



**F. Gary Knapp, CFA**  
Managing Director and  
Head of Liability-Driven  
Investment Strategies



**Michael Collins, CFA**  
Managing Director  
Senior Investment Officer

*This paper was originally published in January 2011. In this updated version, we review several duration extension scenarios as of December 31, 2013.*

## Liability-Driven Perspectives

# Go Long for the Taper Touchdown

*Corporate pension plan funded ratios improved dramatically in 2013 as the equity markets rallied and long-term U.S. Treasury rates rose almost a percentage point in response to signs of stronger U.S. economic growth and the Federal Reserve's plan to taper its bond buying program. As a result, many corporate pension plans are in a much better position to advance their de-risking strategies and take advantage of the historical steepness of the yield curve.*

*For many plan sponsors, we believe simply extending the duration of their existing fixed income allocation from intermediate term to longer term could reduce the mismatch, and resulting tracking error, between their plans' assets and liabilities, even in an environment in which the Federal Reserve begins raising short-term interest rates.*

*In this paper, we take a brief look at the current interest rate backdrop and how the historical steepness of the U.S. Treasury yield curve provides an attractive entry point into longer duration high quality bonds. We then look at some of the risk/return trade-offs of extending duration under different interest rate and yield curve scenarios.*

### Backdrop Still Supports a Low Rate Environment

Entering 2014, we look for U.S. interest rates to remain relatively low in light of elevated unemployment, muted inflation, and moderate global economic growth. Despite the Fed's decision to begin exiting the bond buying business, we expect it will continue to run an extremely accommodative policy, keeping the federal funds rate near zero for many quarters, or years, to come. The Fed is not alone—the European Central Bank is expected to emphasize its 'very low rates for long' mantra in its effort to spur growth, and the Bank of Japan will likely continue its double-barreled policy to restore 2% inflation with: 1) low interest rates, and 2) an aggressive bond buying program.

While some may contend that an expanding U.S. recovery will pressure interest rates higher, we believe that most of the rise in yields is behind us, or at least fully priced in, for the short to medium term. The forward yield curve at year-end 2013, for example, implied a 4.7% yield on the five-year U.S. Treasury note in five years. This level suggests the market is pricing in an economic growth rate of well over 3.0%. While plausible, it strikes us as optimistic given the current uneven economic outlook.

As noted in a recent Prudential Fixed Income white paper, "The Low Ranger," ongoing global headwinds emanating from high consumer debt, financial sector deleveraging, fiscal retrenchment, and excess capacity, among other factors, suggest that the global economic backdrop may remain subpar relative to previous recoveries, with commensurately lower inflation and interest rates. Other factors lending support to the U.S. fixed income market are the continued search for yield given persistent near-zero cash rates, as well as increased demand from pension plans and insurance companies, particularly for longer-term securities.

***In all, we expect the 10-year U.S. Treasury yield to average about 3.0% over the next decade.***



### Steepness of Yield Curve Offers Ongoing Opportunity

The U.S. Treasury yield curve remains historically steep from intermediate to long-term maturities, the key maturity range for pension plans. As shown below, the difference between 10-year and 30-year U.S. Treasury bond yields was 94 bps as of December 31, 2013, well above the average yield differential of 36 bps since January 1980. Historically, the U.S. Treasury yield curve steepens during periods of accommodative monetary policy (as represented by the federal funds rate), and then flattens as the Fed eventually begins raising short-term interest rates.

#### Federal Funds Rate vs. Slope of U.S. Treasury Yields

As of December 31, 2013



Source of data: Bloomberg.

### How Extending Duration Affects Asset Portfolio Risk

A plan sponsor that extends from an intermediate duration portfolio to a long duration portfolio will certainly increase the portfolio’s interest rate risk. However, the current steepness of the yield curve means that a long duration strategy also provides a much higher yield, which helps compensate for this additional risk. In fact, a plan can now add more than two percentage points of yield just by moving from an intermediate duration strategy (measured by the Barclays U.S. Aggregate Bond Index) to a long duration strategy (measured by the Barclays U.S. Long Government/Credit Index), as shown below. Part of this increase is due to the steepness of the yield curve, and part is due to the greater amount of credit-related securities in the Long Government/Credit Index relative to the Aggregate Index.

#### Characteristics

#### Barclays US Aggregate Bond Index vs. US Long Duration Government/Credit Index

December 31, 2013

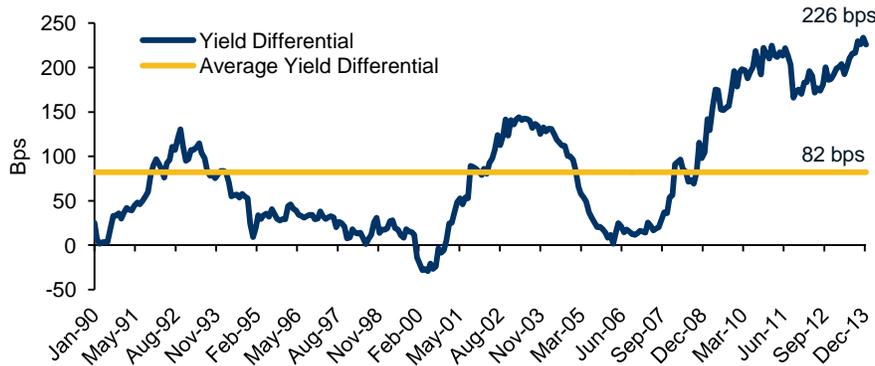
|   | Barclays US Aggregate Bond Index | Barclays US Long Govt/Credit Index |
|---|----------------------------------|------------------------------------|
| Yield to Worst (%)  | 2.48                             | 4.74                               |
| Duration (yrs)  | 5.55                             | 13.87                              |
| Quality   | Aa1/AA2                          | Aa3/A1                             |
| US Treasuries, US Govt Agencies, and MBS <sup>1</sup> (%) | 71.2                             | 36.6                               |
| Credit-Related <sup>2</sup> (%)                           | 28.8                             | 63.4                               |

**Yield pick-up:  
2.26%**  
**Duration increase:  
8.32 years**

Sources: Prudential Fixed Income and Barclays. <sup>1</sup>Mortgage-backed securities are not a component of the Barclays US Long Govt/Credit Index. <sup>2</sup>Represents corporate bonds, non-US government-related debt, taxable municipal bonds, and structured product.

The chart below illustrates the yield differential between intermediate and long duration strategies from January 1990 to December 31, 2013. Here, two key observations support the case for extending into a long duration strategy at the present time. First, the current yield differential of 226 bps is historically attractive, offering 144 bps more yield than the average of 82 bps since January 1990. Second, the yield differential is 2.1 standard deviations from its historical average. This suggests that the probability of the yield curve mean reverting, or flattening, is higher than the probability it will continue to steepen. These dual factors—a significant yield pick-up and the prospect for yield curve flattening—suggest that extending now to a long duration strategy could provide more attractive returns over time than continuing to invest in an intermediate duration strategy.

**Yield Differential**  
**Barclays US Aggregate Bond Index vs. US Long Duration Government/Credit Index**  
 January 1, 1990 to December 31, 2013



Historically high yield differential (2.1 standard deviation)

The yield curve would have to flatten 144 bps for the differential to return to its historical average.

Sources of data: Prudential Fixed Income and Barclays.

Against this market backdrop, let’s consider a few scenarios that illustrate how changes in interest rates and the steepness of the yield curve could affect the relative performance of intermediate vs. long duration government/credit portfolios.

In all scenarios, the intermediate duration strategy is represented by the Barclays U.S. Aggregate Bond Index and the long duration strategy by the Barclays U.S. Long Duration Government/Credit Index as of December 31, 2013. The total return data is hypothetical and reflects both the yield earned over the period and the capital gain or loss from a hypothetical change in interest rates.

*The four scenarios below represent hypothetical changes in interest rates constructed by Prudential Fixed Income as of December 31, 2013 and are for illustrative purposes only. Total return data does not represent actual performance results and is not a guarantee or a reliable indicator of future results. All scenarios have significant inherent shortcomings and do not consider many real-world frictions, such as the impact that material economic and market factors might have. An investment cannot be made directly in an index.*

**Scenario 1: Interest Rates Rise in a Parallel Shift (Low Probability)**

In this scenario, we assume that interest rates rise uniformly across the yield curve, and that the slope of the yield curve, and corporate bond and mortgage spreads over U.S. Treasuries, remain unchanged. Although we believe this scenario to be highly unlikely, we have shown this illustration in Scenario 1 because it is the traditional interpretation of duration as a measure of interest rate risk.

**How the Fixed Income Portfolios Would Likely Perform:**

- Over a one-year period, the long duration government/credit portfolio would outperform an intermediate duration portfolio as long as interest rates do not rise by more than +25 bps across the

yield curve. This is the point where the price decline on the long duration bonds would exceed their current yield advantage.

- Over a two-year period, the breakeven point approximately doubles, from +25 bps to +50 bps. A long duration government/credit portfolio would outperform an intermediate duration portfolio if interest rates rise less than +50 bps across the yield curve over a two-year period. This breakeven point is higher than the one-year scenario because the long duration strategy benefits from an extra year of earning higher yields (the yield differential) over the intermediate duration strategy.

**Scenario 1: Low Probability**  
**Interest Rates Rise in a Parallel Shift**  
**Hypothetical Total Returns of Intermediate vs. Long Duration Strategies**

| Yield Change* (bps) | Annualized Total Return Scenarios (%) |                                    |                                  |                                    |
|---------------------|---------------------------------------|------------------------------------|----------------------------------|------------------------------------|
|                     | One Year                              |                                    | Two Years                        |                                    |
|                     | Barclays US Aggregate Bond Index      | Barclays US Long Govt/Credit Index | Barclays US Aggregate Bond Index | Barclays US Long Govt/Credit Index |
| +25                 | 1.1                                   | 1.3                                | 1.8                              | 3.1                                |
| +50                 | -0.3                                  | -2.2                               | 1.1                              | 1.4                                |
| +100                | -3.1                                  | -9.1                               | -0.3                             | -2.1                               |
| +200                | -8.6                                  | -23.0                              | -3.1                             | -9.5                               |

Approximate Breakeven Points

\* Reflects the hypothetical yield change for each index.  
 Source of underlying data: Barclays. Source of calculation: Prudential Fixed Income. For illustrative purposes only. The total return calculations shown are hypothetical and reflect the sum of 1) the beginning yield of the index and 2) the change in value of the index based on its duration and change in the level of interest rates. Yield and duration index data is as of December 31, 2013, as shown on page 2.

**Scenario 2: Yield Curve Flattens—Short to Intermediate-Term Rates Rise More Than Long-Term Rates (Medium to High Probability)**

While short-term interest rates are bound to rise at some point in the future, long-term rates, which are most relevant to the funded status of a pension plan, could rise by a smaller degree or not at all, resulting in a flattening of the yield curve.

In this scenario, the key performance variables are the extent that interest rates rise across short, intermediate, and long-term maturities. In Scenario 2, we look at a range of hypothetical interest rate scenarios and potential return scenarios for intermediate and long duration strategies over both one-year and two-year periods. In all scenarios, we assume that corporate bond spreads and mortgage spreads over U.S. Treasuries remain unchanged.

**How the Fixed Income Portfolios Would Likely Perform:**

- Over a one-year period, the intermediate duration portfolio and long duration portfolio would have similar returns if long-term interest rates rise about half as much as intermediate-term rates. For example, if intermediate-term rates rise by +150 bps and long-term rates rise by +75 bps, the one-year return on each of the two strategies would be about -5.8%.
- Over a two-year period, the long duration portfolio would outperform in most cases provided intermediate-term rates do not rise by more than +300 bps, and long-term rates do not increase by more than about +150 bps. As in Scenario 1, the breakeven point is higher over a two-year period because it includes an extra year of the higher relative yields offered by the long duration strategy. You will note that in this example the yield curve flattens significantly (150 bps), bringing the yield differential between intermediate and long-term rates close to its historical average of 82 bps. (As is

illustrated on page 2, the yield curve would have to flatten 144 bps for the yield differential to return to its historical average.)

**Scenario 2: Medium to High Probability  
Yield Curve Flattens (Bear Flattener)  
Short to Intermediate-Term Rates Rise More Than Long-Term Rates  
Hypothetical Total Returns of Intermediate vs. Long Duration Strategies**

| Yield Change* (bps)              |                                    | Annualized Total Return Scenarios (%) |                                    |                                  |                                    |
|----------------------------------|------------------------------------|---------------------------------------|------------------------------------|----------------------------------|------------------------------------|
|                                  |                                    | One Year                              |                                    | Two Years                        |                                    |
| Barclays US Aggregate Bond Index | Barclays US Long Govt/Credit Index | Barclays US Aggregate Bond Index      | Barclays US Long Govt/Credit Index | Barclays US Aggregate Bond Index | Barclays US Long Govt/Credit Index |
| +100                             | +0                                 | -3.1                                  | +4.7                               | -0.3                             | +4.7                               |
| +150                             | +75                                | -5.9                                  | -5.7                               | -1.7                             | -0.4                               |
| +200                             | +100                               | -8.6                                  | -9.1                               | -3.1                             | -2.1                               |
| +300                             | +150                               | -14.2                                 | -16.1                              | -6.0                             | -5.7                               |

Approximate Breakeven Points

\* Reflects the hypothetical yield change for each index.

Source of underlying data: Barclays. Source of calculation: Prudential Fixed Income. For illustrative purposes only. The total return calculations shown are hypothetical and reflect the sum of 1) the beginning yield of the index and 2) the change in value of the index based on its duration and change in the level of interest rates. Yield and duration index data is as of December 31, 2013, as shown on page 2.

Another scenario is one in which the yield curve flattens even more significantly than any of the examples shown above. In this instance, the outperformance of the long duration strategy would be even more pronounced. Moreover, if the Fed keeps short-term rates low for more than two years, the higher possible relative yields provided by the long duration strategy would compound over a longer time period to generate an even greater level of outperformance.

**Scenario 3: Yield Curve Flattens—Short to Intermediate Rates Remain Low and Long-Term Rates Decline (Low to Medium Probability)**

In this next scenario, we consider an environment in which short and intermediate-term rates remain low for an extended time period, while long-term interest rates remain unchanged or even decline. The likelihood of this environment depends on an array of factors, including slower-than-expected economic growth, persistently low inflation, and low interest rates globally. As in the prior scenarios, the examples below assume that corporate bond spreads and mortgage spreads over U.S. Treasuries remain unchanged.

**How the Fixed Income Portfolios Would Likely Perform:**

- The long duration strategy is the clear favorite in this scenario. A long government/credit portfolio would handily outperform an intermediate duration portfolio if there was no change in interest rates and would significantly outperform an intermediate portfolio if long-term rates decline.

**Scenario 3: Low to Medium Probability****Yield Curve Flattens (*Bull Flattener*)****Short to Intermediate-Term Rates Remain Low and Long-Term Rates Decline  
Hypothetical Total Returns of Intermediate vs. Long Duration Strategies**

| Yield Change* (bps)              |                                    | Annualized Total Return Scenarios (%) |                                    |                                  |                                    |
|----------------------------------|------------------------------------|---------------------------------------|------------------------------------|----------------------------------|------------------------------------|
|                                  |                                    | One Year                              |                                    | Two Years                        |                                    |
| Barclays US Aggregate Bond Index | Barclays US Long Govt/Credit Index | Barclays US Aggregate Bond Index      | Barclays US Long Govt/Credit Index | Barclays US Aggregate Bond Index | Barclays US Long Govt/Credit Index |
| 0                                | 0                                  | 2.5                                   | 4.7                                | 2.5                              | 4.7                                |
| 0                                | -50                                | 2.5                                   | 11.7                               | 2.5                              | 8.0                                |
| 0                                | -100                               | 2.5                                   | 18.6                               | 2.5                              | 11.2                               |

\* Reflects the hypothetical yield change for each index.

Source of underlying data: Barclays. Source of calculation: Prudential Fixed Income. For illustrative purposes only. The total return calculations shown are hypothetical and reflect the sum of 1) the beginning yield of the index and 2) the change in value of the index based on its duration and change in the level of interest rates. Yield and duration index data is as of December 31, 2013, as shown on page 2.

**Scenario 4: Yield Curve Steepens—Short to Intermediate-Term Rates Remain Low and Long-Term Rates Rise (Low Probability)**

Of course, there are interest rate scenarios in which a duration extension strategy would not outperform an intermediate duration strategy over the next couple of years. In particular, if intermediate-term rates remain largely unchanged but long-term rates rise, the yield curve would steepen, resulting in a wider yield differential between intermediate and long duration strategies—even higher than its current wide yield differential of 226 bps. As in prior scenarios, we assume in this example that corporate bond spreads and mortgage spreads over U.S. Treasuries remain unchanged.

**How the Fixed Income Portfolios Would Likely Perform:**

- The long duration strategy would underperform an intermediate strategy for both the one and two-year periods, as is illustrated below.

**Scenario 4: Low Probability****Yield Curve Steepens (*Bear Steepener*)****Short to Intermediate-Term Rates Remain Low and Long-Term Rates Rise  
Hypothetical Total Returns of Intermediate vs. Long Duration Strategies**

| Yield Change* (bps)              |                                    | Annualized Total Return Scenarios (%) |                                    |                                  |                                    |
|----------------------------------|------------------------------------|---------------------------------------|------------------------------------|----------------------------------|------------------------------------|
|                                  |                                    | One Year                              |                                    | Two Years                        |                                    |
| Barclays US Aggregate Bond Index | Barclays US Long Govt/Credit Index | Barclays US Aggregate Bond Index      | Barclays US Long Govt/Credit Index | Barclays US Aggregate Bond Index | Barclays US Long Govt/Credit Index |
| 0                                | +50                                | 2.5                                   | -2.2                               | 2.5                              | 1.4                                |
| 0                                | +100                               | 2.5                                   | -9.1                               | 2.5                              | -2.1                               |
| 0                                | +150                               | 2.5                                   | -16.1                              | 2.5                              | -5.7                               |

\* Reflects the hypothetical yield change for each index.

Source of underlying data: Barclays. Source of calculation: Prudential Fixed Income. For illustrative purposes only. The total return calculations shown are hypothetical and reflect the sum of 1) the beginning yield of the index and 2) the change in value of the index based on its duration and change in the level of interest rates. Yield and duration index data is as of December 31, 2013, as shown on page 2.

What could make the already steep yield curve steepen even further? Some scenarios include investors selling long-term U.S. Treasuries due to fears the Fed will taper its bond buying program at a faster pace than anticipated, concerns over the long-term creditworthiness of the United States, or fears of long-run, uncontrolled inflation. In these unpleasant scenarios, the benefits of today's steep yield curve would be outweighed by the negative impact of higher long-term rates.

### **A Note about Corporate Bond Spreads**

Keep in mind that the examples shown in this paper assume that corporate yield spreads over U.S. Treasuries remain unchanged over both the one-year and two-year time periods. A tightening of corporate bond spreads, which is possible given good credit fundamentals and strong demand for the sector, would further enhance the value of extending into a long government/credit portfolio now. In fact, plans that are considering a pure credit-related strategy, such as a long duration corporate bond strategy, would benefit from an even more generous yield (5.21%, or +47 bps over the long government/credit strategy shown in these examples<sup>1</sup>), as well as the potential for additional spread tightening in future periods.

### **Conclusion**

#### **For Many Plan Sponsors 'Going Long' at this Stage of the Game is a Move in the Right Direction**

*Many plan sponsors are considering implementing longer duration strategies in stages as they evaluate the benefits, risks, and trade-offs for reducing the risk and tracking error of their plans' funded status. We believe that simply extending the duration of an existing fixed income allocation is a move in the right direction. Today's market environment—low short and intermediate-term rates, subdued inflation, moderate growth, and the Fed's taper largely priced into the market—provides an attractive opportunity to make this move. Not only does a historically steep yield curve provide a generous yield pick-up, but if the yield curve flattens, a long duration strategy has the potential to outperform an intermediate duration strategy.*

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<sup>1</sup> Represents the yield of the Barclays US Long Corporate Index and its yield differential over the Barclays US Long Government/Credit Index as of December 31, 2013.

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