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# Assessing the Risk of Fiscal Distress for Public Pensions: State Stress Test Analysis

**Legislative Pension and Retirement Commission**  
Minnesota Legislature

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# The Pew Charitable Trusts



- More than 40 active, evidence-based research projects
- U.S. projects include public safety, pensions, and states' fiscal health
- All follow a common approach: rigorous, data-driven, nonpartisan

# Pew's Public Sector Retirement Systems Project



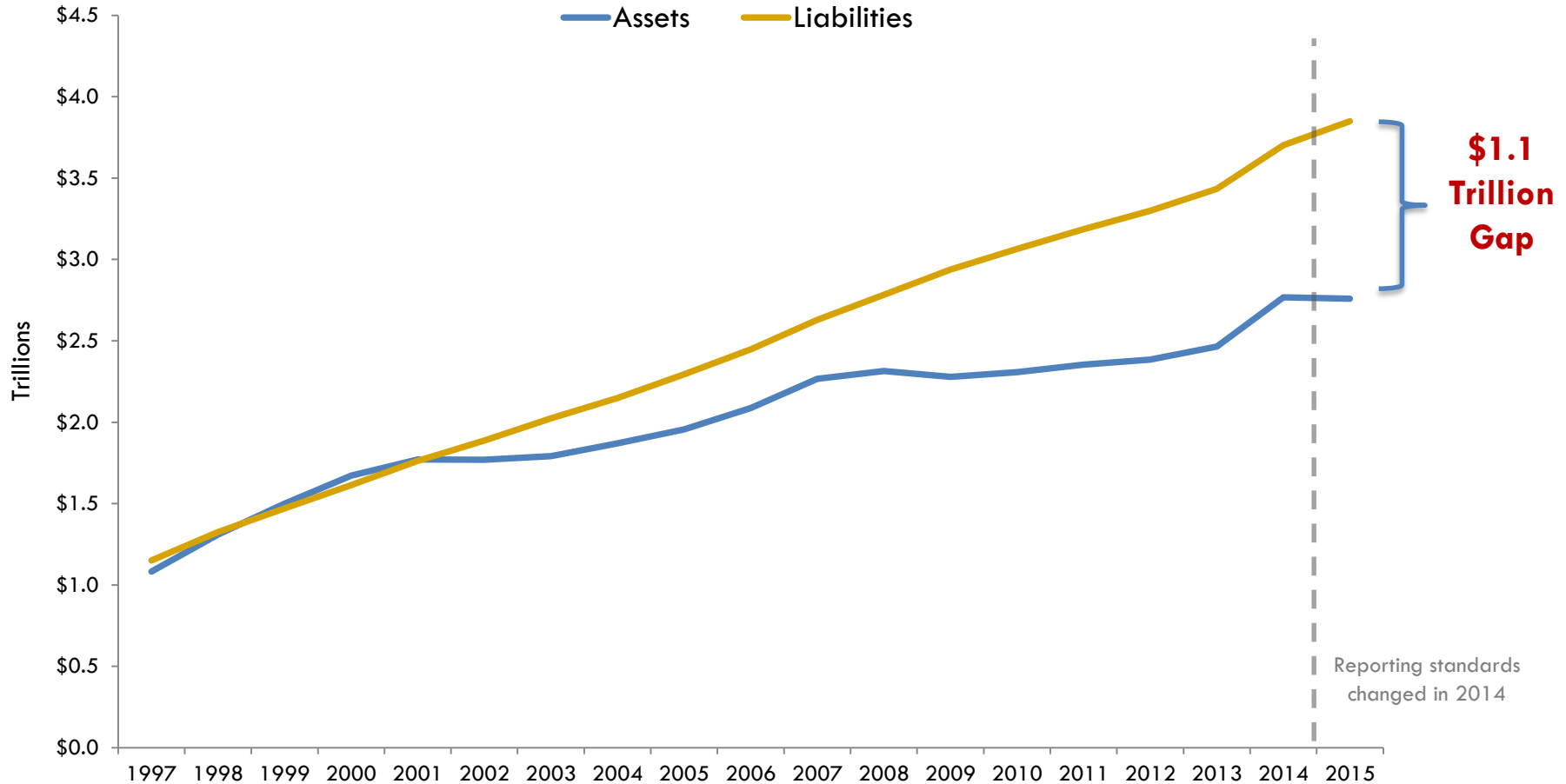
- Research since 2007
- Includes 50-state trends on public pensions and retiree benefits relating to funding, investments, governance, and employee preferences
- Technical assistance for states and cities since 2011



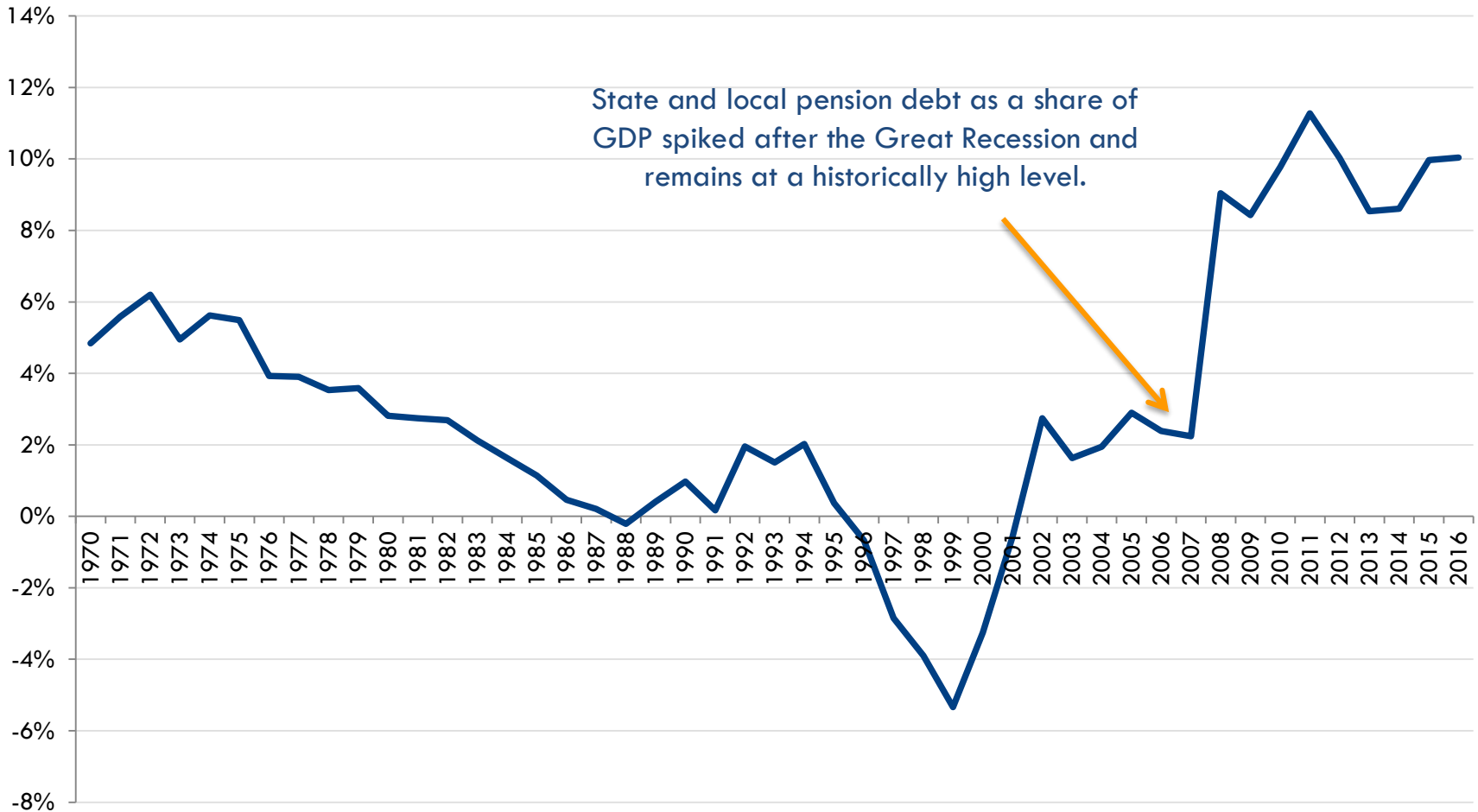
## Background

- In aggregate, state and local pension systems are as exposed to the impact of an economic downturn as ever, based on measures of fiscal health and investment risk.
- Pension fiscal health varies considerably across states and cities and in some cases, among individual pension plans within a single jurisdiction.
- Reforms will have an increasing impact over time on lowering cost and reducing risk.

# 50 State Pension Funding Gap - 2015

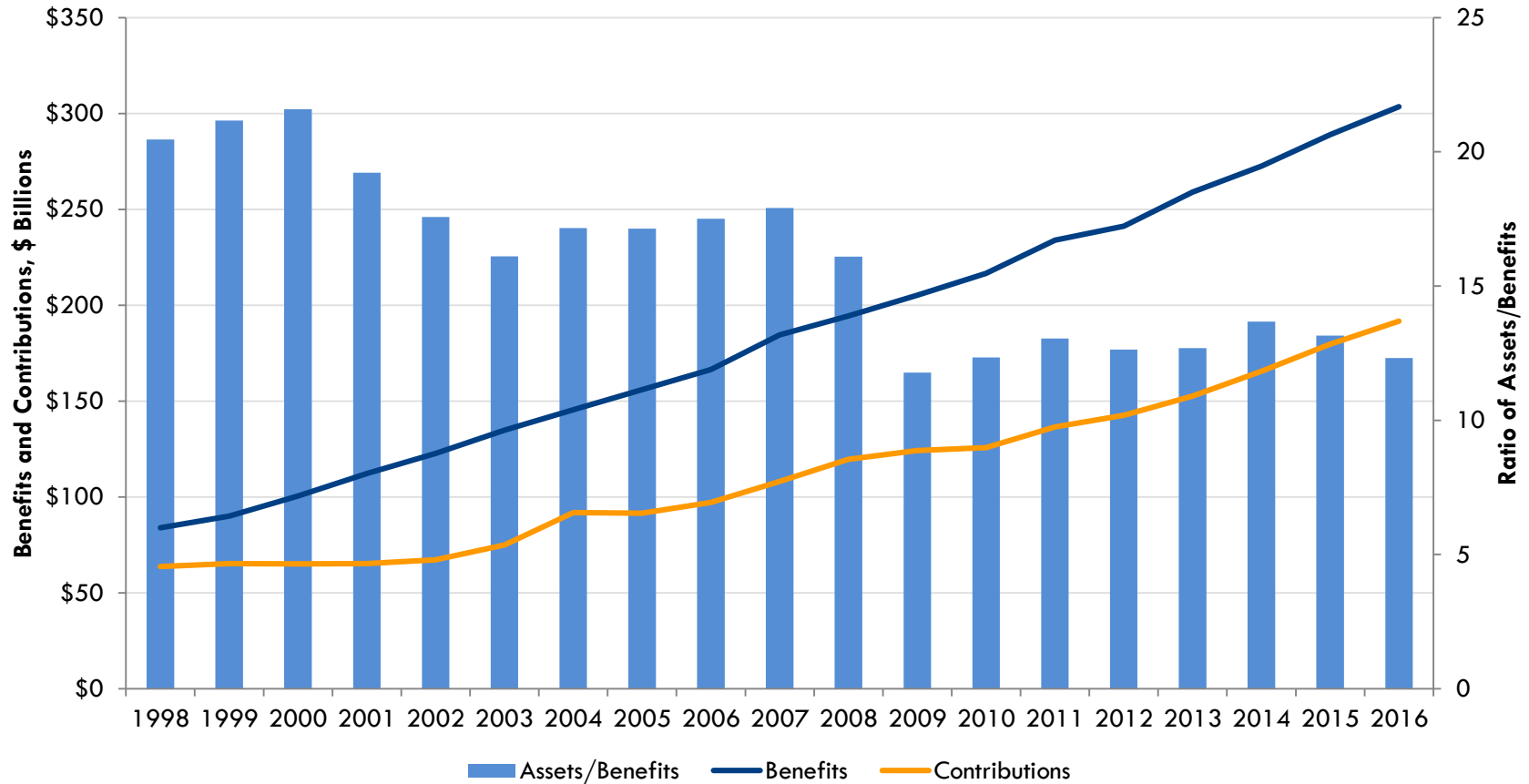


# State and Local Pension Debt as a Share of Gross Domestic Product



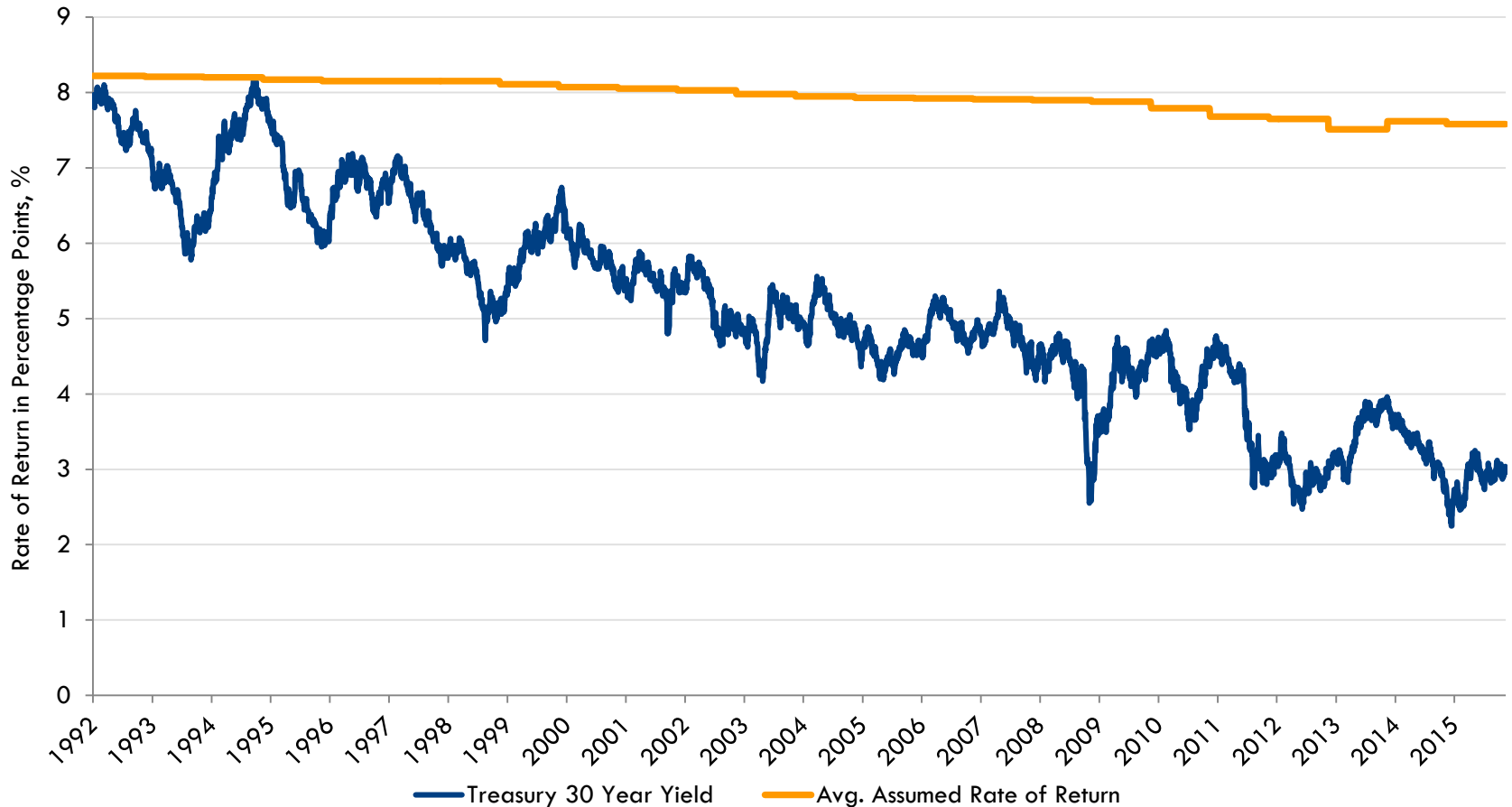
# Benefits, Contributions & Assets/Benefits for State & Local Plans

Widening Operating Cash Flow Gap and Reduced Asset to Benefit Coverage



# Pension Fund Risk Premium at Historic High

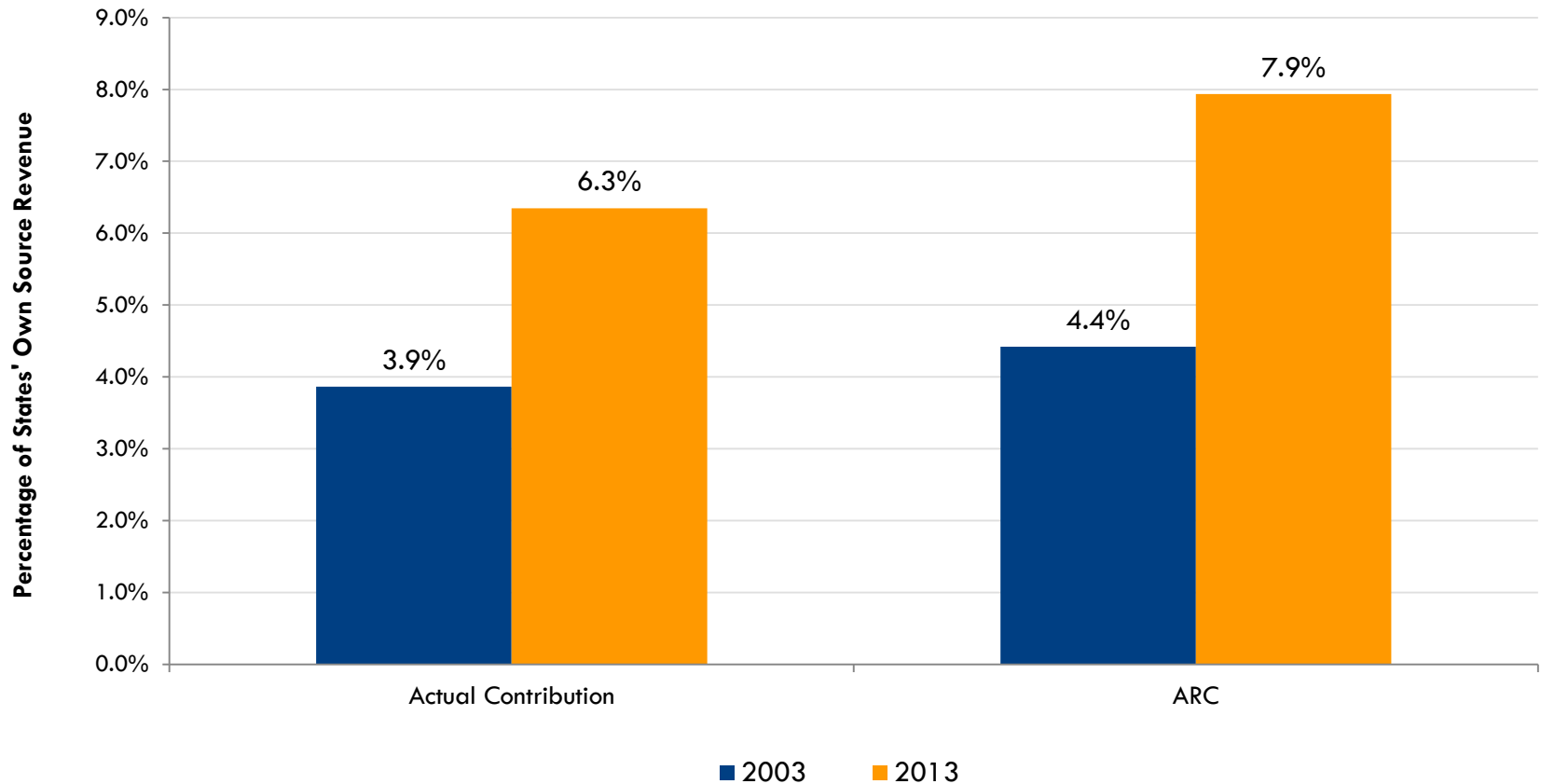
Plan's average assumed rate of return remains relatively stable, while bond yields have declined





# Contributions as a Share of Own Source Revenue

Budget Allocation to Pensions Nearly Doubled from 2003 to 2013

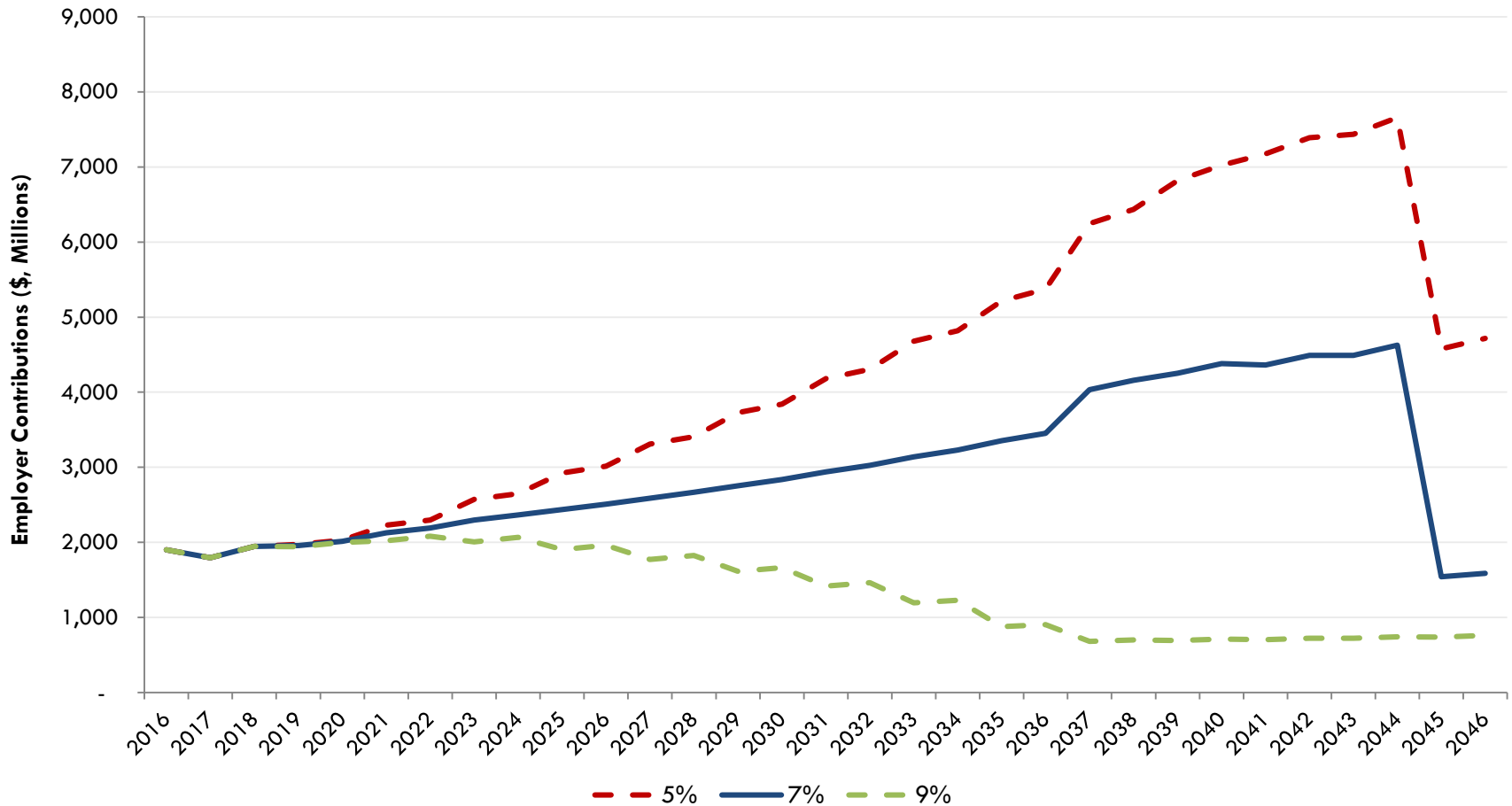


# Stress Testing

## Measuring and Managing Fiscal Uncertainty

# Virginia Sensitivity Analysis

Contributions Vary under Current, Low and Higher than Expected Investment Returns



**Note:** Includes the state, teachers, and political subdivision plans under the Virginia Retirement System.

**Source:** Analysis by Pew and The Terry Group, based on Comprehensive Annual Financial Reports and Actuarial Valuations, and data provided by plan officials.

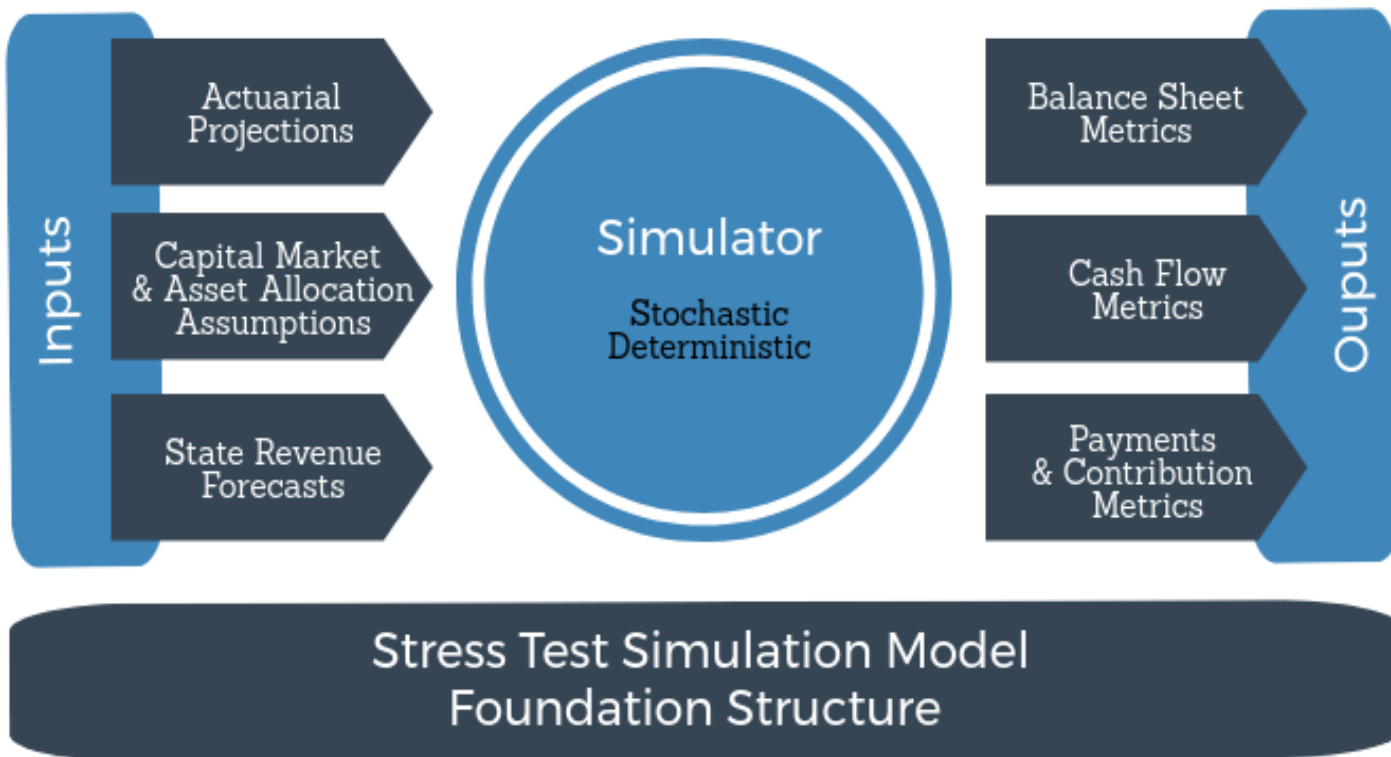


# What is Stress Testing?

- Analysis in which adverse economic scenarios and market volatility are simulated to assess the fiscal health and stability of a financial system.
- Builds on existing projections and current reporting practices, including GASB sensitivity requirements and is consistent with emerging standards on risk reporting.
- Assesses the impact of lower investment returns or an economic recession, on pension costs and liabilities, including the likelihood of retirement system insolvency for poorly funded pension plans.
- Examines the effects of financial market volatility and contribution policies on state and municipal budgets.

# Stress Testing Simulation Model Foundation Structure

Pew's simulation tool incorporates a states' financials as inputs, simulates economic conditions, and produces projections and metrics



# Pew's Analytic Framework

Two-part lens that helps generate broad range of likely outcomes

## Stress Test Simulation Model Analytic Framework

### Economic Scenarios

#### Scenario 1

Fixed 5%  
Returns

#### Scenario 2

Asset  
Shock

### Behavioral Assumptions

#### Assumption 1

Sustainable  
Budget

#### Assumption 2

State  
Policy

# Why Does Stress Testing Matter?

- Comprehensive tool to aid administrators and policymakers to plan for the next downturn.
- Promotes good funding practices – which also saves money
- Provides a scorecard to assess reform proposals based on a range of possible market outcomes.

# Actuarial Standards of Practice, No.51

- Provides guidance and recommendations on disclosing the risk potential for actual pension obligations to differ significantly from expected forecasts and how additional risk reporting measures should be incorporated into the typical reporting processes for public pension plans.
- Affects reporting practices for defined benefit pension plan and will apply to actuarial work on or after November 1, 2018.
- Measures risk associated with not meeting targeted investment returns, funding policies not being followed, or unexpected, material changes in plan membership, payroll or other assumptions relevant to calculating future contributions and liabilities.
- Recommends reporting risk specifically related to **actuarially determined contributions** (contribution risk) and reporting of future funded status and accrued liabilities.
- Defines and recommends scenario and sensitivity analysis as well as stress testing as measures for assessing the impact of these risks on the plans financial status.



# **Stress Testing in Practice**

## Fiscal Health, Costs, and Contribution Volatility

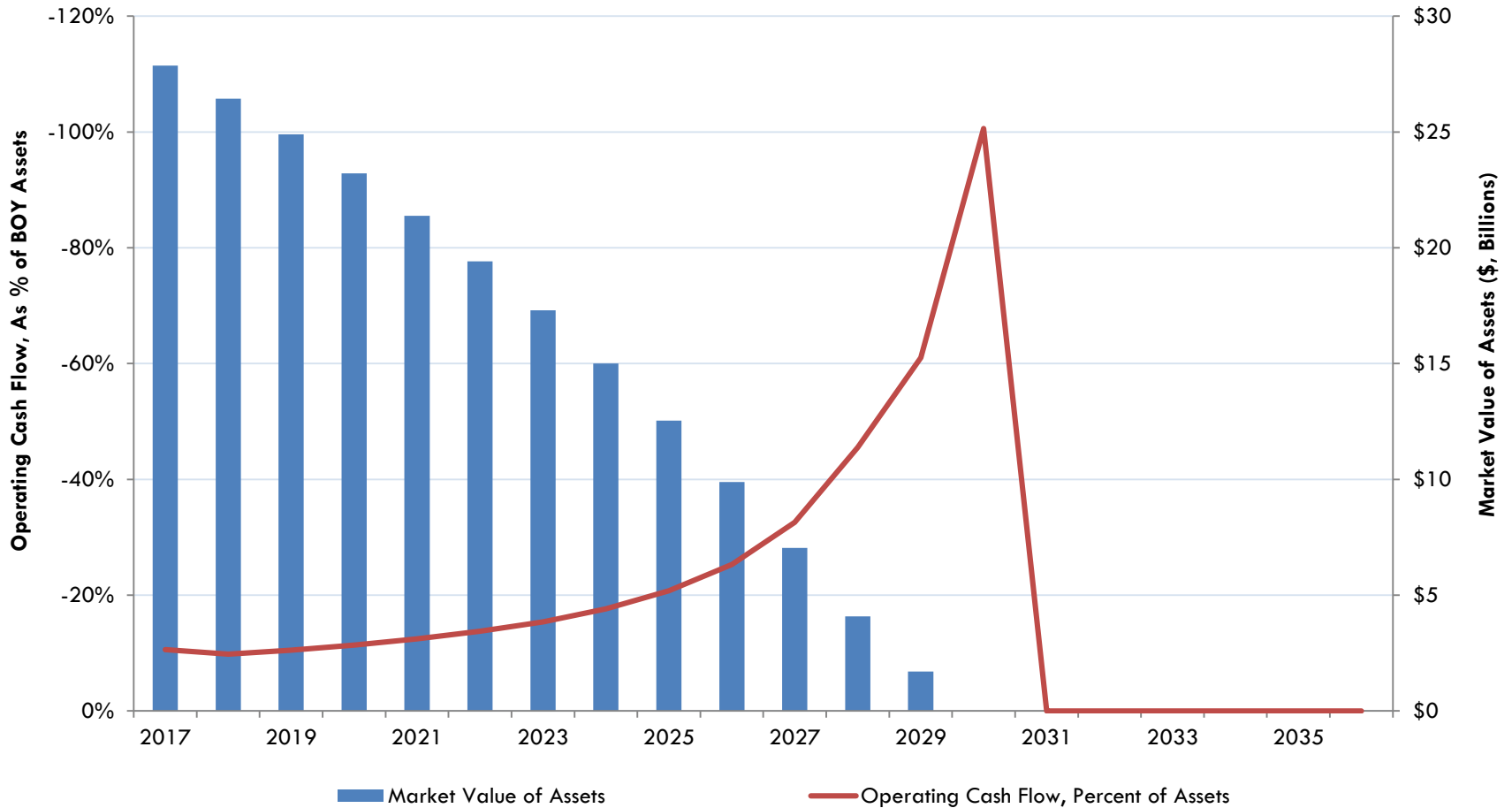
# Key Questions for Assessing Public Pensions

- How do we measure fiscal distress and which states are at risk?
- How might lower investment returns impact pension costs and therefore state budgets in the long term?
- What is the impact of economic volatility on pension fiscal health, given states' high exposure to stocks and other risky asset classes?



# New Jersey Projected Assets and Cash Flow

Under fixed 5 percent returns scenario and applying the sustainable budget contribution assumption

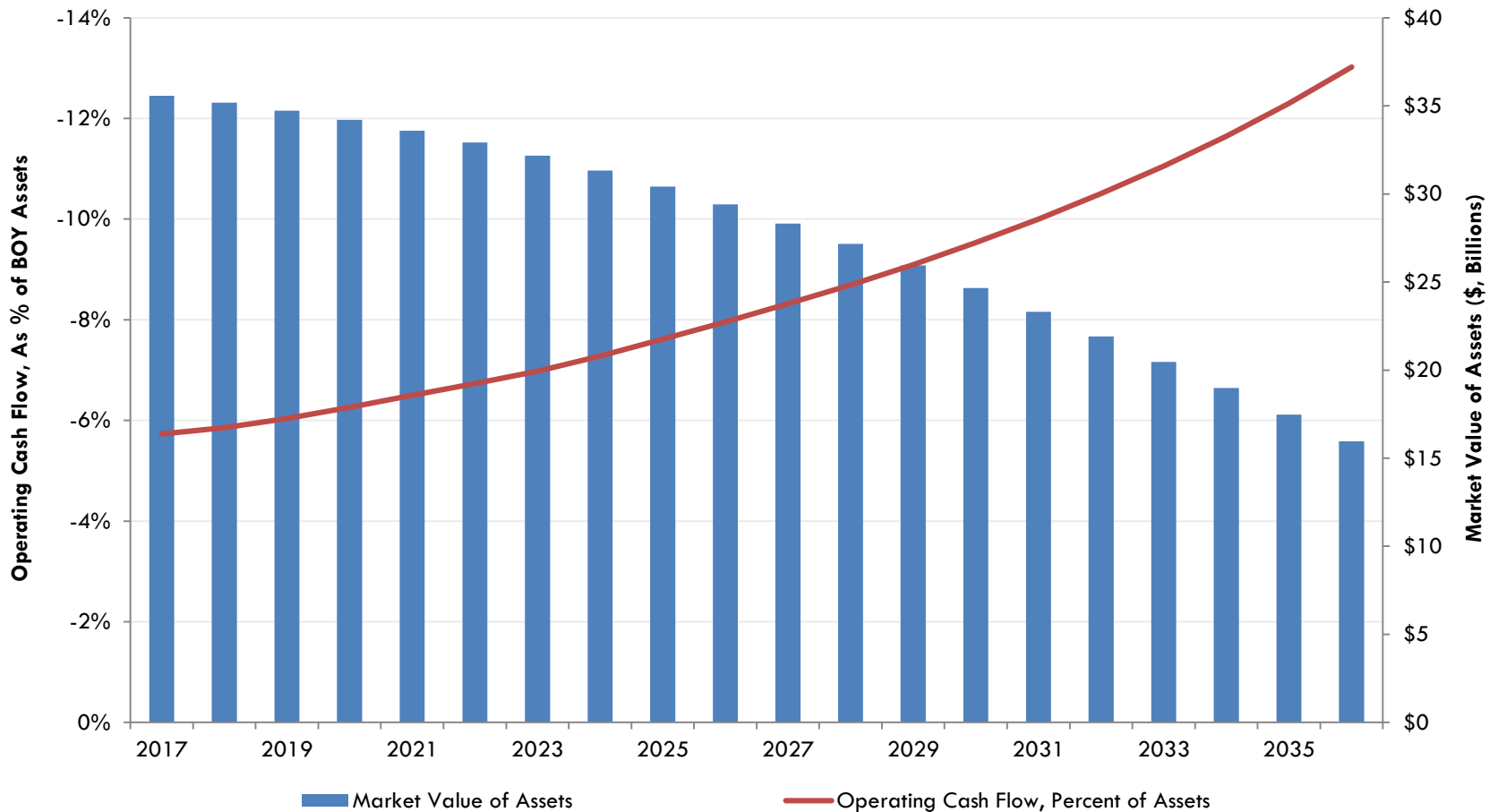


**Notes:** Assumed actual returns of 5 percent and employer contributions are fixed as a percentage of own source revenue. Data for the New Jersey Public Employees Retirement System (PERS)-state portion only- and the Teacher Pension Annuity Fund (TPAF) plans.

**Sources:** The Pew Charitable Trust and The Terry Group, based on publicly available comprehensive annual financial reports, actuarial reports and valuations, or other public documents, or as provided by plan officials.

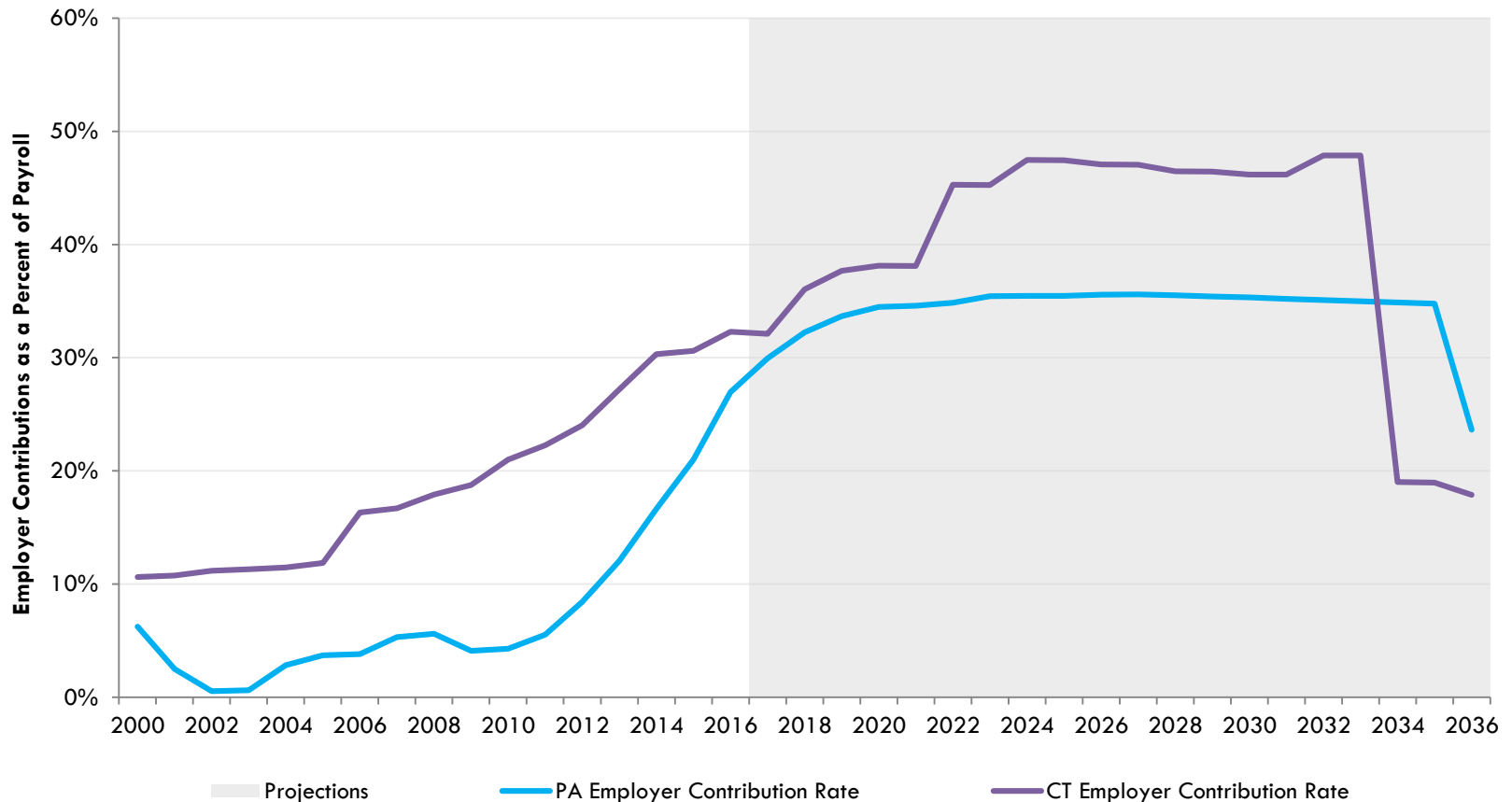
# Colorado Projected Assets and Cash Flow

Under fixed 5 percent return scenario and applying the sustainable budget contribution assumption



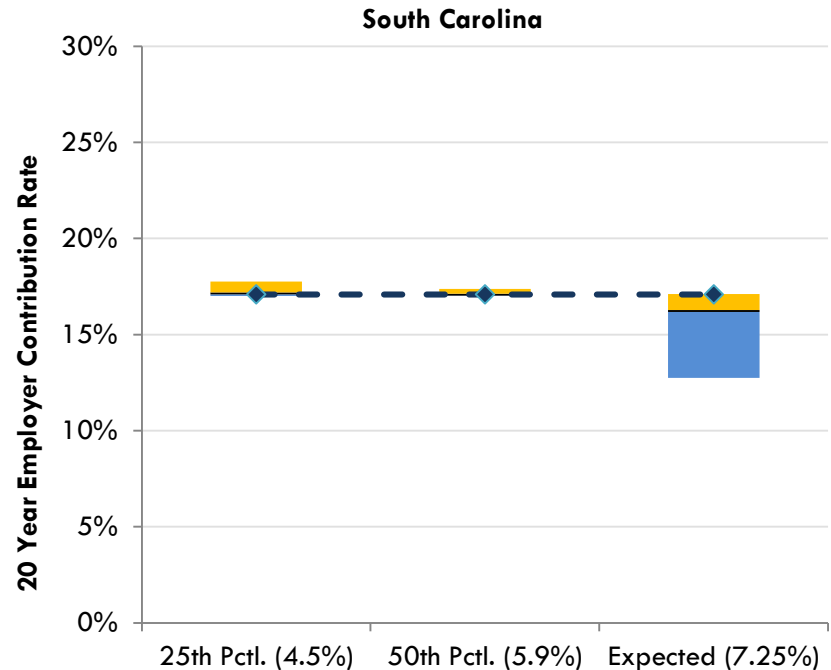
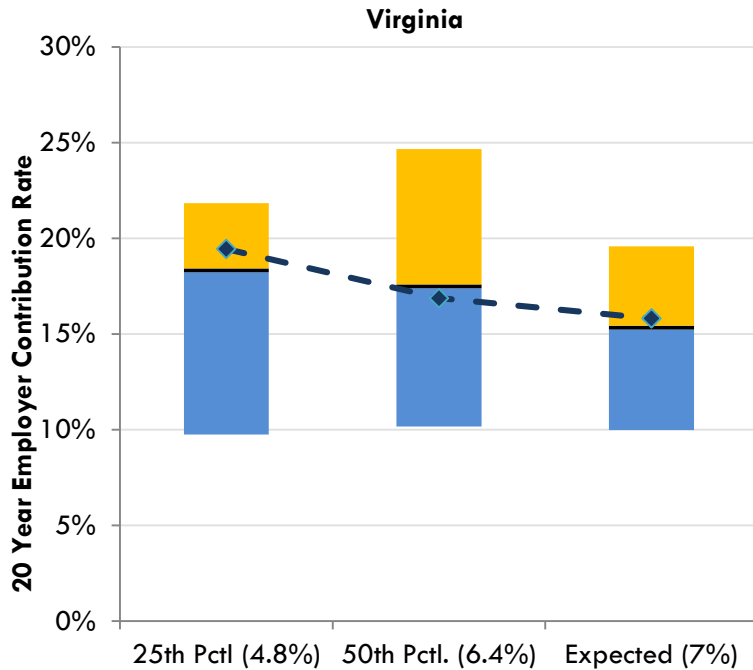
# Pennsylvania and Connecticut Employer Contributions over Time

Under plans' assumed rates of return and the state policy contribution assumption



# Projected Impact of Volatility of Costs for Virginia and South Carolina

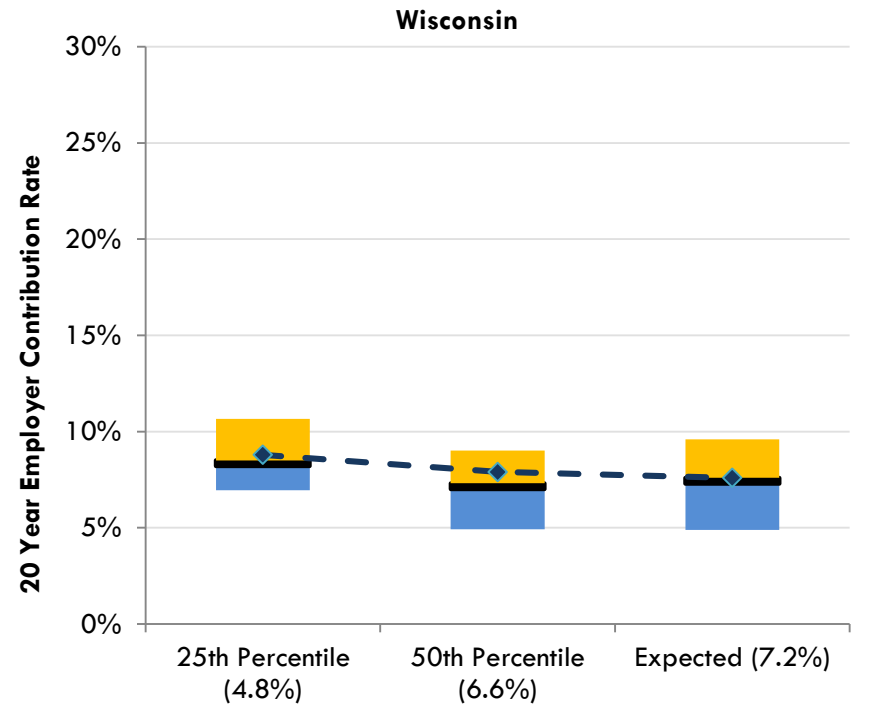
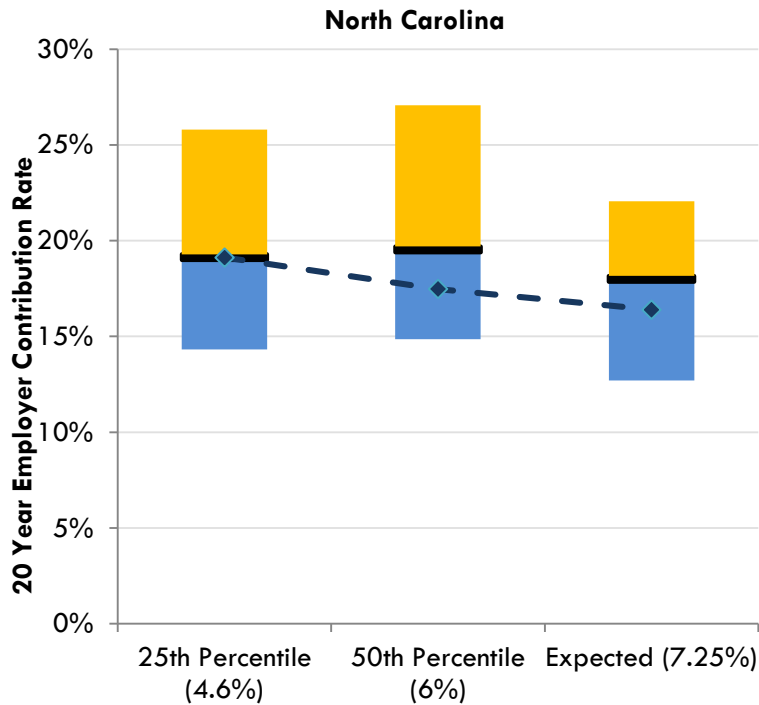
Funding policy has a significant impact on the range of required contributions



Min Average Max Deterministic

# Projected Impact of Volatility of Costs for North Carolina and Wisconsin

Risk-sharing provisions limit costs and volatility for Wisconsin



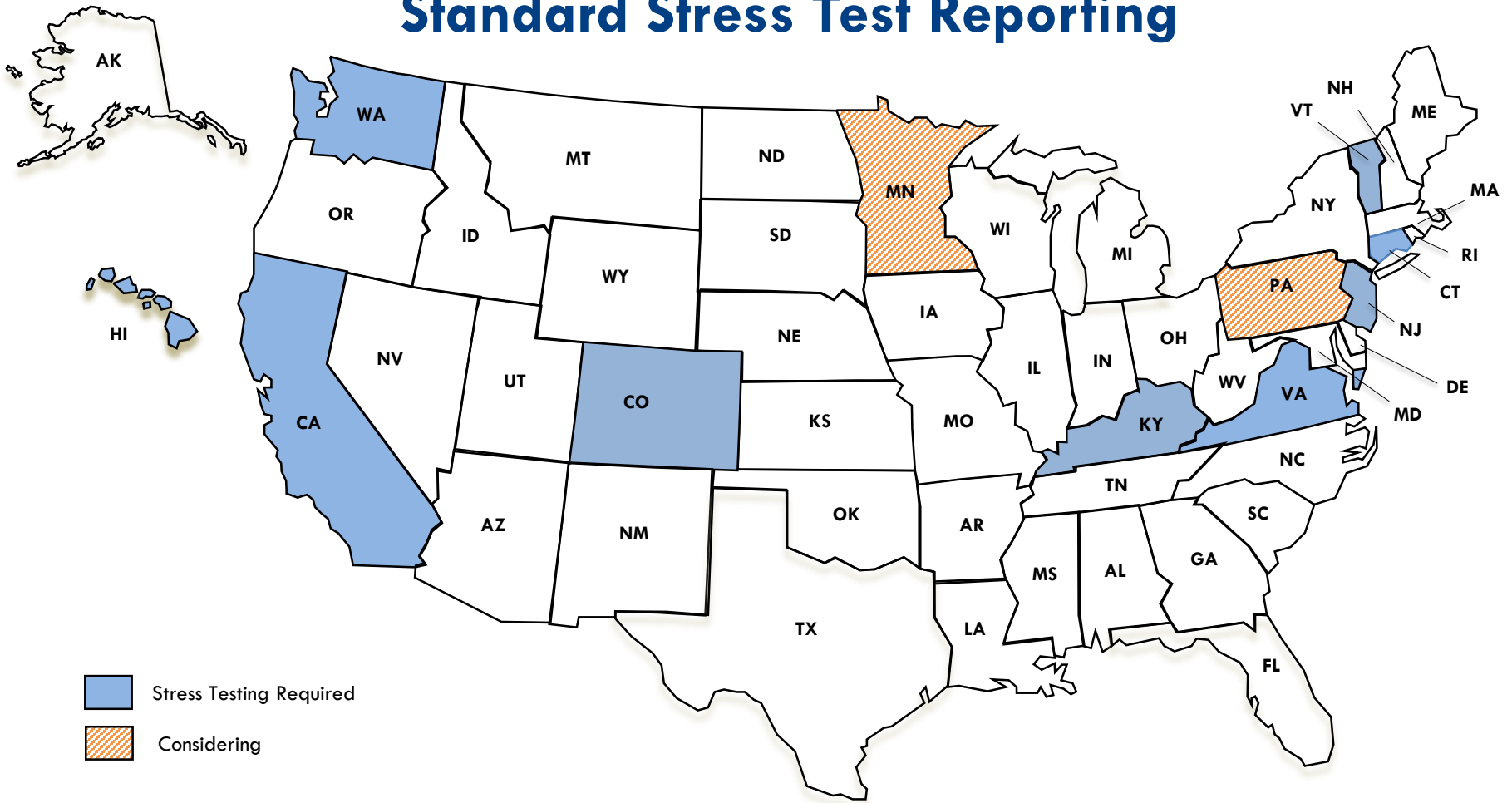
Min Average Max Deterministic

## Conclusion: Key Findings

- US Public pension funds face unprecedented vulnerability to economic downturns.
- Poorly-funded plans project unfunded liabilities, high costs, and in some cases, risk of insolvency when hit with lower returns.
- Keys to protect against fiscal distress:
  - Well-funded pension systems maintain fiscal discipline and;
  - Adopt innovative policies tailored to manage market volatility.
- Funding policy is the primary factor influencing cost variability, according to stochastic analysis.
- Stress test analysis helps states prepare for economic uncertainty and adjust investment strategies to achieve fiscal policy goals.



# States That Have Adopted or are Considering Standard Stress Test Reporting



# Appendix

# Addressing Questions and Concerns

- **This isn't necessary – stock market shows things are improving.**
  - Public pension plans are more vulnerable than ever, based on measures of fiscal health and investment risk.
  - There is a consensus view that the long-term outlook for investment returns will remain low. In response, many pension funds, which regularly analyze a potential range of outcomes for investment performance, have recently reduced their expected rate of return.
- **This kind of analysis is already being done, actuaries have this covered.**
  - Many plans already perform sensitivity analysis and asset/liability studies; but these reports are designed to establish and test investment return targets, and ***do not inform broader policy discussions on long-term impacts to the state budget, or take into account more rigorous economic forecasts and specific economic scenarios.***
  - Work product and disclosure is not done in a consistent manner.
- **Will conflict with emerging standards – we should wait and see.**
  - Stress testing builds on existing practices and is consistent with recently adopted new standards.
  - **Officials cannot afford to wait.** Policymakers—along with taxpayers and plan participants—can only benefit from tools that help them understand the cost uncertainty in state pension plans.
- **Cost.**
  - Creates a standard approach.
  - Less than \$100k (example- Hawaii estimated cost at \$12k).

# Addressing Questions and Concerns (continued)

- **Will the output conflict with existing projections or reporting requirements?**
  - No, Pew's framework establishes baseline projections using each state's own assumptions, performed by professional actuaries. We have extensive experience ensuring that our projections are essentially consistent and welcome the opportunity to communicate with plan administrators in this endeavor.
  
- **Is stress testing just an academic exercise?**
  - To date, California, Colorado, Connecticut, Hawaii, Kentucky, Virginia, and Washington state have performed public facing stress test analysis or adopted reporting requirements in the past year to include this information in standard reporting going forward.
  - In Colorado, a stress analysis was conducted as part of a mandatory report on the effectiveness of a prior reform and raised important questions about whether the changes would be sufficient in the event of another economic downturn.
  - Pennsylvania is now considering stress testing as a regular reporting requirement, after conducting a sensitivity analysis as part of a major reform passed earlier this year.

# Sample Stress Testing Language

## I. Baseline projections

(1) Projections of assets, 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;

## II. Stress test analysis

(2) Projections for the items listed in item (1), assuming that investment returns are two percentage points lower than the assumed rate of return, or fixed at 5 percent, and that the State makes employer contributions:

- (A) Based upon the then-current funding policy for the system; and
- (B) That are held constant as a percentage of available revenue;

## III. Scenario analysis: Asset shock followed by period of low growth

(3) Estimates of the items listed in item (1), if there is a one year loss on planned investments of 20 percent followed by a 20-year period of investment returns 2 percentage points below plan assumptions, or fixed at 5 percent, with the following assumptions regarding contribution policy:

- (A) Employer contributions are adjusted based upon current policy; and
- (B) Employer contributions are held constant as a percentage of available revenue; and

## IV. Normal-cost sensitivity analysis

(4) The estimated actuarially accrued liability using Entry Age Normal (EAN), 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, calculated at the following discount rates:

- (A) Two percentage points above the current rate of return assumption
- (B) Two percentage points below the current rate of return assumption
- (C) The ten-year average of the yield of thirty-year treasury notes.

# Key Pension Terms

- **Actuarial Required Contribution (ARC)** – This is the sum of the actuarial cost of benefits earned in the current year (called service cost or normal cost) and an additional payment on the unfunded actuarial accrued liability (UAAL) called the amortization payment.
- **Assumed Rate of Return** – Estimated return on investments used by actuaries to project the rate of return on plan assets and calculate the value of plan liabilities.
- **Funded Ratio** – Assets divided by the actuarial accrued liabilities. A measure of fiscal health.
- **Net Amortization** – A measure of whether state pension funding policies are sufficient to reduce, or amortize, pension debt in the near term.
- **Pension Debt** – The difference between the actuarial accrued liability and the value of plan assets on hand. Also referred to as the Unfunded Actuarial Accrued Liability (UAAL).

# Plan Type Definitions

- **Defined Benefit Plan (DB):** traditional pension plan with a fixed monthly retirement income benefit based on age, years of service, and worker's salary.
- **Defined Contribution Plan (DC):** 401(k)-style plan with the retirement benefit based on accumulated employer and employee contributions, and returns on those investments.
- **Hybrid Plan:** plan that combines elements of DB and DC plans; “Side-by-Side” is the most common type of hybrid plan, where employees get a reduced DB benefit plus a DC account.
- **Cash Balance Plan (CB):** plan where benefit is based on employee and employer contributions that are pooled and professionally managed with a guaranteed minimum rate of return and annuitization option at retirement.

# Example of Net Amortization Calculation

North Carolina and South Carolina both paid their ARC but follow very different contribution policies.

		North Carolina	South Carolina
1	Pension debt, beginning of 2014	\$7,467,231	\$20,225,470
2	Effective interest rate for pension debt	7.3%	7.5%
3=1*2	Interest on pension debt	\$541,695	\$1,516,910
4	Cost of new benefits	\$2,234,931	\$895,467
5	Employee contributions, with interest	\$1,223,208	\$779,138
6=3+4-5	Employer benchmark for net amortization	\$1,553,417	\$1,633,240
7	Employer contributions, with interest	\$1,692,560	\$1,178,570
8=7-6	Expected reduction in pension debt	\$139,143	-\$454,670
9=7/6	Percentage of benchmark contributed	109%	72%

Source: State Comprehensive Annual Financial Reports and state pension plan actuarial valuations and financial reports. All dollar figures in thousands.



# 50 State and Regional Report Card

	Minnesota	50 State Rank	Regional Rank	Comments
<b>Funded Ratio (2015)</b>	53%	43	6/7	IL ranks lower than MN on this benchmark
<b>% of ARC Paid (2004-2013)</b>	77.8%	40	5/7	WI, SD, IA, and MI performed better than MN
<b>Net Amortization as a share of Payroll (2016)</b>	-1.6%	32	6/7	WI, SD, ND, IA, and MI performed better than MN
<b>10 Year Investment Return (2016)</b>	6.50%	2/44**	2/11***	44** funds report annual returns net of fees, as of 6/30
<b>Assumed Rate of Return</b>	8.18% (Weighted Average of All Plans)	Greater than US Median	Greater than Region Median	Region ranges from 7.0% – 8.2%
<b>Investment Transparency</b>	Reports returns net, and by asset class	Minnesota meets nearly all transparency recommendations	N/A	Should also report gross of fee returns
<b>Pension Benefits</b>	Defined Benefit Plan with a 1.7% multiplier per year of service	The average general employee DB plan multiplier is 1.8%	The average general employee DB plan multiplier for this region is 2.1%	
<b>OPEB Liability as a % of Personal Income</b>	0.4%	7 <sup>th</sup> Smallest	6/7 (2 <sup>nd</sup> Lowest)	State provides workers with coverage but not an explicit monthly premium contribution.

**Notes:** Region includes: ND, SD, IA, WI, IL, MI

\*\*New Mexico Educational Retirement Board, and the Vermont State Employees and Teachers Retirement Systems reported net of fees for 2016, but gross for 2015.

\*\*\*Of the eleven funds, eight report on a Net June 30 basis. Michigan and Wisconsin report Gross of Fees but have fiscal years which cover different periods, Michigan on a September 30<sup>th</sup> basis and Wisconsin on December 31<sup>st</sup>.

# Funding Policy

- **Minnesota State Retirement System (MSRS)**: Required to contribute amounts based on a fixed percentage of employee compensation specified in statute.
  - **State Employees Retirement Fund (SERF)**: Participating employers contribute 5.5% of payroll. Closed 30-year (with 26 years remaining), Level percent of pay amortization used to determine sufficiency.
  - **State Patrol Retirement Fund (SPRF)**: Employer contributes 20.10 % of payroll. Closed 25-year (with 22 years remaining), Level percent of pay amortization used to determine sufficiency.
  - **Correctional Employees Retirement Fund (CERF)**: Employer contributes 12.85% of payroll. Closed 30-year (with 22 years remaining), Level percent of pay amortization used to determine sufficiency.
  - **Judges Retirement Fund (JRF)**: Employer contributes 22.5% of salary. Closed 30-year, Level percent of pay amortization used to determine sufficiency.
  - **Legislators Retirement Fund (LRF)**: Pay as you go plan paid by direct appropriations.
  
- **Public Employees Retirement Association (PERA)**: Required to contribute amounts based on a fixed percentage of employee compensation specified in statute.
  - **General Employees Fund (GEF)**: Employer contributes 11.78%, 7.5%, or 9.75%, depending on sub-plan. Closed 19-year (with 17 years remaining), Level percent of pay amortization used to determine sufficiency.
  - **Police and Fire Fund (PFF)**: Employer contributes 16.20%. Closed 27-year (with 25 years remaining), Level percent of pay used to determine sufficiency.
  - **Correctional Fund (CF)**: Employer contributes 8.75%. Closed 17-year (with 15 years remaining), Level percent of pay used to determine sufficiency.
  - **Volunteer Firefighters**: state does not contribute.
  
- **Minnesota Teachers Retirement Fund (TRF)**: The employer is required to contribute 7.70% of employee compensation as specified in statute, plus supplemental statutory contributions totaling 0.74% of pay. Closed, layered 23-year, level percent of payroll amortization used to determine sufficiency.