Pennsylvania Treasury
Pension Fee Commission

Society of Actuaries Blue Ribbon Panel on Public Plan Funding
Measuring and Managing Risk

Robert Stein
Chairman

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Panel members and charge

Panel Members

- Bob Stein, retired, Ernst & Young, chair
- Andrew Biggs, American Enterprise Institute
- Douglas Elliott, Brookings Institution
- Bradley Belt, former CEO, PBGC
- Dana Bilyeu, Executive Director, NASRA
- David Crane, Stanford University
- Malcolm Hamilton, retired, Mercer (Canada)
- Laurence Msall, The Civic Federation (Illinois)
- Mike Musuraca, Blue Wolf Capital Management
- Bob North, New York City Office of the Actuary
- Richard Ravitch, former Lt. Governor of New York
- Larry Zimpleman, Principal Financial Group

The Panel's Charge

- Assess the changing funded status of public pension trusts
- Develop recommendations to strengthen plan funding going forward

- Primary recommendations
  - Enhance financial and risk management practices
    - Stress testing
    - Investment risk measurement
    - Aggregate risk measurement
  - Strengthen the actuary's role
  - Support system effectiveness

Major risks

➢ Investment performance

PASERS investment return assumption		Actual results, average annual return
Prior to 2009:	8.5 %	20 years ending 2017: 7.0%
2009 – 2011:	8.0 %	
2012 – 2016:	7.5 %	10 years ending 2017: 4.1%
2017 +:	7.25%	

➢ Contribution discipline

% of ARC paid, 10 years 2005 – 2014:   46.5%
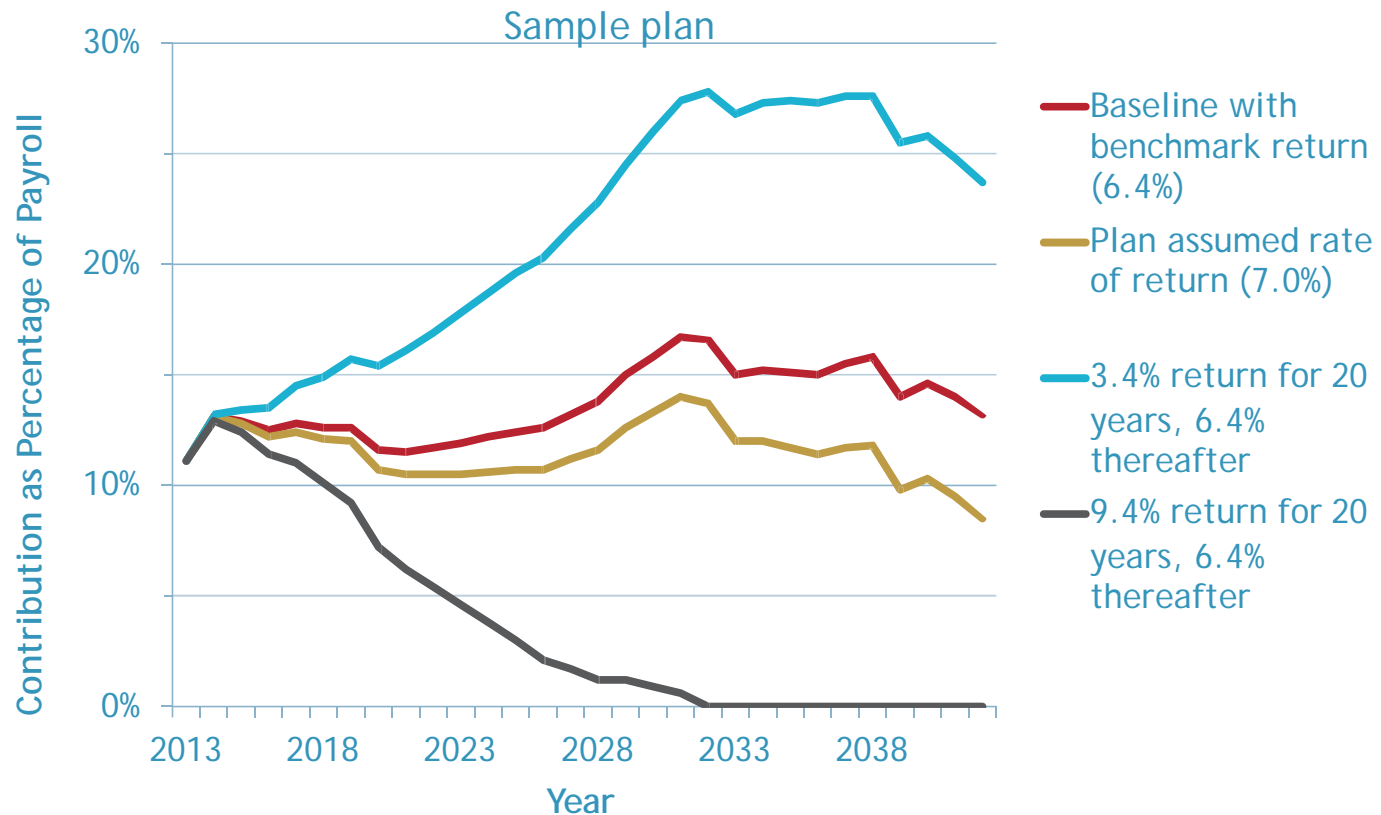
➢ Member life-span, especially in retirement

➢ Plan maturity – the balance between active and retired employees

Scenario and stress testing can quantify the importance of these risks to the plan's financial soundness

Measuring risk: Stress testing

- Normal volatility, experienced 2/3 of the time
  - Volatility about the plan assumption
- 20 years of "stress"; financial outcomes projected 30 years
  - Plan assumptions
  - Baseline: BRP 'standardized rate of return'
  - Measure year by year impact of the stress on contributions and funded status
- Severe stress (20 years)
  - Investment performance: returns 3% lower/higher than expected
  - Contributions: pay 80% of recommended contribution
- Other key assumptions - retiree mortality and the level of new hires - should also be tested

Sample results: contributions as % payroll following investment return stresses

Sample plan

Contribution as Percentage of Payroll vs. Year (2013–2038+)

Legend:
- Baseline with benchmark return (6.4%)
- Plan assumed rate of return (7.0%)
- 3.4% return for 20 years, 6.4% thereafter
- 9.4% return for 20 years, 6.4% thereafter

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Stress testing: Questions to be addressed

➢How much risk should be taken?
- Can the plan accept the likelihood that the funded ratio will fall below 60% over 50% of the time?
- Can the plan accept that contributions will increase to X% of payroll 1/3 of the time?

➢What asset allocation best supports our tolerance for adverse outcomes?

➢What is the possible impact on contributions of proposed benefit changes?
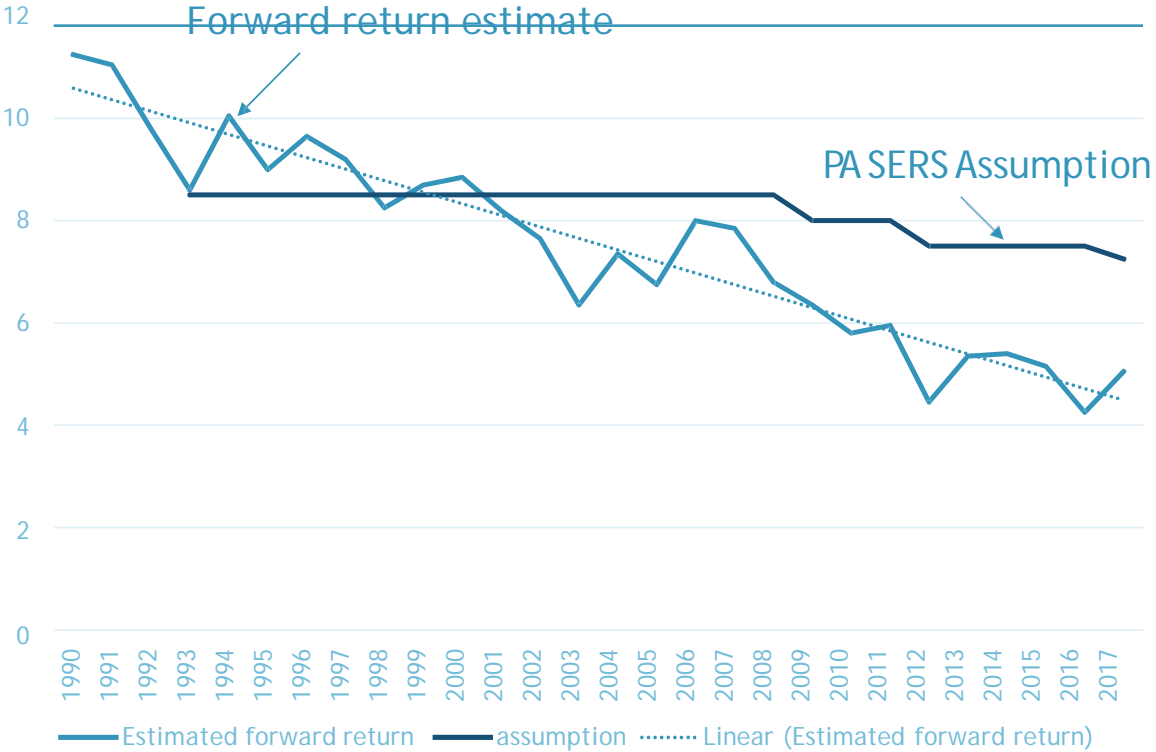
Risk measures: Investment return

**Sample plan
10 Year trailing returns compared to assumption**

Legend: Trailing return, Assumption
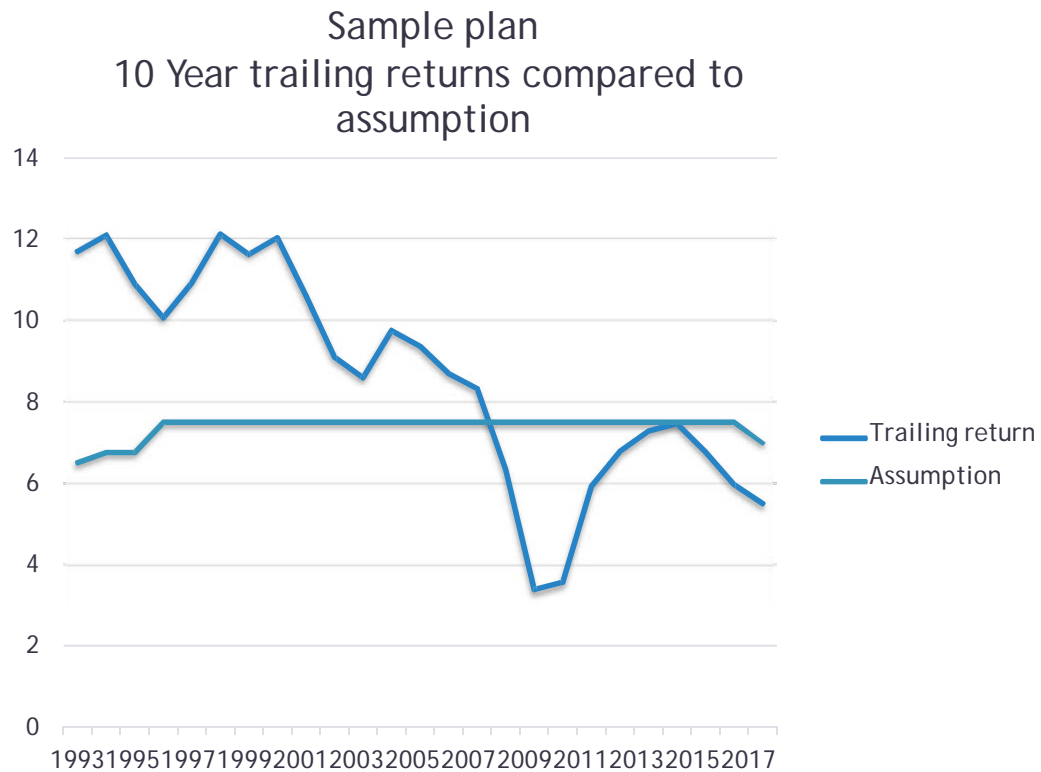
PASERS investment returns

20 years ending 2017:   7.0%

10 years ending 2017:   4.1%

Risk measures: investment return

Forward returns estimated using BRP risk free rate + spread method

Risk measures: investment return
Plan liability and Contribution at risk free rate

➢ Measures magnitude of 'investment performance risk' assumed

➢ Uses plan assumptions and methods, except for assumed earnings rate

➢ Compare risk free liability and Contribution to plan calculations

- Measures the size of the benefit obtained from the assumed investment return

Risk measures: total risk
Standardized contribution

- Benchmarks plan's recommended contribution to assess funding risks
- Compares plan's contribution, using its assumptions and methods, to BRP recommended assumptions and methods
  - Forward-looking long-term rate of return based on risk free rate plus spread
  - Gain/loss amortization over 15 years
  - 5-year asset smoothing
- BRP assumptions are unbiased - set to be achievable 50% of the time