Measuring Risk in Public Pension Plans

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Overview

• Sources of Risk
• Risk Measurement
• Affordability of Risks
Sources of Risk

• Many sources of risk
  – Actual vs. Assumed Investment Returns
    • Variability in portfolio returns
    • Negative net cash flow
  – Actual vs. Assumed Experience
    • Mortality
    • Salary increases
    • Payroll or revenue growth
    • Retirement rates
  – Contribution Risk
    • Sponsor doesn’t contribute required amount
    • Required amount insufficient

• But...
Sources of Risk

• Assets (including contributions) generally dominate:

**Experience Gains and Losses**

- **Asset (Gain)/Loss**
- **Liability (Gain)/Loss**
- **Net Experience G/(L)**

- **Standard Deviation of (Gain)/Loss**
  - Assets: $88.0M
  - Liabilities: $16.8M

This is using “smoothed” assets!
Risk Measurement

• One size does not fit all for risk measurement
  – Different funding framework
    • Fixed vs. variable (Actuarially-determined) contributions
  – Different dynamics
    • Size and growth trajectory of plan vs. sponsor
    • Benefit design (Traditional DB vs. Risk-Sharing Designs)
    • Strength of legal projections (benefits and contributions)

• But …
Risk Measurement

• Useful examples exist
Cost and risk can be broken into three components:

- **Normal cost** represents the expected cost of benefits attributed to the next year of service.
- **Interest cost** represents the interest on the current unfunded liability or the carrying cost for the consequences of past risks.
- **Interest cost at risk** represents the amount that the interest cost would increase if investment performance in one year is two standard deviations below expectations (~20% for this plan, or a 13% loss vs. 7% assumed).
Affordability of Risks

• When a plan invests in a diversified portfolio
  – It hopes to achieve investment returns in order to reduce the overall expense of the plan
  – If anticipated returns don’t materialize, then someone has to make up for the unanticipated investment losses
  – If the sponsor (and members) can always make the contributions needed, the plan is sustainable

• Issues affecting ability to afford the risks of the plan
  – The path matters
  – Leverage due to plan size and maturity
  – Revenue growth of plan sponsor
The Path Matters

Projected Contribution Rates

- **Baseline**: 7.25% each year
- **Alt 1**: 6.25% return each year
- **Alt 2**: -20% return year 1, 7.8% return thereafter (6.25% avg)
Plan Size and Maturity

• When pension plans become large relative to their sponsors, risks are magnified
• There are a number of common measures that capture this dynamic
  – Retiree to active ratio
  – Retiree liabilities as percentage of total liabilities
  – Assets to payroll (or sponsor revenue) ratio
    • Measures sensitivity to investment returns
  – Actuarial Liability to payroll (or sponsor revenue) ratio
    • Measures sensitivity to assumption changes and liability gains and losses
Leverage or Volatility Ratios

- A 10% investment loss was equivalent to:
  - 19% of payroll in 1979
  - 70% of payroll in 2016

- A 10% assumption change was equivalent to:
  - 23% of payroll in 1979
  - 142% of payroll in 2016
Leverage or Volatility Ratios

Distribution of Asset Volatility Ratios
Cheiron Survey of California Systems

Distribution of Liability Volatility Ratios
Cheiron Survey of California Systems

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Cost Variability Within Plans

- For this plan, cost (and risk) for Public Safety members about 2x that for non-Safety, as a percentage of payroll
• Sudden or long-term declines in revenue can cause significant pain
  – Unfunded liability payments become larger relative to revenue
  – Deferring contributions can lead to bankruptcy

• Growth solves many problems
  – Unfunded liability payments become smaller relative to revenue
  – Deferring (or smoothing out) contributions can be advantageous

• Many public plan’s amortization method is designed to be a level percentage of payroll assuming 2.5%-3.5% annual growth in payroll (and revenues)
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