Measuring Pension Risk: It’s Not Just for the Actuary
David T. Kausch, FSA, EA, MAAA

NCPERS 2019 Public Safety Conference
October 28 – 30
New Orleans, LA
Agenda

• The Key Questions
  • What is Risk?
  • Who Cares About Pension Risk?
• The Actuarial Community’s View
  • ASOP No. 51
  • Risk Assessment Methods
  • Plan Maturity Measures
• Solvency Liability
THE KEY QUESTIONS
What is Risk?

Common Definitions of Risk

• Risk / n. a possibility of loss or injury. *Merriam Webster*

• Exposure to the chance of injury or loss, a hazard or dangerous chance. *Dictionary.com*

In other words, a possibility (not a certainty) of a negative outcome.

No other specific notion of the impact on the future.

Pension funding valuations use assumptions based on what is expected, not what is unexpected.

Those assumptions assume positive and negative events will “average out” over time.

What is “risk” in the context of pension funding?
### Who Cares About Pension Risk?

**Plan-Related Entities**
- Pension Board of Trustees
- Plan Sponsor(s)
- Plan Members

**Outside Entities**
- Taxpayers?
- Bond Holders?
- Rating Agencies?
- Research Organizations and Think Tanks?

*E.g., “Pension Risk Measurement Focus of Harvard Kennedy School Convening” PEW, August 16, 2019*
THE ACTUARIAL COMMUNITY’S VIEW
The primary focus of actuarial services for Public Employee Retirement Systems (PERS) is on determining plan funding.

There are Actuarial Standards of Practice (ASOPs) on plan funding that have been around for years – but not on measuring risk.

Measuring risk has always been important, but has not always been the highest priority – and practice has been evolving.

In September 2017, the Actuarial Standards Board issued ASOP No. 51, Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions.
The Actuarial Community’s View: ASOP No. 51

For starters, ASOP No. 51 goes beyond the common definition of risk:

- An unexpected event (not necessarily negative)
- A measurement of the impact of effect on future results

Specifically, “Risk” is defined in ASOP No. 51 as follows:

- The potential of actual future measurements deviating from expected future measurements resulting from actual future experience deviating from actuarially assumed experience.
- “Risk” includes contribution risk.

In other words, it is not just the unexpected event, it is the potential consequences of the event – positive or negative.
ASOP No. 51 – Identification of Risks

The actuary should identify risks that, in the actuary’s professional judgment, may reasonably be anticipated to significantly affect the plan’s future financial condition.

Examples of risks include the following:

– Investment Risk
– Asset/Liability Mismatch Risk
– Interest Rate Risk
– Longevity and Other Demographic Risks
– Contribution Risk
This standard does not require the actuary to evaluate the ability or willingness of the plan sponsor or other contributing entity to make contributions to the plan when due.

This standard does not require the actuary to assess the likelihood or consequences of potential future changes in applicable law.

In addition, the actuary is not expected to provide investment advice.
ASOP No. 51 – Assessment of Risk

1. The actuary should assess the risks identified, including the potential effects of the identified risks on the plan’s future financial condition.

2. The assessment should take into account circumstances specific to the plan (for example, funding policy, investment policy, funded status, or plan demographics).

3. This standard does not require the assessment to be based on numerical calculations.
ASOP No. 51 – Methods for Assessment of Risk

If the nature of the actuary’s assessment of risk requires the selection of methods, the actuary should use professional judgment in selecting these methods.

Methods may include, but are not limited to:

- Scenario tests,
- Sensitivity tests,
- Stochastic modeling,
- Stress tests, and
- A comparison of an actuarial present value using a discount rate derived from minimal-risk investments to a corresponding actuarial present value from the funding valuation or pricing valuation.
ASOP No. 51 – Methods for Assessment of Risk

The actuary should take into account the degree to which the methods and models reflect the nature, scale, and complexity of the plan.

In using professional judgment, the actuary may take into account practical considerations such as usefulness, reliability, timeliness, and cost efficiency.
If, in the actuary’s professional judgment, a more detailed assessment would be significantly beneficial for the intended user to understand the risks identified by the actuary, the actuary should recommend to the intended user that such an assessment be performed.

In making this judgment, the actuary should take into consideration factors including, but not limited to, the following:

- Findings of the risk assessment that the actuary has performed, length of time since last assessment, and significant changes since last assessment,
- The size of the plan, the size of the plan relative to the plan sponsor, the maturity of the plan, the funded status of the plan,
- The asset allocation
- The contribution allocation procedure and the sponsor’s contribution history
Scenario Test
A process for assessing the impact of one possible event, or several simultaneously or sequentially occurring possible events, on a plan’s financial condition.
Sensitivity Test
A process for assessing the impact of a change in an actuarial assumption on an actuarial measurement.

**Sensitivity of Net Pension Liability to the Single Discount Rate Assumption**

<table>
<thead>
<tr>
<th>Current Single Discount Rate Assumption</th>
<th>1% Decrease</th>
<th>1% Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6.50%</td>
<td>8.50%</td>
</tr>
<tr>
<td></td>
<td>7.50%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$929,673,796</td>
<td>$451,109,461</td>
</tr>
</tbody>
</table>
Stochastic Modeling

A process for generating numerous potential outcomes by allowing for random variations in one or more inputs over time for the purpose of assessing the distribution of those outcomes.
Stress Tests
A process for assessing the impact of adverse changes in one or relatively few factors affecting a plan’s financial condition.
The actuary should calculate and disclose plan maturity measures that, in the actuary’s professional judgment, are significant to understanding the risks associated with the plan.

Examples include the following:

- Ratio of market value of assets to active participant payroll;
- Ratio of retired life actuarial accrued liability to total actuarial accrued liability;
- Ratio of a cash flow measure (such as benefit payments, or contributions less benefit payments) to market value of assets; and
- Ratio of benefit payments to contributions; and the duration of the actuarial accrued liability.
Ratio of Market Value of Assets to Payroll

- This plan maturity metric is an illustration of **contribution rate risk**
- For example, if the metric is 10, a return on assets 5% different than assumed would equal 50% of payroll.
- A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in plan sponsor contributions as a percentage of payroll.
- This chart shows the distribution of this metric for GRS clients’ most recent valuation.
  - Results vary depending on whether a plan is open or closed to new hires
  - Median for all plans is 5
  - Median for open plans is 4
  - Median for closed plans is 6
Ratio of Actuarial Accrued Liability to Payroll

- This plan maturity metric is an illustration of potential contribution rate risk
- This would be the same as the MVA/Payroll metric for fully funded plans
- A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) potential volatility in plan sponsor contributions as a percentage of payroll.
- This chart shows the distribution of this metric for GRS clients’ most recent valuation.
  - Results vary depending on whether a plan is open or closed to new hires
  - Median for all plans is 7
  - Median for open plans is 6
  - Median for closed plans is 10
Ratio of Actives to Retirees and Beneficiaries

- This plan maturity metric is an illustration of funded status risk.
- A young plan with many active participants and few retirees will have a high ratio of active to retirees.
- A mature open plan may have a ratio near 1.0.
- A super-mature or closed plan may have significantly more retirees than actives resulting in a ratio below 1.0.
- This chart shows the distribution of this metric for GRS clients’ most recent valuation.
  - Results vary depending on whether a plan is open or closed to new hires
  - Median for all plans is 0.9
  - Median for open plans is 1.2
  - Median for closed plans is 0.6
Ratio of Market Value of Assets to Benefit Payments

- This plan maturity metric is an illustration of funded status risk.
- A young plan may have a higher ratio if benefit payments are small.
- A mature or super-mature plan with a low ratio has increased risk of depleting assets.
- This chart shows the distribution of this metric for GRS clients’ most recent valuation.
  - Results vary depending on whether a plan is open or closed to new hires.
  - Median for all plans is 12.
  - Median for open plans is 14.
  - Median for closed plans is 11.
Ratio of Net Cash Flow to Market Value of Assets

- This plan maturity metric is an illustration of funded status risk.
- A goal of prefunding is that investment returns will pay a portion of the benefits, so negative net cash flow is expected.
- If net cash flow is more negative than (real or nominal) investment return, the plan will lose (real or nominal) principal assets.
- This chart shows the distribution of this metric for GRS clients’ most recent valuation.
  - Results vary depending on whether a plan is open or closed to new hires.
  - Median for all plans is -2.0%.
  - Median for open plans is -1.4%.
  - Median for closed plans is -2.5%.

![Chart showing the distribution of the ratio of net cash flow to market value of assets for GRS clients' most recent valuation, comparing open and closed plans. The chart indicates a higher risk for closed plans.](chart.png)
SOLVENCY LIABILITY
What is Pension Liability?

The Basic Question:

- We have promised benefits to members, so how much do we owe and when?

The Basic Answer:

- Pension Liability tells us how much we owe today for benefits that have accrued so far
- Actuarially Determined Contributions tell us how much and when to contribute for past, current, and future benefit accruals
Actuarial Accrued Liability

Specifically, Public Employee Retirement Systems generally compute the Actuarial Accrued Liability (AAL) with annual valuations.

Annual Valuations

- Compare AAL with Valuation Assets to measure progress towards achieving funding target.
- Compute Actuarially Determined Contributions to stay on target for past accrual of benefits and systematically fund for current and future accruals.

The AAL is a Funding Target
Actuarial Accrued Liability

To determine the AAL:

- We start with the plan provisions
- We gather member data
- We make assumptions to estimate
  - What happens to members (demographic assumptions)
  - What happens to money (economic assumptions)

Most Systems use the Entry Age Normal cost method to determine contributions:

- Consistent with the level percent of payroll budgeting objective
Actuarial Accrued Liability

Critical Technical Point

- The assumed rate of return plays an important role
  - Today’s assets are assumed to grow with interest to pay benefits
  - Said another way, future payments are discounted at the assumed rate of interest or return
- This assumption is consistent with the objective of budgeting level employer contributions
- As with any assumption, there is the risk that it will not be met

**Key Difference:** The discount rate for solvency liability will not be the same as the assumed rate of return
Solvency Liability

Solvency Liability* (SL) has a different purpose from plan funding

The purpose of SL is to ask what would the members’ accrued benefits be worth today if they were secured with risk-free assets?

SL calculations differ from AAL in two key ways:

- The discount rate
- The actuarial cost method

* The term “Solvency Liability” is not a standard term. The recent exposure draft for changes to ASOP No. 4 calls it the “Investment Risk Defeasement Measure”
### Solvency Liability

#### Major Differences in the Discount Rate

- Expected future benefit payments are assumed to be risk-free and thus the discount rate should be risk-free.
- Benefit payments at different dates in the future would each be discounted with a different risk-free rate such as the yield on a U.S. Treasury Bond of the same maturity as the benefit payment:
  - i.e., rather than one discount rate, we would use a series of rates such as a Treasury yield curve.
- This is considered a market-based liability calculation.
- Implications for comparing AAL and SL are:
  - Most PERS have an assumed rate of return between 6% and 8%.
  - Treasury Yields are currently varying between 1% and 3%.
  - Lower discount rates generally mean higher SL than AAL.
  - Yields change each year so SL will be more volatile than AAL.
Solvency Liability

Key Takeaway

*Solvency Liability Will Likely Be Much Higher and More Volatile Than Other PERS Liabilities*

*Driven by Today’s Low and Volatile Interest Rates*
Expected Return and Risk

Most PERS Prefund Benefits and Invest those Assets in a Diversified Portfolio

Loosely speaking, riskier investments are expected to earn a higher return or risk premium.

That risk premium is not guaranteed:
- Actual returns may be higher or lower than expected.

Discounting expected benefit payments using the expected return does not reflect this investment risk:
- One could argue the reverse: this gives credit today for future unearned risk-premia.
Another way of thinking about discounting at risk-free rates is asking how much would we need to invest today using only risk-free assets to pay benefits.

- It sounds academic, but it represents the level of assets needed to “guarantee” the benefit security of the members, i.e., the “Solvency” liability.
- The difference between the SL and the AAL may be thought of as an estimate of the risk premium needed to secure benefits.
- There were times in the 1980s and 1990s when SL may have been lower than AAL due to high interest rates.
Expected Return and Risk

The AAL and Actuarially Determined Contributions are determined using the expected return so what happens to the investment risk?

The risk of future returns differing from expected:

- Is generally borne by the plan sponsor through future contribution increases or decreases
- A portion may be borne by the members through benefit changes or employee contribution rate changes

In other words, there is a trade-off:

- Lower employer contributions today
  - *in exchange for*
- An understanding that the employer will fund future investment risk (up or down) as it occurs or members will bear future investment risk through benefit changes
Expected Return and Risk

Key Takeaway

**Contribution/Risk Trade-off**

*Lower employer contribution rates today*

*In exchange for*

*The employer funding future investment risk*

*Members’ Benefit Security Ultimately May Be at Stake as Well*
Examples of the Contribution/Risk Trade-Off

Funding holidays and benefit increases in the late 1990s were the “positive” side of investment risk when returns were high.

The market downturn in 2008-2009 provided a case study for the “negative” side of this trade-off in practice.

- Employer contribution rates increased dramatically
- Benefits were frequently reduced via:
  - Increased member contribution rates
  - New tiers of lower benefits
  - COLA reductions or eliminations
Paying for the Risk Today

- Solvency Liability is generally* not intended to be used for funding purposes
- If funding were to be determined on this basis, the employer would effectively pay today to eliminate tomorrow’s investment risk
- If so, would that change the rationale for investing in risky assets?

* Opinions vary. Some proponents of Financial Economics have the view that solvency or other market-based liabilities are the “right” way to fund plans.
So What Does It Mean?

SL May Be Useful for Other Purposes

- Withdrawal Liability
- Pension Risk Transfers
- Liability Driven Investing
- Single Transactions such as Service Purchases
- Any transaction where a party has a one-time obligation to fund a benefit and no future obligation to bear risk
So What Doesn’t it Mean?

Solvency Liability is a new liability measure with a different purpose.

Solvency Liability is generally not a funding liability.

Solvency Liability is generally not an accounting liability.

The liability calculation depends on the purpose of the measurement.
So What Doesn’t it Mean?

Having an additional measure of PERS liability will undoubtedly increase the difficulty of communicating plan financial results.

Disclosing a solvency liability that is not intended for funding purpose runs the risk that it may be misused by outside parties for other purposes.

- If solvency liability makes the plan look worse than valuation liability, it may be misused to curtail benefits.
- If solvency liability makes the plan look better than valuation liability, it may be misused to curtail contributions.
So What Doesn’t it Mean?

The fact is that pension plans are complicated financial obligations that cannot be adequately explained by just one number.

Measuring a pension plan’s financial health and associated risks requires substantial technical information and thorough analysis from many perspectives.
The calculation and disclosure of Solvency Liability is currently not required.

The Actuarial Standards Board issued an Exposure Draft of changes to ASOP No. 4, Measuring Pension Obligations and Determining Pension Plan Costs or Contributions.

The proposed changes would require disclosure of the “Investment Risk Defeasement Measure” (otherwise known as Solvency Liability).
What Comes Next?

ASOP No. 4 will likely have a second Exposure Draft later this year

The Solvency Liability disclosure requirement is expected to be in the second Exposure Draft and final version of the revised ASOP

There will be a comment period for the second Exposure Draft

There will be an implementation period after the new ASOP is finalized

Do not expect this issue to go away
What Comes Next?

It is important to have an understanding of the purpose, uses, and misuses of Solvency Liability

Solvency Liability may turn out to be a useful tool for trustees to assess the condition of their plans and make informed decisions

Remember the key takeaways

- Higher, more volatile liability
- Contribution/risk trade-off
What Comes Next?

- Continue to talk to your Actuary about Solvency Liability
- Continue to talk to your Actuary about Risk
- Stay informed and educate others

- See GRS Perspectives, October 2016

Potential Solvency Liability Disclosure May Have Significant Implications for PERS

Comment to the Actuarial Standards Board on changes to the ASOPs
QUESTIONS
THANK YOU
Disclaimers

- This presentation shall not be construed to provide tax advice, legal advice or investment advice.
- Readers are cautioned to examine original source materials and to consult with subject matter experts before making decisions related to the subject matter of this presentation.
- This presentation expresses the views of the author and does not necessarily express the views of Gabriel, Roeder, Smith & Company.
Thank you to Judy Kermans and Mita Drazilov who checked and peer reviewed this presentation

ACKNOWLEDGEMENT