

# Measuring and monitoring risk for public pension plans

*“Measure twice, cut once” - John Florio<sup>1</sup>*

## Introduction

All pension plan sponsors use financial management policies (including funding, investment and cost/liability management) to manage liability-based challenges over time.<sup>2</sup> They must decide how much money to contribute into the plan each year, how to invest the money and how to measure the liability growth and cost of the plan over time. We believe that there is no “one-size-fits-all” answer to these interrelated policy decisions, as the right answers will be based on each plan’s situation. We also believe that each plan should use an integrated financial management approach in order to deliver the best outcomes. As a result, we propose an expanded perspective for understanding and measuring market risk for public plans. In the words of management guru Peter Drucker, “You can’t manage what you don’t measure.”

Monitoring market risks can add value for public plans.<sup>3,4,5</sup> Specifically, it is important to understand the influence of market interest rates. When the general level of interest rates falls, prospective returns on all investable assets decline, thereby increasing the net present value needed to meet the future liability payment stream (and vice versa). With this backdrop, we recommend that public plans should understand, measure and monitor market risks. In this way, they are able to make informed decisions about whether and how to manage risk.

We are not recommending changes to how public plans determine contribution or accounting requirements, but are simply acknowledging that measuring and understanding market risk will lead to better risk management and decision-making. We will continue to expand on this theme throughout this paper and in future papers, including a review of how public plans have historically measured market risk, an examination of liquidity needs for public plans, and an exploration of how various investment strategies (e.g. return enhancement, tail risk protection, and other hedging approaches) can fit into an effective risk management strategy. Throughout our papers on public plan financial management, we will address the interaction of investment policy, liability and cost measurement, and funding policy.

## Why an expanded perspective is valuable

Public plans currently measure pension plan liabilities differently than corporate plan sponsors. Reporting standards for public plans suggest that liabilities can be calculated using the long-term expected return on plan assets as the discount rate.<sup>6</sup> For public plans, this means market interest rate risk is largely unmeasured (or at least under-measured), so the impact of fluctuating interest rates is not transparent and readily observable. This does not mean market risk does not exist. It just means risk is not fully measured for each distinct time period, but rather manifests itself over longer periods of time. Figure 1 shows historical levels of interest rates compared to typical public plan expected return assumptions. The green line represents 30-year Treasury yields. The yellow line shows estimated market value interest rates (the rate at which an insurance company would value the benefit promise to plan participants). The dashed blue line represents the median expected return assumption among large public pension plans. The chart illustrates how public plan assumptions have not fully reflected falling interest rates in recent years. Generally, public plans do not fully reflect rising interest rates in each particular year either.

**Figure 1: Comparing discount rate bases**

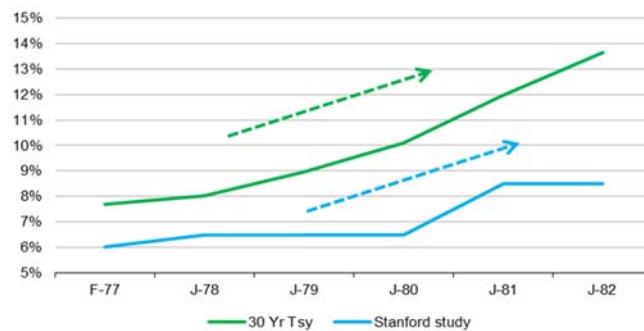


Sources: LGIMA, BAML, Bloomberg, Public Plans Data website.<sup>7</sup> For illustrative purposes only.

In the chart, notice how the persistently low interest rates are leading to a continued decline in funding discount rates (the blue dashed line is marching in the direction of the lower market rates). This suggests that while public plans do not necessarily experience the impact of fluctuating interest rates in the short term, they are subject to interest rate levels over longer time horizons.

Figure 1 represents a long period of generally declining interest rates. We wanted to further investigate the idea that rising (and persistently high) interest rates and falling (and persistently low) interest rates do affect expected returns for public plans over time. We needed to expand our time period in order to do so, and looked at a recent study from the Stanford Institute for Economic Policy Research (SIEPR).<sup>8</sup> The study tracked assumptions for a large public plan over 30-plus years. Over this longer time period, we see examples of both rising and falling interest rates. An example of a period of rising rates is the late 1970s to early 1980s (1977–1982). A period of falling rates came in the early 1990s to early 2000s (1993–2003). Figure 2 shows that when rates rose (and kept rising), the plan in the study eventually raised its expected return assumption.

**Figure 2: Period of rising interest rates – 1977 to 1982**

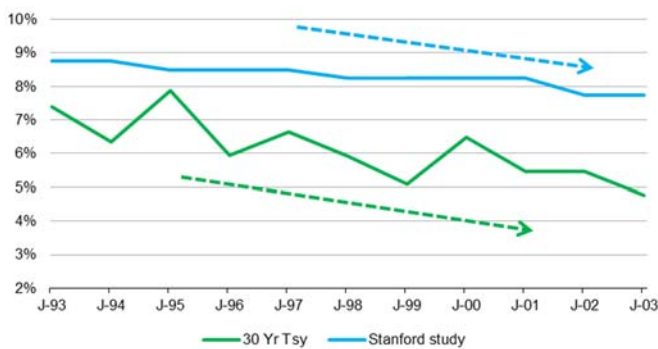


Sources: LGIMA, Bloomberg, Public Plans Data website.<sup>7</sup> SIEPR.<sup>8</sup> For illustrative purposes only.

Similarly, Figure 3 shows that when rates fell (and kept falling), the plan kept lowering the return assumption (similar to the pattern we see among public plans today shown in Figure 1).

So, while there is not an immediate interest sensitivity that is automatically measured for every time period, there is a tendency over the long term for the level of interest rates to affect public plan expected return/discount rate assumptions.

**Figure 3: Period of declining interest rates – 1993 to 2003**



Sources: LGIMA, Bloomberg, Public Plans Data website.<sup>7</sup> SIEPR.<sup>8</sup> For illustrative purposes only.

### Monitoring interest rates

When the general level of interest rates falls, prospective returns on all investable assets decline, thereby increasing the net present value needed to meet the future liability payment stream (and vice versa). This simple idea that interest rates are a key building block to determining and evaluating expected returns is why monitoring market risk is important.

$$\text{Expected return} = \text{market interest rates} + \text{the risk/return premium on return-seeking assets}^9$$

Think of interest rates as the water level as the tide rises and falls, either lifting or lowering all boats (i.e., all financial asset classes). What type of return should you expect from stocks for example? Should you expect 8% regardless of this building block interest rate? Or ask yourself, if the nominal risk-free interest rate on Treasuries were 0%, what would be an attractive return for a stock portfolio? If nominal risk-free Treasuries were yielding 10%, would your answer change? We would argue that stocks need to offer a much higher return potential in the latter scenario than the former. If the expected return assumption is not moving with market rates, this suggests the expected risk premium on equities and other return-seeking assets (RSA) is moving. Understanding and evaluating this nuance of expected returns is another important aspect of a broad risk management perspective.

### Financing decisions and the role of the expected return assumption

Implicit in any large purchase is a decision on how the buyer is going to pay for it. One simple approach is to pay the whole amount up front at the time of sale. This makes a lot of sense when the benefits of the purchase accrue entirely to the purchaser. The other approach is to finance the purchase into installments over the useful life of the purchased item. In this latter situation, the purchaser makes assumptions to determine the proper installment schedule. One can aim to reduce the early installment amounts, hope that assumptions materialize and adjust as needed as actual experience plays out. Alternatively, one can aim to make larger early installment amounts based on more conservative assumptions and adjust as needed as well. Either approach can make sense. The former is more attractive immediately (it defers funding needs), whereas the latter approach does a better job at meeting/exceeding future expectations (it minimizes unpleasant surprises in the future).

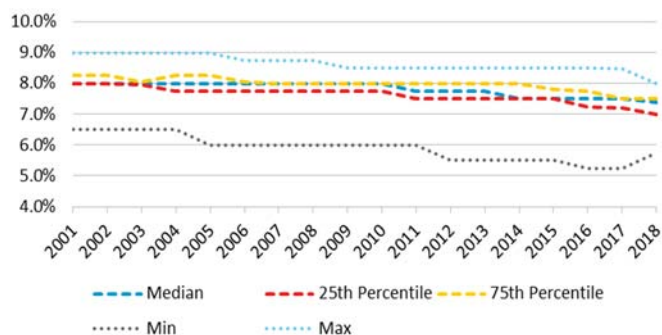
To put these ideas into practice, consider a pension plan. It needs to purchase benefits it has committed to pay the participants. The pension liability measurement serves as a funding target that reflects the plan sponsor's financing preferences. The sponsor can use a high expected return assumption to defer funding (the installment purchase approach described above) and hope for strong investment returns to help pay these future installments. Alternatively, the sponsor can use a lower expected return assumption (funding more in the near term) and increase the likelihood that future installments are reduced by good experience (more pleasant surprises and fewer unpleasant ones).

### Implementing market-based monitoring

Next, we want to provide some background and historical perspective on public plan expected return assumptions, decompose this assumption into building blocks (interest rates + risk/return premium) and discuss how historical reported funded status compares to market-based measures of funded status.

Public plans currently measure pension plan liabilities using the long-term expected return on plan assets as the discount rate.<sup>6</sup> As noted above, when the underlying level of interest rates changes, so does the long-term prospective return on all investable assets. As seen in Figures 1–3, actual experience has been that public plans and their actuaries do reflect market movements in interest rates over time, but only partially in any given year.<sup>2,10</sup> So, for public plans, market interest rate risk is under-measured on a year-over-year basis. The level of rates does work its way into liability measurements over time, as illustrated in Figures 1–3.

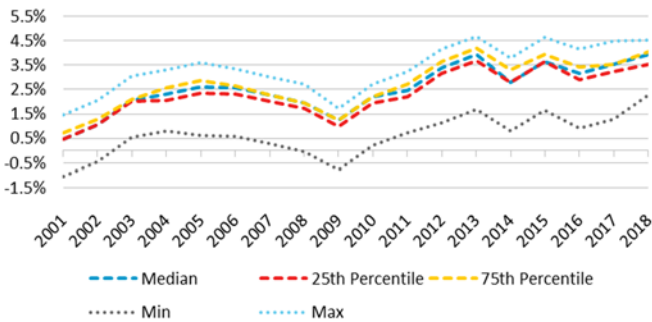
**Figure 4: Historical discount rates for the largest public plans**



Sources: LGIMA, Public Plans Data website.<sup>7</sup> For illustrative purposes only.

Figure 4 shows the range of discount rates used by public plan sponsors (the maximum, 75th percentile, median, 25th percentile and minimum). We can see that discount rates have fallen less than the drop in market interest rates seen in Figure 1. This is consistent with what we saw in Figures 2 and 3 where we observed that the plan in the Stanford study moved its expected return in the direction of rates when rates rose or fell, but the movement occurred incrementally over time.

One factor playing into the relatively modest movement in discount rates as compared to market rates is that the implied risk premium assumed for plan assets has increased over the time period. The implied risk premium can be thought of as the actual expected return assumed (the discount rate used to value the liability) minus a market value interest rate (the market rate an insurer would use to determine the value of the benefit promise to participants). We show this implied risk premium in Figure 5.

**Figure 5: Implied risk premium**

Sources: LGIMA, Public Plans Data website.<sup>7</sup> For illustrative purposes only.

As described above, a common approach to developing an expected return assumption is to use a building block approach<sup>9</sup> – start with interest rates, then add a risk/return premium to get to an overall expected return. We suggest using a market rate for interest rates and then developing an expected risk premium by multiplying the premium the plan expects to earn on its equities and other risk-seeking assets by the percentage allocation to risk-seeking assets. One could describe the result of this calculation as a market-related expected return (or discount rate). The rate would fluctuate with market interest rates and would generally have a relatively stable expected risk premium (if the plan asset allocation were not changing). Contrast this to Figure 5, which shows that implied risk premiums have migrated to higher levels over time for public pension plans. Monitoring the risk premium being assumed is important because it is a significant element of the overall financial management strategy. For this reason, tracking and monitoring the building blocks for a market-related discount rate and comparing these to the building blocks for the actual expected return being used as the discount rate can provide insights into how various elements of the financial management program are working together.

### Pension financial management

An integrated financial management program is enhanced by monitoring market-based risk. We suggest monitoring the market-related discount rate described above because it captures current market interest rates and best reflects an estimate of expected returns using a building block approach. We also suggest that public plans track liabilities and funded status using a market interest rate. In other words, “measure twice, cut once.” Both market-based measures of discount rates and funded status help sponsors understand market volatility and how under-measured risk may be fluctuating. This can be valuable information for purposes of liability measurement and funded status management as well as for investment policy. This can be done solely for information and risk management purposes – we are not suggesting that changes need to be made to how plans determine contribution requirements or report liabilities or funded status. We do think having market-based funded status information can help plan sponsors<sup>11</sup> make ever more informed decisions around funded status management and have more confidence in the choices they make about funding, investment policy and liability measurement.

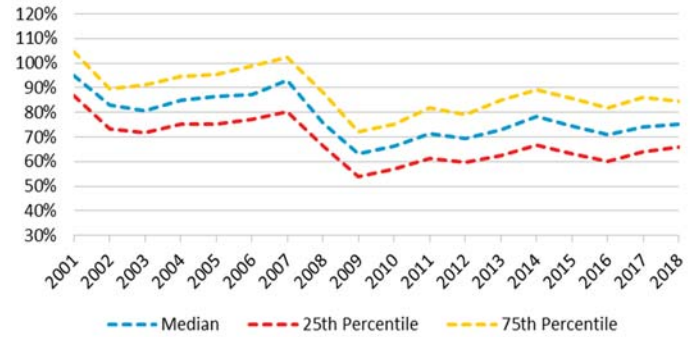


Another element of the overall financial management strategy is the plan funding strategy. Note that the actuarial liability (AL) functions as a funding target for the plan. Is the strategy to fund enough to fully fund the plan’s actuarial liability? Or, alternatively, is the funding approach to target a lower funded status over time (60%, 70%, 80%, etc.)? Let’s look at what has happened to plans’ funded status by comparing the market value of assets to the reported AL. Figure 6 shows how reported AL funded status has trended down over time (from 95% at the median in 2001 to about 75% in 2018).

**How does measuring and monitoring market-related risk help public plans?**

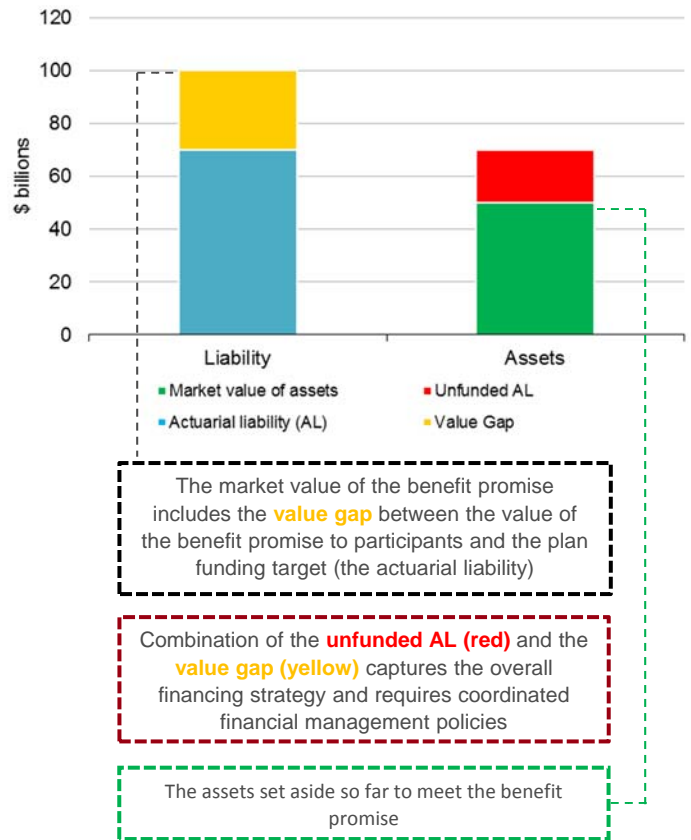
We have suggested that public plans understand the value of the benefit promise to participants (this is the value to participants irrespective of how a plan’s assets are invested). This is the present value of benefits valued at a market interest rate and represents the value an insurance company would assign to the promise. We have also suggested that plans monitor a market-related expected return. This can provide insights into how liability measurements fit into the overall financial management strategy. With these added monitoring tools, we can begin to discuss pension financial management (investment policy, funding policy, cost/liability management policies) in an integrated way. Figure 7 summarizes how this integrated pension financial management framework could be described.

**Figure 6: market value of assets / actuarial liability**



Sources: LGIMA, Public Plans Data website.<sup>7</sup> For illustrative purposes only.

**Figure 7: Pension plan financial management framework**



Source: LGIMA. For illustrative purposes only.

We believe that the adoption of a market-based monitoring framework by the public pension plan community will reduce risk and provide information to plans to make ever more informed decisions about liability measurement and funded status management. We suggest that public plans<sup>11</sup> expand their approach to pension risk monitoring to incorporate market-based funded status measures into their measurement and evaluation of risk.

Understanding market value measures of benefit promises and funding targets, funded status and funded status volatility provides plan sponsors with valuable insights about the relative aggressiveness or conservatism of assumptions and the risk-return trade-offs of various risk management strategies, and helps identify opportunities for improved outcomes. As various entities (GASB<sub>6</sub>, SOA<sub>5</sub>, etc.) encourage the evolution of public plan reporting toward market-value disclosure, having the analytic tools necessary to evaluate the impact can only benefit public plans and plan participants.

### Concluding comments

Our approach to enhancing public plans' risk management through additional measurement and monitoring of risk has many advantages. First, our approach can be practically implemented gradually over time. It doesn't require an immediate complete makeover of the entire investment strategy and asset allocation. We will cover other aspects of this approach incrementally in future papers. The key point of this paper is to embrace the wisdom of Peter Drucker and realize that risk cannot be managed unless it is measured. Measurement of market risk requires incorporating the current level of interest rates into evaluating funded status risk. Measuring market risk enables effective risk management and reduces risk. It aligns pension risk management with the plans' long-term and steady-state goals.

Additionally, it provides a straightforward and widely applicable approach that is grounded in objective and observable market information. Ultimately, we believe that the adoption of this approach by the public pension plan community over time will reduce risk and provide information to plans to make ever more informed decisions about liability measurement and funded status management.

#### NOTES:

1. John Florio, was a linguist a royal language tutor at the Court of James I and a possible friend of and influence on William Shakespeare.
2. LGIMA, "How Do Public Pension Plans Address Liability-based Challenges?" 2019.
3. Lawrence N. Bader, "How Public Plans Can (and Why They Shouldn't) Ignore Financial Economics," *Financial Analysts Journal*, Volume 71, Issue 5, 2015.
4. Ed Bartholomew, Jeremy Gold, David G. Pitts and Larry Pollack, "Financial Economics Principles Applied to Public Pension Plans," working paper, November 11, 2016.
5. Society of Actuaries, "Report of the Blue Ribbon Panel on Public Pension Plan Funding," 2014.
6. Government Accounting Standards Board (GASB) Statements 67 and 68, 2012.
7. The Public Plans Data website is developed and maintained through a collaboration of the Center for Retirement Research at Boston College, the Center for State and Local Government Excellence, and the National Association of State Retirement Administrators.
8. Stanford Institute for Economic Policy Research (SIEPR), "The 'California Rule' and Public Pensions," working paper No. 17-018, 2017.
9. American Academy of Actuaries Pension Practice Council, "Forecasting Investment Returns and Expected Return Assumptions for Pension Actuaries," 2019.
10. Milliman White Paper, "2018 Public Pension Plan Funding Study," 2018.
11. Note that while the focus of this paper is on public pension plans, the concepts and framework apply to multi-employer plans and nonelecting church pension plans as well. [Plans that meet the definition of a church plan in IRC Section 414(e) and for which no IRC Section 410(d) election has been made (to voluntarily be covered by additional provisions of ERISA) are known as "nonelecting church plans."]

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