

## Developing pension plan investment strategy: A variety of considerations

Jeff Marzinsky, CIMA, CPC



*There are a variety of aspects that investment committees should consider in managing pension plans. In the past it had been mostly strategies for investments, but now there are multiple dimensions that should be considered.*

A pension plan is a dynamic conglomerate of many factors; this article will discuss several aspects and touch on some of the options that may be contemplated. Consider this a pension plan investment strategy primer that will provide an overview of those aspects.

Before starting the analysis, it is often important for a committee to set some basic objectives that should be achieved.

### **Setting short-term and long-term goals and appropriate**

**measurements:** These could be as simple as a target return over a time period, a funded status achievement, or development of a benchmark to measure progress toward meeting the goal. More importantly, it is monitoring progress toward goals and adjusting course as necessary.

**Determining the various risks and levels of exposure, along with levels of variability that are acceptable:** This may be variability of returns (positive and negative) for the investment portfolio, or fluctuations in liabilities based on shifts in interest rates and the subsequent variability of contribution requirements.

### **Implementing tools and processes to manage the various risks:**

This can range from the basic, which may be developing an asset allocation within the level of portfolio and interest rate variability that is acceptable, to a fully hedged liability-driven investment (LDI) strategy.

### **DEMOGRAPHICS: THE EMPLOYEES PARTICIPATING IN THE PLAN**

*Pension plan sponsors and investment committees for a pension plan may think of it as “the plan” or “the pool of assets we oversee,” but it’s much more than that. Dissecting the plan, you find that each active eligible employee, terminated former employee, and surviving spouse has an effect on the plan.*

Valuing the projected annual benefit payments year by year for each individual employee is generally part of the actuarial valuation process. Annual projections can be summarized at the plan level for liabilities that may occur each year for the next few years, out to the next century (90+ years) of future plan-level payments. Discounting the projected benefits back to the current date provides a measure of the anticipated liabilities.

From the benefit payments, we can calculate a measurement called “duration” (the weighted average number of years until those future payments come due). Duration provides the plan sponsor with information on how its plan liabilities will react to changes in interest rates. Higher-duration liabilities exhibit higher volatility in relation to interest rate changes.

Analyzing the employee base and former employees eligible for payment can yield the sponsor details from which various decisions must be made, when combined with the insight provided by the duration calculation. For example, if significant liabilities are attributable to terminated employees eligible for future payouts (normally with a higher duration than current retirees), one option to consider may be offering those employees an opportunity to take a lump-sum distribution from the plan. Another option is looking into selling off the plan liability to an insurance company to continue making those payments. Either of the options would serve to eliminate some liability that could be prone to significant volatility, therefore helping to reduce overall risk in the plan.

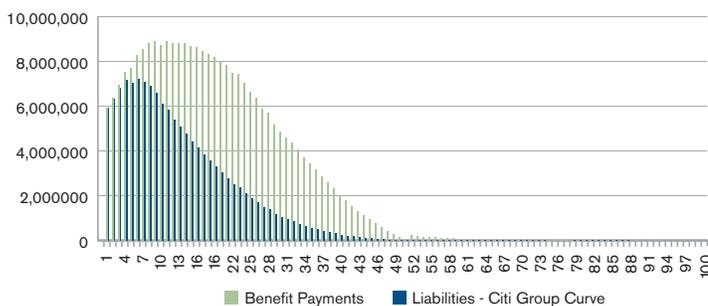
In Figure 1 on page 2, we have a sample data set for a pension plan; we see that the plan has a liability duration of approximately 12.65 years, based on the annual projected benefit payment cash flows. Tallying the total projected cash flows, we can see that the future benefits amount to approximately \$271 million, while the discounted amount of those payments, or the liability, is approximately \$135 million. Over the next century, payments will be made to beneficiaries; however, the majority of those payments will be made in the near term, 20 years or less. It is important to analyze the future benefit requirements in understanding the financial requirements of the pension plan liability structure.

**FIGURE 1: PROJECTED CASH FLOWS AND PLAN LIABILITY DURATION**

**DURATION OF PROJECTED LIABILITIES**

| Duration               | Segment Duration | Benefit Payments   | Liabilities        | % Allocated to Segment |
|------------------------|------------------|--------------------|--------------------|------------------------|
| Segment I (0-4 yrs.)   | 2.548            | 34,541,325         | 33,311,551         | 25%                    |
| Segment II (5-19 yrs.) | 11.494           | 128,943,489        | 77,289,412         | 57%                    |
| Segment III (19+ yrs.) | 29.489           | 108,286,933        | 25,289,418         | 19%                    |
|                        | <b>12.6499</b>   | <b>271,771,746</b> | <b>135,890,381</b> | <b>100%</b>            |

**PROJECTED BENEFIT PAYMENTS AND LIABILITIES**



**SENSITIVITY OF PLAN LIABILITIES PROJECTED ONE YEAR FORWARD**

| Scenario   | Rate Change +/- bps | Int. Rate Adjusted Liability | Current Projected Liability | Change in Projected Liability | % Change in Projected Liability |
|------------|---------------------|------------------------------|-----------------------------|-------------------------------|---------------------------------|
| Scenario 1 | -150.00             | 166,822,156                  | 135,890,380                 | 30,931,776                    | 22.76%                          |
| Scenario 2 | -75.00              | 152,857,243                  | 135,890,380                 | 16,966,863                    | 12.49%                          |
| Scenario 3 | 75.00               | 130,081,737                  | 135,890,380                 | (5,808,643)                   | -4.27%                          |
| Scenario 4 | 150.00              | 120,793,897                  | 135,890,380                 | (15,096,483)                  | -11.11%                         |

**ASSET ALLOCATION: RETURNS VERSUS RISK MANAGEMENT**

One study, “Determinants of Portfolio Performance,” by Brinson, Hood, and Beebower, presented in *Financial Analysts Journal* (May-June, 1992), indicated that asset allocation was and is an important determinant of portfolio returns over time. According to this study, asset allocation decisions account for 91.5% of a portfolio’s performance while individual investment selection accounts for 4.6%, market timing 1.8%, and the remainder to various other factors.

In starting the asset allocation process, it is important to set expectations for various categories of investments, with regard to their future returns as well as levels of risk. Often, equities will bear a higher level of risk (in standard deviation), but over time may produce a higher level of return. Bonds generally have a lower level of risk and a commensurately lower level of expected return.

In developing an appropriate asset allocation for a portfolio, various factors are often considered. The expected level of return (mean) and the expected level of risk (standard deviation) over various time periods for the various asset allocations are considered. A third dimension is taken into consideration when developing a portfolio consisting of a variety of different assets: the movement of historical returns among the selected asset classes in the portfolio. This concept is covariance (or the similarity or dissimilarity of how the assets move relative to each other). Bearing in mind that each and every asset class included in the portfolio has both an expected return assumption, as well as a risk expectation, mixing the various asset classes leads to an overall portfolio level of expected return and risk.

The process of finding those portfolios that yield the highest return for the lowest level of risk is generally called “portfolio optimization” and falls under the concept of modern portfolio theory (MPT), developed by Harry Markowitz in the 1950s. Since then, various tools and scenario generators have been devised to build upon those MPT theories.

In general, portfolios with more equity allocation, or exposure, have higher expected returns, as well as commensurately higher levels of risk. Those with more fixed income allocations will often have, on average, lower expected returns and risk. Setting a target level of expected return and risk for the portfolio is often the first consideration in developing an asset allocation policy that ties to a rate of return goal for the pension investment portfolio.

As we can see in Figure 2 on page 3, the various asset mixes, based on the expected risk and return for each asset class, exhibit different levels of risk and return. Taking each of the portfolios from Scenario 1 to Scenario 5, the allocation is adjusted from more equity to lesser equity. Often, pension plan sponsors look to de-risk their investment portfolio as funded status of the plan improves. So we can see the various scenarios reduce equity exposure, reallocating assets to more fixed income.

In addition to increasing the fixed income exposure, an additional item may be considered: the overall duration of the portfolio, in particular the duration of the fixed-income assets. The fixed-income asset exposure, especially long-duration fixed income, could be used to create an interest rate hedge between the plan assets and liabilities, which is the concept of an LDI strategy. In Figure 2, we can also see that as we move from Scenario 1, along the glide path, long-duration fixed-income exposure is increased. In Scenario 1, we have a portfolio with an approximate duration of 2.73 years and in Scenario 5 we have a portfolio duration of approximately 11.08 years, with incremental adjustments. Over time, a pension plan sponsor may look to gradually match the duration of plan assets to the duration of the plan liabilities.

**FIGURE 2: PORTFOLIO ALLOCATION SCENARIOS**

| Asset Category    | Approximate Duration (years) | Sample LDI Glidepath    |                         |                         |                         |                         |
|-------------------|------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
|                   |                              | Scenario 1 Allocation % | Scenario 2 Allocation % | Scenario 3 Allocation % | Scenario 4 Allocation % | Scenario 5 Allocation % |
| Short-term Fixed  | 2.5                          | 4%                      | 4%                      | 4%                      | 3%                      | 2%                      |
| Intermediate-term | 7                            | 32%                     | 27%                     | 19%                     | 12%                     | 4%                      |
| Long-duration     | 15                           | 1%                      | 16%                     | 33%                     | 50%                     | 69%                     |
| High-yield        | 8                            | 3%                      | 3%                      | 4%                      | 5%                      | 5%                      |
| Equity            | 0                            | 60%                     | 50%                     | 40%                     | 30%                     | 20%                     |
| Equity %          |                              | 60%                     | 50%                     | 40%                     | 30%                     | 20%                     |
| Fixed Income %    |                              | 40%                     | 50%                     | 60%                     | 70%                     | 80%                     |

|                                   | Scenario 1 | Scenario 2 | Scenario 3 | Scenario 4 | Scenario 5 |
|-----------------------------------|------------|------------|------------|------------|------------|
| Approx. Portfolio Duration (yrs.) | 2.73       | 4.63       | 6.70       | 8.82       | 11.08      |
| Expected Return Percent (mean)    | 6.27       | 5.87       | 5.53       | 5.19       | 4.84       |
| Expected Risk (std. deviation)    | 11.58      | 9.76       | 8.35       | 7.49       | 7.50       |

**GEOPOLITICAL RISKS AND GLOBAL ECONOMICS**

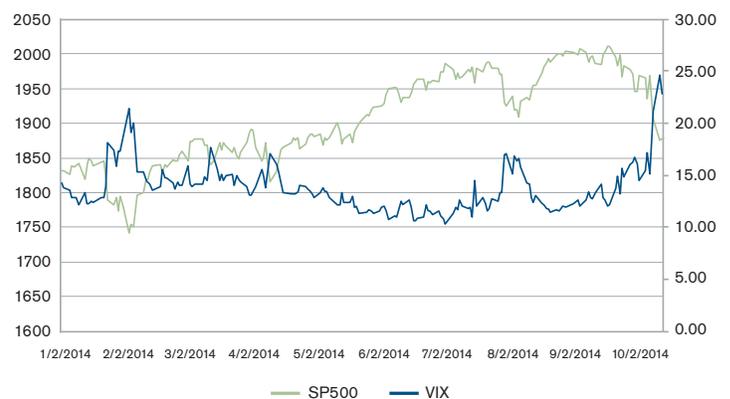
*Not often thought of, but certainly an impact on investment value.*

Events domestically and abroad most definitely have an impact on investment values. When worldwide events arise, often investors consider moving out of equities and into “safer” types of investments. For example, during the summer of 2014, when tensions escalated between Russia and Ukraine, we periodically saw volatility in global equity markets. Having a diversified portfolio of various asset classes can stem the impact of these events on the value of an investment portfolio.

In Figure 3, we see daily values for the year of the U.S. S&P 500 Index plotted against the Chicago Board Options Exchange Market Volatility Index (VIX). The VIX is an indicator of market risk, showing the expectation of volatility in markets; it is composed of a variety of put and call options of stocks in the S&P 500 index. We can see spikes in the VIX and concurrent declines in the S&P 500 at various points. For example, in February we saw volatility in markets increase as word of Russia moving into Crimea spread and in the United States there was debate about the debt ceiling. As volatility rose, the S&P 500 declined and as tensions subsided we saw the decline in volatility and rise in the markets. Again, during July and August tensions between Russia and the Ukraine escalated, news came of Argentina’s debt default, and at the end of August the U.S. Federal Reserve (the Fed) noted that interest rates will continue to be kept low “for a considerable time.” Investor sentiment is also a driver in investing, as investors often make decisions based on the real-time

and constant flow of news over the Internet and social media. Often these news pieces and economic data broadcasts have an immediate impact on the stock markets around the world. So as you can see, historical returns are part of the process of developing a long-term portfolio, but day-to-day events that are often not predictable may create volatility in markets and affect the investment returns within a portfolio. It is important to assess these shorter-term issues and their potential impacts on the portfolio and determine if adjustments to goals and strategies currently in place are warranted.

**FIGURE 3: VOLATILITY AND THE STOCK MARKET**



**INTEREST RATES AND DURATION:  
THE FOOTPRINT OF LDI**

*This certainly is simple, isn't it? If interest rates rise, liabilities decline and so does the value of bond investments.*

We saw that play out during 2013, as bond investments and liabilities with longer durations (10+ years) were impacted more so than those with shorter durations. During 2013 we saw interest rates for 10-year and 30-year Treasuries rise around 100 basis points. This certainly had an impact on funding status for pension plans, as liabilities declined steeply (you can see this in Milliman's Pension Funding Index, which rose from 77% at the end of 2012 to 95% by the end of 2013).

While this was a positive for funded status through the decline in liability values, it also affected bond investments. In the rising rate environment during 2013, we saw bond indexes produce negative returns. The Barclays Aggregate Bond Index fell by 2.75%, for example, while the Barclays U.S. Government/Credit Long Bond Index was off by 8.83%.

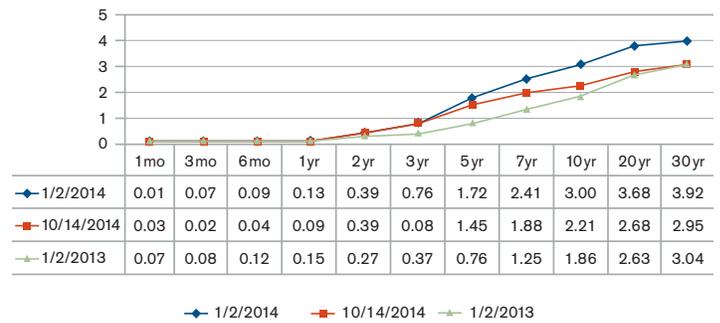
While the loss in asset value is not something that any investor wants to weather, the concept of an LDI strategy may offer some explanation as to why a sponsor may consider investments that may be affected negatively by rising rates.

Essentially, LDI is a process by which a sponsor measures the future cash flows of the plan and reconciles them to the average duration of bond investments and the overall plan. If the plan is in a perfect state of LDI reconciliation, then as interest rates move up or down the assets and liabilities move in a synchronous relationship. This may also have the effect of managing the volatility of required contributions to the pension plan. If the plan has a mismatch in asset and liability duration, assets and liabilities may move in radically different manners as interest rates shift. This relationship will certainly affect the overall funded status of the plan and the volatility of the funded status from year to year.

Now in 2014, we are seeing essentially the opposite of what we saw in 2013, with most rates on a decline. From January through mid-October of 2014, we have seen the 30-year Treasury rate decline nearly 100 basis points. Similarly, we have seen most others decline as well, except for an anomaly in the three-year, which has risen slightly. This has generally led to positive returns in bond indexes and an increase in the value of plan liabilities through mid-October. The Barclays Aggregate Bond Index has been up 4.64% through October 15, for example, and the Barclays U.S. Government/Credit Long Bond Index has risen by 17.03%.

As shown in Figure 4, movements in interest rates can significantly impact bond investments; and with the Fed hinting there are adjustments to come, it is important to have an understanding of the potential impact on your investment portfolio and plan liabilities.

**FIGURE 4: TREASURY YIELD CURVE**



**SUMMARY**

*The culmination of various aspects most certainly affects the value of plan assets and liabilities in effectively managing a pension plan, and often does in developing an investment strategy for the plan assets.*

As a pension plan sponsor, it is important to fully understand the various areas that will impact the volatility of assets, liabilities, and contributions on the pension plan and to develop a strategy that will lessen this impact.

Initially, define short- and long-term goals: Will the plan be ongoing and active, will it be frozen or terminated, what are the risk and return objectives for assets and liabilities? Then analyze the composition of the plan liabilities; get an understanding when cash-flow requirements will come due and the impact on the value of liabilities when interest rates move. Building the investment portfolio to support the liabilities has a variety of considerations, looking at the risk and return, as well as the duration of the liabilities and portfolio and the impact of moving interest rates in considering an LDI strategy. In addition, there will be aspects that can't always be predicted that may merit attention and lead to a change of strategy. Most importantly, focus on the harmonious dynamic of assets and liabilities in the pension plan. They need to work together.

Jeff Marzinsky, CIMA, CPC, is a principal and investment consultant with the Albany office of Milliman. Contact him at [jeff.marzinsky@milliman.com](mailto:jeff.marzinsky@milliman.com).

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