Measuring Risk in Pension Plans
Stress Testing

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Public Sector Retirement Systems Project
The Pew Charitable Trusts

- More than 40 active, evidence-based research projects

- Projects include public safety, immigration, elections, transportation, pensions, and state tax incentives

- All follow a common approach: data-driven, inclusive, and transparent

Pew’s Public Sector Retirement Systems Project

- Research since 2007 includes 50-state trends on public pensions and retiree benefits relating to funding, investments, governance, and employee preferences

- Technical assistance for states and cities since 2011
Measuring and Managing Cost Uncertainty

- With interest rates at historically low levels, there is increased attention around both the level of risk in pension fund portfolios and the potential for unplanned costs if return targets are not achieved.

- Public pension funds have taken steps to address these concerns by:
  - Increasing contributions
  - Modifying investment return targets and/or asset allocations
  - Implementing changes to benefit plan design

- Stress-testing investment returns and pension costs can further aid policymakers in their efforts to better understand and plan for cost uncertainty.
  - See: Washington state, CALPERs, Society of Actuaries Blue Ribbon panel recommendations
Pension Fund Risk Premium at Historic High

US Public Fund Average Increasing Risk Premium – Plan’s Assumed Rate of Return Remains Relatively Stable, While Bond Yields Have Declined

Rate of Return in Percentage Points, %

Treas ury 30 Year Yield Avg. Assumed Rate of Return
Pension Fund Investments Track the Stock Market

Equity investments and pension fund returns are highly volatile.

Sources: The Wilshire®, Trust Universe Comparison Service®

Investment returns

TUCS Federal/State DB Plan Median Performance (%)  S&P 500
What do policymakers need to know?

- What will things look like if things go as expected?
- What will things look like if returns fall short?
- How much risk is a public pension plan taking on and who bears that risk?

- Key data points:
  - Employer contributions
  - Employee contributions
  - Plan liabilities and assets
  - Plan percent funded and unfunded liability
  - Benefit payments
  - Net operating cash flow
  - Total pension cost
Pension Cost to Investment Returns

Estimated Contributions at Varying Investment Returns Under Current Law

The graph shows the estimated pension cost contributions at varying investment returns under current law. The contributions are depicted for different investment return rates: 7%, 9%, and 5%. The graph illustrates the trend from 2016 to 2044, with contributions increasing over time for each rate.
## Contributions and Debt Projections Through 2045
(Under Current Investment Return Assumption of 7%)
Figures in Millions

<table>
<thead>
<tr>
<th>Year</th>
<th>Contributions (in Millions)</th>
<th>Pension Debt (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>2018</td>
<td>$1,500</td>
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</tr>
<tr>
<td>2020</td>
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<tr>
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<tr>
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</tr>
<tr>
<td>2044</td>
<td>$21,000</td>
<td>$21,000</td>
</tr>
</tbody>
</table>

### Graph

- **Contributions** (in blue)
- **Pension Debt** (in green)

- **Y-axis**: Contributions and Pension Debt (in Millions)
- **X-axis**: Years (2016 to 2044)

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*Source: The Pew Charitable Trusts*
Stress Testing – 5% Return, Contributions Adjusting
Figures in Millions
Stress Testing – 5% Return, Contributions Held Constant
Figures in Millions
Stochastic Stress Testing
Various Returns, Baseline Contribution Policy, Figures in Millions

Employer Contributions (Baseline)
Employer Contributions (25th Percentile)
Employer Contribution (75th Percentile)
Funded Ratio (Baseline)
Funded Ratio (25th Percentile)
Funded Ratio (75th Percentile)
Incorporating Stress Testing in Plan Reporting

- **Investment returns**
  - Lower than expected returns
  - Asset shocks
  - Low returns over long-term
  - Inflation
  - Deflation

- **Contributions**
  - Current policy
  - Fixed percent of revenue
  - Fixed at current level

- **Actuarial assumptions**
  - Discount rates
  - Workforce demographics
  - Longevity
Incorporating Stress Testing in Plan Reporting

- CalPERS and Washington state among the first state-sponsored plans to incorporate regular stress testing. Washington stress tests actuarial assumptions as well as investment returns.

- Hawaii and Virginia have all recently adopted new legislation to require stress testing of state-sponsored retirement systems. Hawaii stress tests discount rates as well as investment returns.

- New Jersey is considering a bill to require stress testing.
Sample Stress Testing Language

• **Baseline Projections**
  
  – Projections of assets (actuarial and market value), liabilities, pension debt, service cost, employee contributions, actuarial recommended employer contributions, net amortization, benefit payments, payroll, and funded ratio based on plan assumptions for the next 30 years;
  
  – The expected contributions as a percent of payroll, the ratio of benefit payments to payroll, the ratio of funding liability to payroll, and the ratio of market value of assets to payroll.

• **Sensitivity Analysis**
  
  – The estimated actuarially accrued liability using Entry Age Normal, the total plan normal cost for all benefit tiers, the employer normal cost for all benefit tiers, the total normal cost for the latest benefit tier, and the employer normal cost for the latest benefit tier calculated using a discount rate equal to the assumed rate of return.
  
  – The above calculated at the following discount rates: 6%, 9%, 3.7% (10-year avg. of 30-year Treasury)
Sample Stress Testing Language

• **Stress Test Analysis**
  – Estimates of the items listed in the baseline projections over a 20 year period assuming investment returns are 4%, 6%, and 9%, with the following assumptions regarding contribution policy:
    • Employer contributions adjust based on current policy
    • Employer contributions are held constant at the levels calculated for the Baseline Projections

• **Scenario Analysis (Asset Shock with Low Growth):**
  – Estimates of the items listed in baseline projections if there is a one year loss on investments of 15%, followed by a 20 year period of investment returns 2 percentage points below plan assumptions, with the following assumptions regarding contribution policy:
    • Employer contributions adjust based on current policy
    • Employer contributions are held constant at the levels calculated for the Baseline Projections
Don’t miss out!
Visit Booth #545 in the exhibit hall to learn about The Pew Charitable Trusts’ work in all 50 states and meet our policy experts.

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