RISK ASSESSMENT

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NCPERS UNIVERSITY:  
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Agenda

Risk Identification

Risk Assessment
  – Tools
  – Examples

Risk Management
Risks That Pension Plans Face

• Return Volatility
• Credit Risks
• Mortality
• Liquidity Risk
• Currency Risk
• Anti-selection
• Diversification
• Contribution Volatility
• Funding Ratios
• Asset Allocation

• Political
• Public Media
• Transparency Risk
• Public Perception
• Fraud
• Regulatory
Ultimate Risk

The inability to pay the plan’s promised benefits at funding levels that can be afforded
Risk Identification – Asset Related

Investment Return
– What are consequences of lower than expected returns on assets?
– What is the effect of a single “bad” year?

Volatility
– How does volatility impact results?

Plan Maturity
– How leveraged are assets to the source of contribution?
– How much of liability is for inactive participants?
– How does net cash flow impact other risks?
Risk Identification – Contribution Related

Contribution Adequacy
Contribution Sustainability
Intergenerational Equity
Contribution Stability/Volatility
Political Risk
  – Will the contributions be made?
Membership Stability
  – What happens if payroll declines?
Risk Identification – Other Risks

Publicity Risk
– How will potential actions be perceived by stakeholders?

Fraud Risk

Assumption Risk
– What is the consequence of assumptions being “wrong”?
– What is the impact of a change to assumptions?
Tools for the Assessment of Risk

Scenario and Stress Testing
– Using forecast to understand the impact of scenarios
  • What returns cause the crossing of thresholds?
    – Long-term/single-year
  • What impact does payroll growth have on contributions?
  • How would different funding methods impact projections?

Stochastic Testing
– Probability fans
– Status testing
  • What is the likelihood of ...?
Tools for the Assessment of Risk

Direct Assessment

– Risk premium assumed in discount rate

Funding Adequacy Measures

– Tread water
  – Comparison to Actuarially Determined Contribution

Maturity Measures

– Assets leverage ratio
– Net cash flow
Stress Testing – Investment Risk

Fixed Rate Plan
  – Contribution adequacy measured by amortization length of equivalent contribution

Baseline
  – Expected return each year

Stress test
  – Impact of one year negative 5% return
Stochastic Modeling
Assessment of Investment Risk

Historical Implied Risk Premium

Survey Data from Public Plans Database as of 9/5/2018
Assessment of Funding Adequacy

Tread Water is equal to Normal Cost plus interest on the unfunded liability on market value of assets

- This cost is independent of asset smoothing or amortization methods
- This is the contribution required to result in no change in unfunded liability if all assumptions are met
Assessment of Funding Adequacy
Importance of Plan Maturity

As plans become more mature, they are more sensitive to investment risk

– Key issue is the size of the plan compared to the resources that support it
– Maturity can increase both as the plan grows and as resources shrink

Plan maturity has played a role in many (but not all) of the plans that have had difficulties (public, multiemployer, or corporate)

Disclosure of maturity measures can help plans and their stakeholders recognize when they are becoming sensitive to risk
Plan Maturity – Support Ratio

# Inactives/ # Actives
– Sensitivity to losses since contributions are typically based on active payroll

![Support Ratio - Inactives per Active](chart.png)

- 5th to 25th Percentile
- 25th to 50th Percentile
- 50th to 75th Percentile
- 75th to 95th Percentile

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Plan Maturity – Asset Leverage Ratio

Market Value of Assets/Payroll
– Payroll is a proxy for sponsor revenues

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Plan Maturity – Net Cash Flow

Net Cash Flow = Contributions – Benefit payments and expenses as a percent of assets
Plan Maturity – Net Cash Flow

Negative Net Cash Flow makes plans more sensitive to return volatility.

Example

– Average time-weighted return is 8.0% for both level and volatile return scenarios
– Level return scenario gives dollar-weighted return 8.0%

– Volatile return scenario dollar-weighted return 6.8%
– Asset Loss $3,889 (12.5%)

– Volatile return scenario dollar-weighted return 8.8%
– Asset Gain $2,773 (8.9%)
Risk Management – In Board Control

Plan Design
- May be outside direct control

Actuarial Assumptions and Methods
- Discount rate, salary scale, COLA
- Mortality, retirement

Investment Risk
- Asset allocation
Risk Management – Plan Design

May be constrained by legislative environment

Typically changes will have more impact over long-term

– Plan maturity will affect how significantly changes impact results
Risk Management – Investment Risk

Board may change asset allocation
   – To manage both return and volatility

Expected return assumption should be based on long-term expectation
   – Lower assumption will increase liability
   – Lower assumption may increase required contribution or ADC
Risk Management – Investment Risk
Risk management – Investment Risk

• How much “risk” can you afford?
Expected Risk Premium – Actual Case

Expected Return on Assets

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<th>Year</th>
<th>Expected Risk Premium</th>
<th>10-Yr Treasury Yield</th>
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<td>1987</td>
<td>8.00%</td>
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<td>1992</td>
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<td>2012</td>
<td>7.58%</td>
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<td>2017</td>
<td>7.50%</td>
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Asset Allocation

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<th>Year</th>
<th>Public Fixed Income</th>
<th>Public Equities</th>
<th>Other</th>
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<td>46%</td>
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<td>2007</td>
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<td>48%</td>
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<tr>
<td>2012</td>
<td>28%</td>
<td>47%</td>
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<tr>
<td>2017</td>
<td>63%</td>
<td>31%</td>
<td>6%</td>
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</table>
Risk Management – Plan Maturity

Immunization of a portion of liability will reduced the effective Asset Leverage Ratio

– Currently expensive to implement
– As funded ratio approaches or exceeds 100%, may be a viable option to reduce risk
Questions?