russell 3000 back to 1979; S&P 500 before 1979                                                            |
| US Large-Cap Equity         | Russell 1000 back to 1979; S&P 500 before 1979                                                            |
| US Small-Cap Equity         | Russell 2000                                                                                              |
| Non-US Equity               | MSCI ACWI ex US IMI back to 1994; MSCI EAFE before 1994                                                   |
| Non-US Large-Cap Equity     | MSCI ACWI ex US back to 2001; MSCI EAFE before 2001                                                       |
| Non-US Small-Cap Equity     | MSCI ACWI ex US Small Cap                                                                                 |
| Emerging Markets Equity     | MSCI Emerging Markets                                                                                     |
| Real Estate                 | FTSE NAREIT, NCREIF, and NCREIF ODCE                                                                      |
| Marketable Alternatives     | HFRI Fund of Funds                                                                                        |
| Non-Marketable Alternatives | Average of 2x the Non-Core Fixed Income series and 2x the US Equity series                                |

Using those streams, we constructed a correlation matrix that takes the simple average of four other correlation matrices – constructed with 3 years, 5 years, and 10 years of data, and one with as much data as possible going back to each series' inception. Averaging these four measures gives acknowledgement to the long-term history while emphasizing the recent past, when correlations have been higher than long-term history has delivered. This approach is therefore conservative in the diversification benefit that will appear from correlation in our modeling.

We made qualitative adjustments only to the real estate correlation coefficients. Our assumed coefficients for real estate average the calculated coefficients for public REITs and private core real estate.

Finally, we ran our calculated correlation coefficients through the Ibbotson statistical correlation matrix tester, which made slight adjustments to ensure that the matrix is positive semi-definite.

Our assumed return correlation matrix follows:

**Sellwood Consulting 2014 Correlation Coefficient Assumptions**

|                               |       |       |       |       |       |       |       |      |       |       |       |       |       |       |      |      |       |       |
|-------------------------------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|-------|-------|-------|-------|------|------|-------|-------|
| Inflation                     | 1.00  | 0.20  | -0.05 | -0.13 | -0.10 | -0.02 | -0.20 | 0.04 | 0.02  | 0.02  | 0.01  | 0.00  | 0.06  | 0.02  | 0.01 | 0.07 | 0.11  | 0.00  |
| Cash Equivalents              | 0.20  | 1.00  | 0.17  | 0.00  | 0.03  | 0.06  | -0.06 | 0.01 | 0.03  | 0.03  | 0.08  | 0.08  | 0.07  | 0.09  | 0.03 | 0.09 | 0.19  | 0.04  |
| Low-Duration Fixed Income     | -0.05 | 0.17  | 1.00  | 0.75  | 0.72  | 0.38  | 0.48  | 0.62 | 0.07  | 0.08  | 0.19  | 0.19  | 0.20  | 0.20  | 0.23 | 0.35 | 0.12  | 0.19  |
| Core Fixed Income             | -0.13 | 0.00  | 0.75  | 1.00  | 0.90  | 0.37  | 0.91  | 0.77 | -0.07 | -0.07 | 0.04  | 0.04  | 0.05  | 0.07  | 0.21 | 0.29 | -0.06 | 0.09  |
| Core-Plus Fixed Income        | -0.10 | 0.03  | 0.72  | 0.90  | 1.00  | 0.74  | 0.77  | 0.77 | 0.26  | 0.27  | 0.40  | 0.40  | 0.40  | 0.43  | 0.45 | 0.57 | 0.25  | 0.47  |
| Non-Core Fixed Income         | -0.02 | 0.06  | 0.38  | 0.37  | 0.74  | 1.00  | 0.24  | 0.46 | 0.67  | 0.67  | 0.77  | 0.77  | 0.77  | 0.79  | 0.55 | 0.76 | 0.62  | 0.85  |
| Long-Duration Fixed Income    | -0.20 | -0.06 | 0.48  | 0.91  | 0.77  | 0.24  | 1.00  | 0.64 | -0.17 | -0.17 | -0.07 | -0.07 | -0.07 | -0.05 | 0.11 | 0.15 | -0.16 | -0.03 |
| TIPS                          | 0.04  | 0.01  | 0.62  | 0.77  | 0.77  | 0.46  | 0.64  | 1.00 | 0.06  | 0.07  | 0.18  | 0.18  | 0.20  | 0.24  | 0.25 | 0.46 | 0.12  | 0.22  |
| US Equity                     | 0.02  | 0.03  | 0.07  | -0.07 | 0.26  | 0.67  | -0.17 | 0.06 | 1.00  | 1.00  | 0.88  | 0.88  | 0.83  | 0.79  | 0.57 | 0.73 | 0.72  | 0.96  |
| US Large-Cap Equity           | 0.02  | 0.03  | 0.08  | -0.07 | 0.27  | 0.67  | -0.17 | 0.07 | 1.00  | 1.00  | 0.88  | 0.88  | 0.83  | 0.79  | 0.57 | 0.73 | 0.72  | 0.96  |
| US SMID-Cap Equity            | 0.03  | 0.02  | 0.03  | -0.12 | 0.23  | 0.66  | -0.21 | 0.04 | 0.96  | 0.95  | 1.00  | 0.85  | 0.83  | 0.79  | 0.58 | 0.73 | 0.73  | 0.92  |
| Non-US Equity                 | 0.01  | 0.08  | 0.19  | 0.04  | 0.40  | 0.77  | -0.07 | 0.18 | 0.88  | 0.88  | 1.00  | 1.00  | 0.97  | 0.93  | 0.53 | 0.78 | 0.80  | 0.91  |
| Non-US Large-Cap Equity       | 0.00  | 0.08  | 0.19  | 0.04  | 0.40  | 0.77  | -0.07 | 0.18 | 0.88  | 0.88  | 1.00  | 1.00  | 0.96  | 0.92  | 0.54 | 0.78 | 0.79  | 0.91  |
| Non-US Small-Cap Equity       | 0.06  | 0.07  | 0.20  | 0.05  | 0.40  | 0.77  | -0.07 | 0.20 | 0.83  | 0.83  | 0.97  | 0.96  | 1.00  | 0.92  | 0.51 | 0.76 | 0.82  | 0.88  |
| Emerging Markets Equity       | 0.02  | 0.09  | 0.20  | 0.07  | 0.43  | 0.79  | -0.05 | 0.24 | 0.79  | 0.79  | 0.93  | 0.92  | 0.92  | 1.00  | 0.49 | 0.74 | 0.77  | 0.86  |
| Real Estate                   | 0.01  | 0.03  | 0.23  | 0.21  | 0.45  | 0.55  | 0.11  | 0.25 | 0.57  | 0.57  | 0.53  | 0.54  | 0.51  | 0.49  | 1.00 | 0.86 | 0.46  | 0.79  |
| Diversified Inflation-Related | 0.07  | 0.09  | 0.35  | 0.29  | 0.57  | 0.76  | 0.15  | 0.46 | 0.73  | 0.73  | 0.78  | 0.78  | 0.76  | 0.74  | 0.86 | 1.00 | 0.60  | 0.80  |
| Marketable Alternatives       | 0.11  | 0.19  | 0.12  | -0.06 | 0.25  | 0.62  | -0.16 | 0.12 | 0.72  | 0.72  | 0.80  | 0.79  | 0.82  | 0.77  | 0.46 | 0.60 | 1.00  | 0.75  |
| Non-Marketable Alternatives   | 0.00  | 0.04  | 0.19  | 0.09  | 0.47  | 0.85  | -0.03 | 0.22 | 0.96  | 0.96  | 0.91  | 0.91  | 0.88  | 0.86  | 0.79 | 0.80 | 0.75  | 1.00  |

Key: Return correlation > 0.50 = gray; < 0.00 = red.

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