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National Pension Education Association 2018 Annual Conference

Actuarial ABCs – Demystifying Your Valuation

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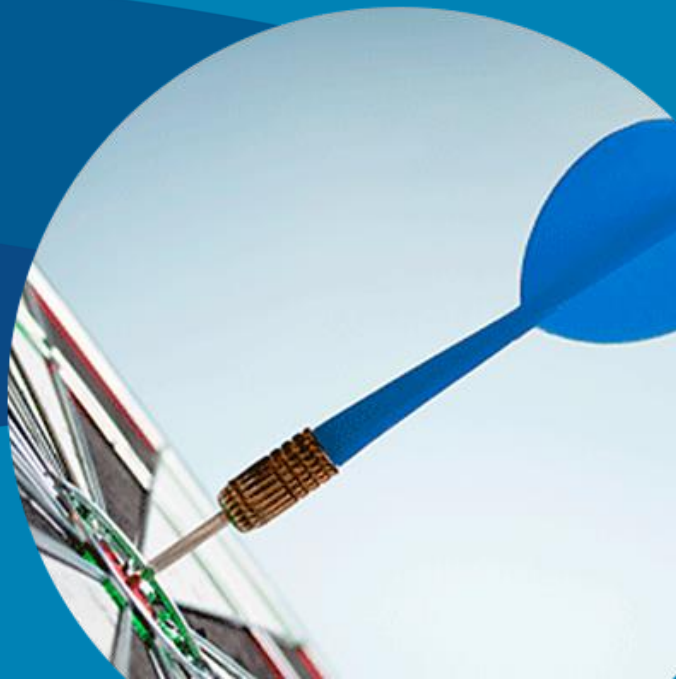
Tucson, AZ
October 23, 2018



Pressure Facing Public Pension Plans

- Tremendous amount of scrutiny (both positive and negative) on public pensions these days
  - "The Pension Hole for U.S. Cities and States Is the Size of Germany's Economy" – Wall street Journal
  - "Public pension funds adopt cost-sharing mechanisms to stem volatility" – Pensions and Investments
  - "The looming retirement crisis for public and private employees" – Philadelphia Inquirer
  - "U.S. state reforms not enough to solve pension problem –Fitch" – Reuters
  - "The Public-Pension Party Must End" – National Review
  - "Controversy simmering over gauging pension obligations" – Pensions and Investments
  - "Why funding levels are improving for state pension plans" – Bond Buyer

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Pressure Facing Public Pension Plans

- Articles referenced above are just a small sample of the media attention out there
- More and more, active and retired members of your plans are taking notice
- Understanding your valuation report and the underlying process is an invaluable tool in communicating with your members

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PURPOSE AND OVERVIEW OF THE VALUATION PROCESS

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Actuarial Valuation Process

Purpose

- Determine employer contribution rates
- Measure the System's liabilities
- GASB #67/68 & CAFR
- Explain changes in actuarial condition
- Track changes over time
- Provide baseline to educate various stakeholders on the general health of the plan and make recommendations for future improvements

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Actuarial Valuation Process

Purpose

- The valuation process itself is not the main time for decision making, it is a time for processing
- The valuation process will point out possible issues that need to be considered, but in general, the inputs that require decision making should have been managed before the valuation process begins
  - Assumptions, benefits, methods, etc.

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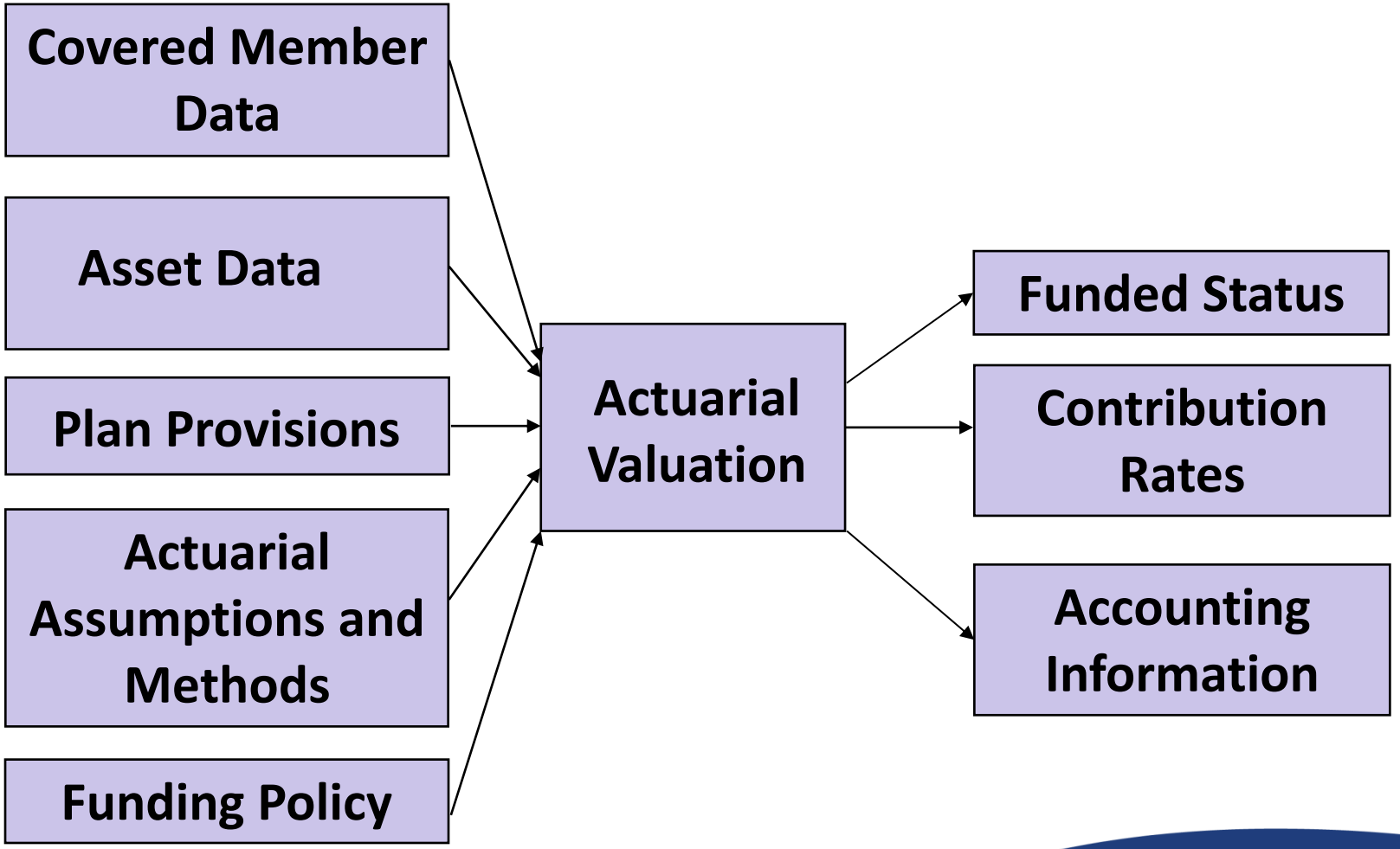
Actuarial Valuation Process

Overview



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VALUATION INPUTS – ASSET DATA

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Asset Data

Reasonability Checks

- Asset information is typically provided by Plan Staff
  - Balance sheet
  - Income and expense
- We check for reasonability and consistency
  - Benefit payments are reasonable compared to expected benefit payments
  - Expenses are reasonable compared to last year
  - Actual contributions are reasonable compared to last year's valuation report
  - Investment return looks reasonable when compared to major market indices
- Detailed information on plan assets can be found in the valuation report

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Asset Data

Multi-Year Asset Smoothing

- Asset Smoothing Process
  - Gain/losses are defined as the difference between the expected asset value and the actual asset value
  - Asset returns are smoothed so that decisions can be made on the underlying trend (and “noise” is filtered out)

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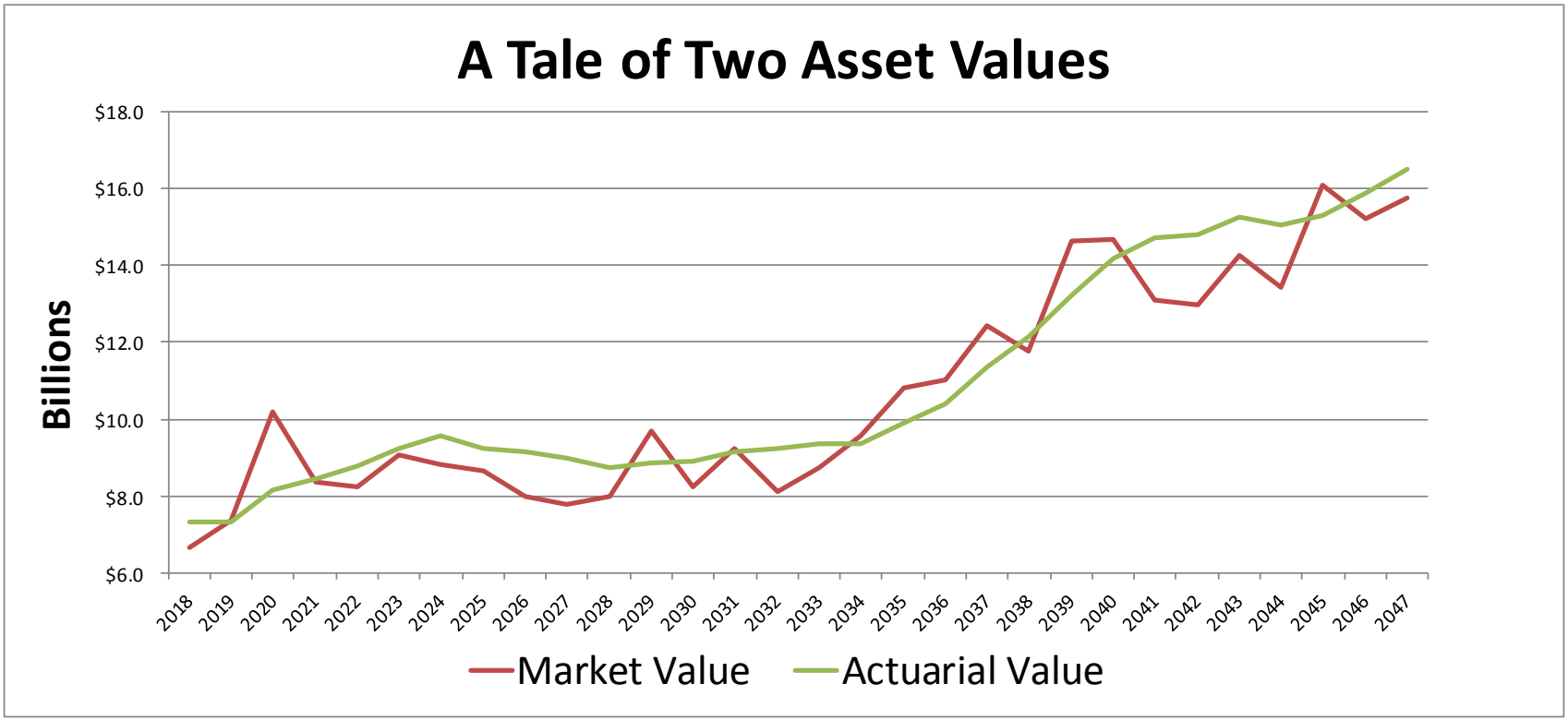
Asset Data

Multi-Year Asset Smoothing



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VALUATION INPUTS - ASSUMPTIONS AND METHODS

Role of Actuarial Assumptions

- What dictates the true cost of the plan?
  - Actuarial assumptions?
  - Plan provisions?
  - Both?

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Role of Actuarial Assumptions

- Over time, the true cost of benefits will be borne out in actual experience
  - Cost of benefits NOT affected by actuarial assumptions
  - Determined by actual participant behavior (termination, retirement), plan provisions, and actual investment returns
  - The annual valuation is a self correcting process-the truth always comes out

- Assumptions help us anticipate and manage what each component of the equation will be
  - Assumptions dictate the timing of the contributions
  - Develop expectations for future contributions, investment returns and benefit payments
  - Important for decision making

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Role of Actuarial Assumptions

- Why are assumptions so important?
  - Overly aggressive assumptions can endanger a Plan
  - Overly conservative assumptions can lead to unaffordable costs
  - Optimal assumptions lead to achieving the goals of a pension plan while balancing stakeholder's goals
    - Benefit Security
    - Sustainability
    - Intergenerational Equity
    - Contribution Stability and Predictability

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Examples of Actuarial Assumptions

- Economic Assumptions
  - Salary rates[1]
  - Investment return[2]
- Demographic Assumptions
  - Mortality rates[2]
  - Disability[1]
  - Retirement[1]
  - Withdrawal[1]
  - Payroll growth rate[1]

[1] Impact the liability for active members only

[2] Impact the liability for active and inactive members

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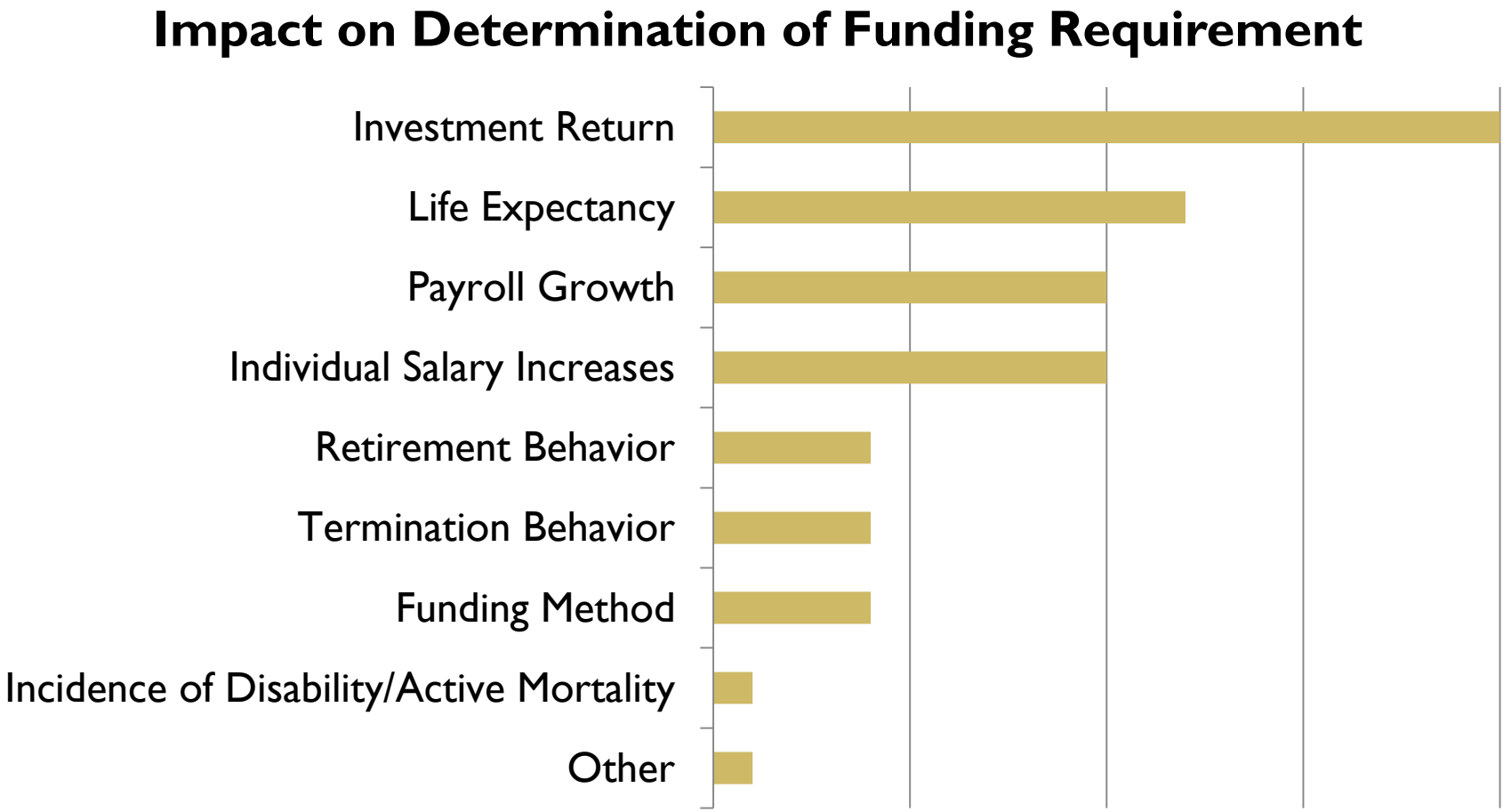
Examples of Actuarial Assumptions



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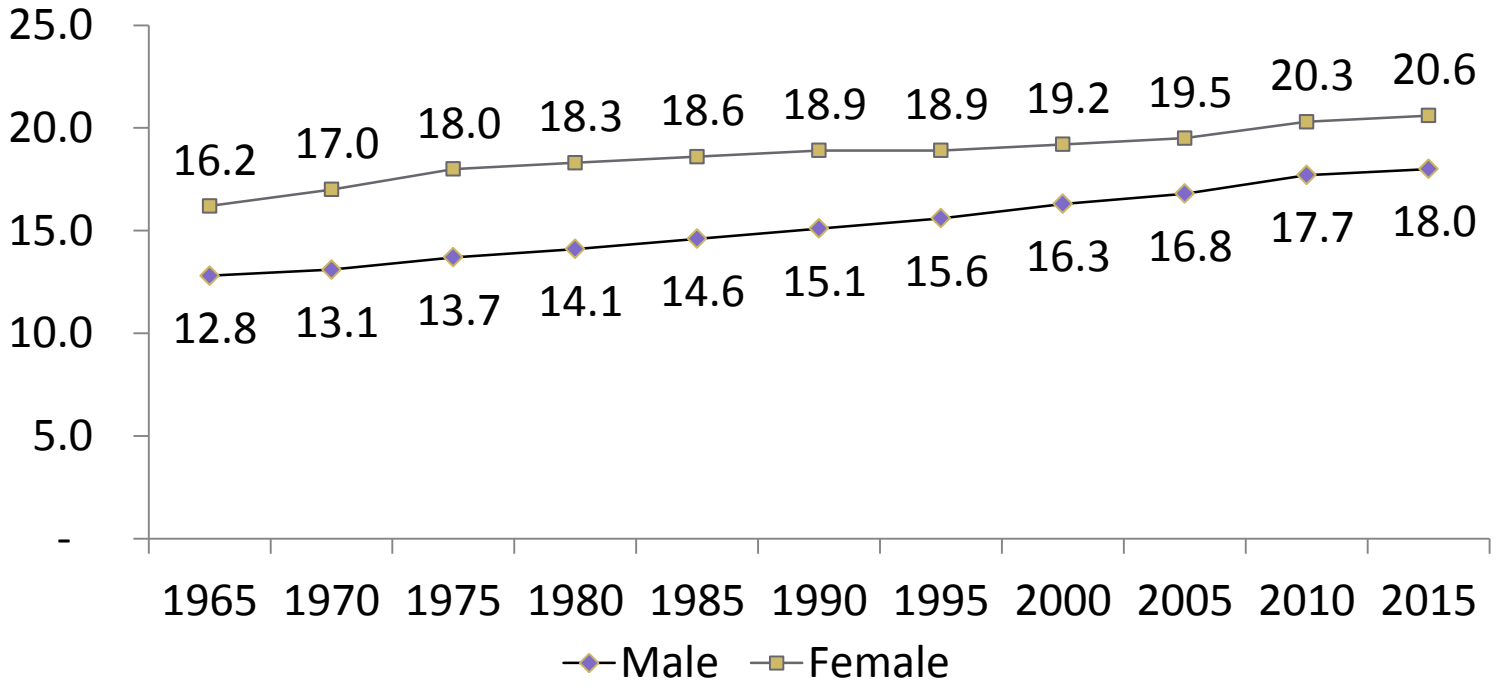
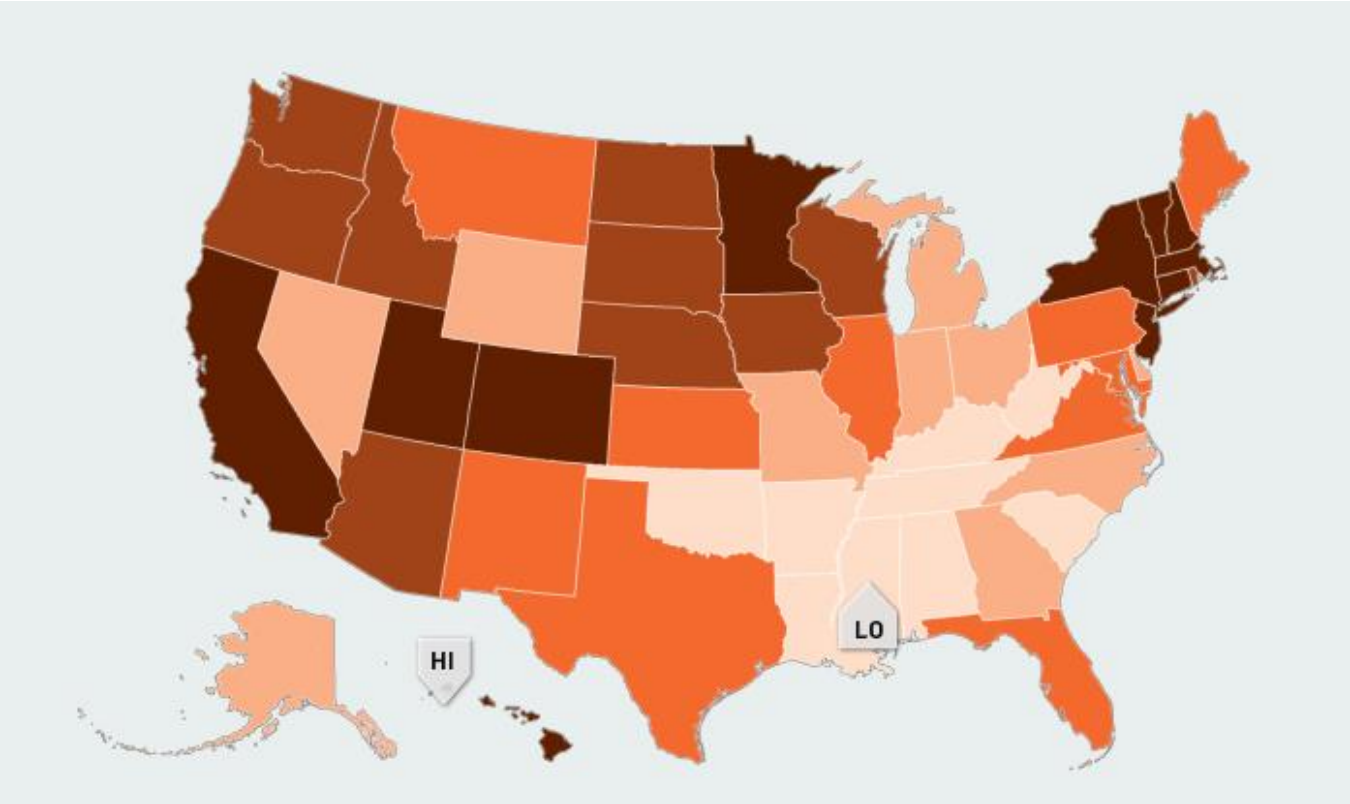
Post-Retirement Mortality

- Life Expectancy for the General US Population - from Age 65



Life Expectancy by State



Legend: 80–81.3 79.5–80.0 78.4–79.5
77.2–78.4 75.0–77.2

Above data from National Vital Statistics

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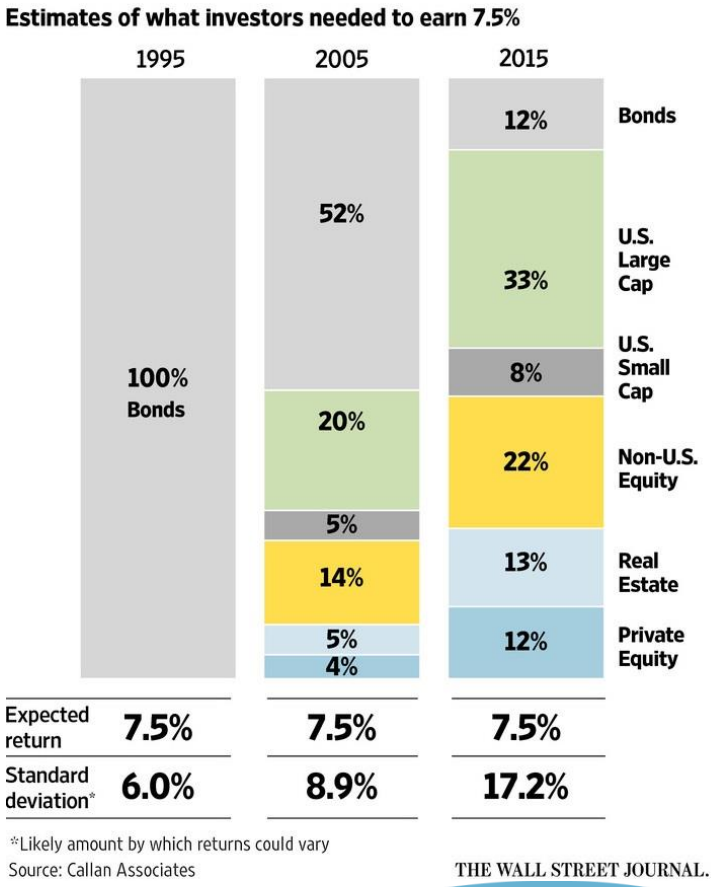
Post-Retirement Mortality

- Nationally, life expectancies continue to improve
- Improvements in future longevity were materially changed recently with built in continuous improvement
  - Generational mortality (Scale AA, BB, MP)
- There has been a significant amount of activity on this assumption in the industry with new tables published as of a couple of weeks ago (PUB-2010)
- Accurate estimates of mortality rates, life expectancies, and future improvements are a critical piece of determining how to properly pre-fund the plan
- Remember, there is no “one size fits all” when it comes to mortality tables

Investment Return Assumption

- Trends in investment return assumptions



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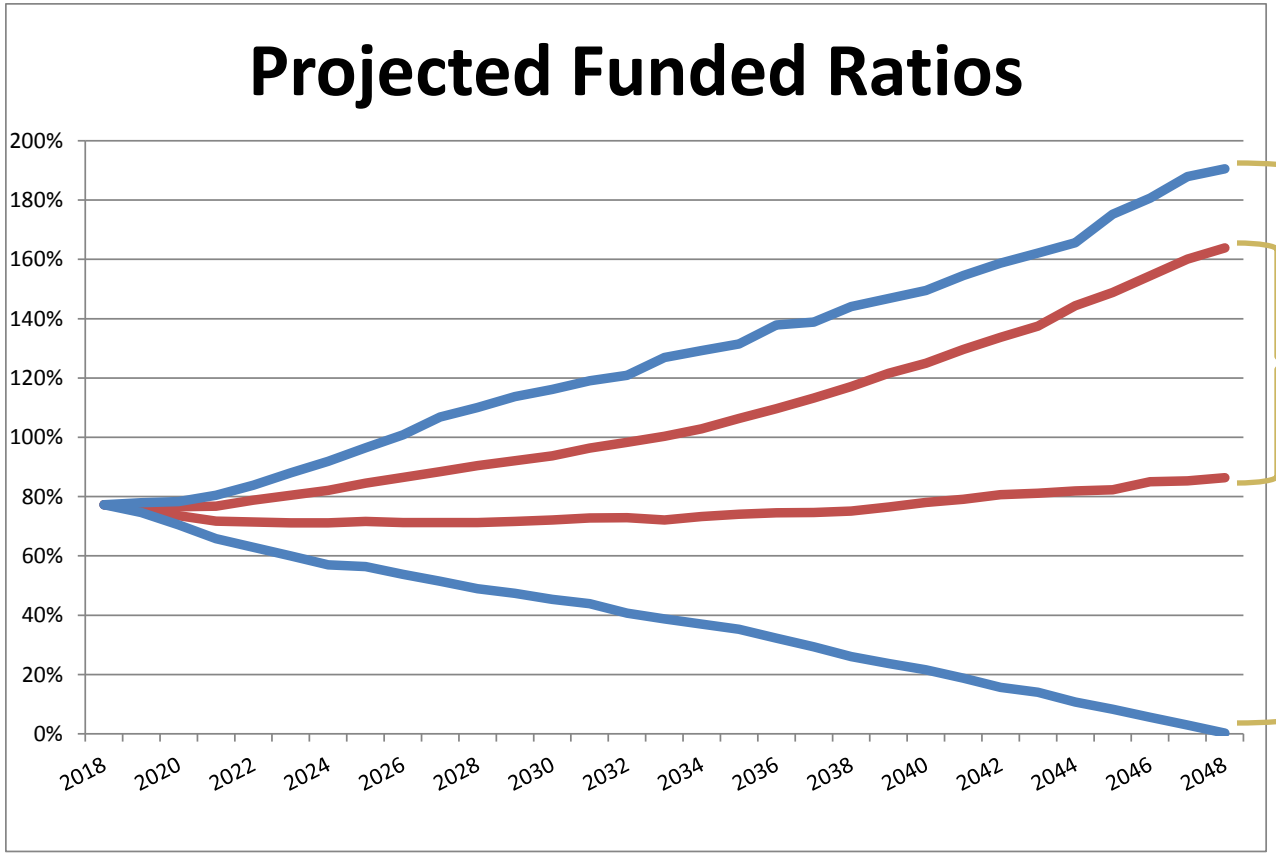
Investment Return Assumption

- What does it mean to take on more risk?



Likely range of outcomes with low risk

Likely range of outcomes with high risk

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Investment Return Assumption

- The assumption selected should be reasonable
  - May be no single “correct” answer
  - Assumption should be a best-estimate
- Assumption is selected using a process that is mainly based on economic capital market expectations using the Plan’s target asset allocation:
  - Utilize a building block approach that reflects expected inflation, real rates of return, and plan related expenses
  - Take into account the volatility of the expected returns produced by the investment portfolio

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Other Assumptions

- Other assumptions such as retirement rates, termination rates, and disability rates, and salary increase rates are typically plan specific
- Periodic experience reviews are performed to validate these assumptions

LIABILITY CALCULATION

Liability Calculation

Actuarial Cost Method

- The Actuarial Cost Method determines the allocation of cost between past and future
- It does not determine or alter the Present Value of Future Benefits, but it can change the funded ratio, which can make comparisons difficult if another Plan is using a different cost method

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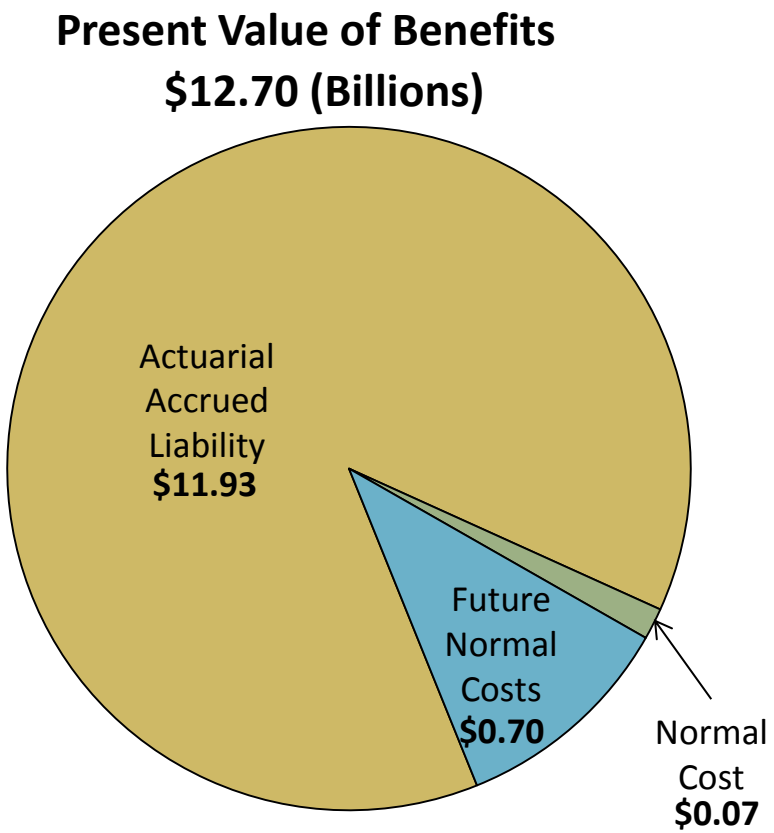
Liability Calculation

- **Present Value of Benefits (PVB)** – present value of all future benefits payable to current participants (active, retired, terminated vested)
- **Actuarial Accrued Liability (AAL)** – portion of PVB allocated to prior years (equal to unfunded actuarial accrued liability plus assets), also represents the ***target value of assets*** at a specific point in time based on the funding objectives
- **Normal Cost** – portion of PVB allocated to current year, also represents cost of accruing next year's benefit
- **Future Normal Costs** – portion of PVB allocated to future years



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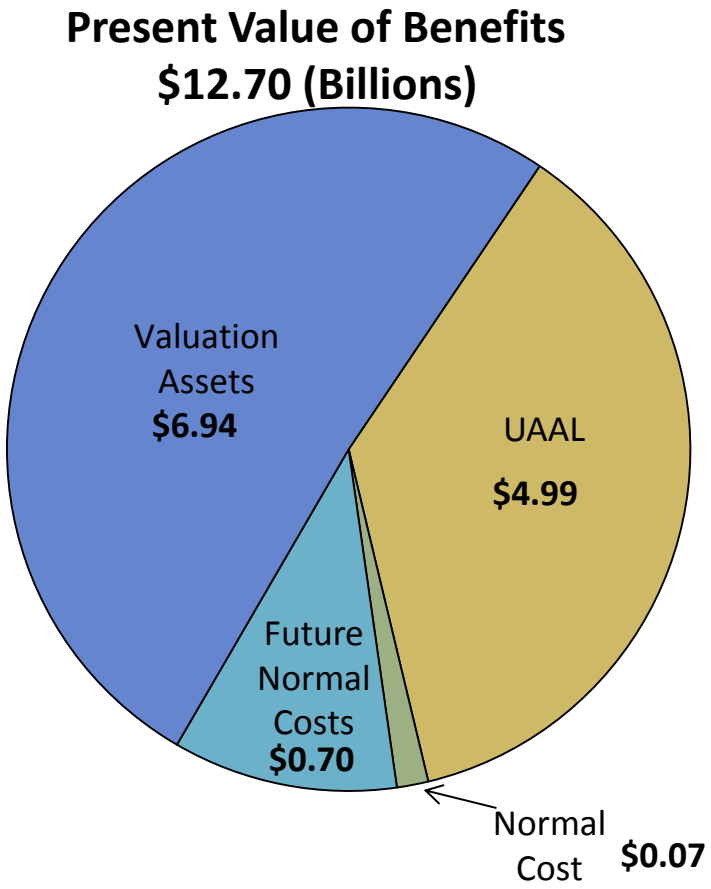
Liability Calculation

- **Unfunded Actuarial Accrued Liability (UAAL) –** shortfall between actuarial accrued liability (or ***target value of assets)*** and the actual value of assets at a specific point in time

- **Funded Ratio –** the actual asset value as a percentage of the target asset value
  - With funded ratio, the trend is your friend



Funded ratio for the Plan is 58.2%

Why is there a UAAL?

- If contributions have been made equal to the actuarially determined contribution for the life of the fund, why does the UAAL exist?
  - New base at inception
  - Benefit increases granted that change the accrual for past service
  - Past experience differing from expectations
  - Changing the prospective assumption for future experience

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GAIN/LOSS ANALYSIS

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Gain/Loss Analysis

- Why did the contribution rates change?
- What were the biggest factors contributing to the changes in funded position?
- Were any assumptions “way off”?

- These are the types of questions that lead us to look at the “gain/loss on accrued liabilities”

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Gain/Loss Analysis

- A “loss” on the accrued liability occurs when the accrued liability is HIGHER than expected
  - Remember, expectations are built from assumptions
- A “gain” on the accrued liability occurs when the accrued liability is LESS than expected
- The interesting part is to look at gains and losses by assumption

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THE FUNDING POLICY

Funding Policy

- Over time, there are four parts of the actuarial funding equation:

- C + I = B + E
  - C = Contributions
  - I = Investment Earnings
  - B = Benefits
  - E = Expenses

- This equation will balance over the long term, but not necessarily over one year or even a number of years
- The funding policy helps determine the “Contribution” portion of the above equation

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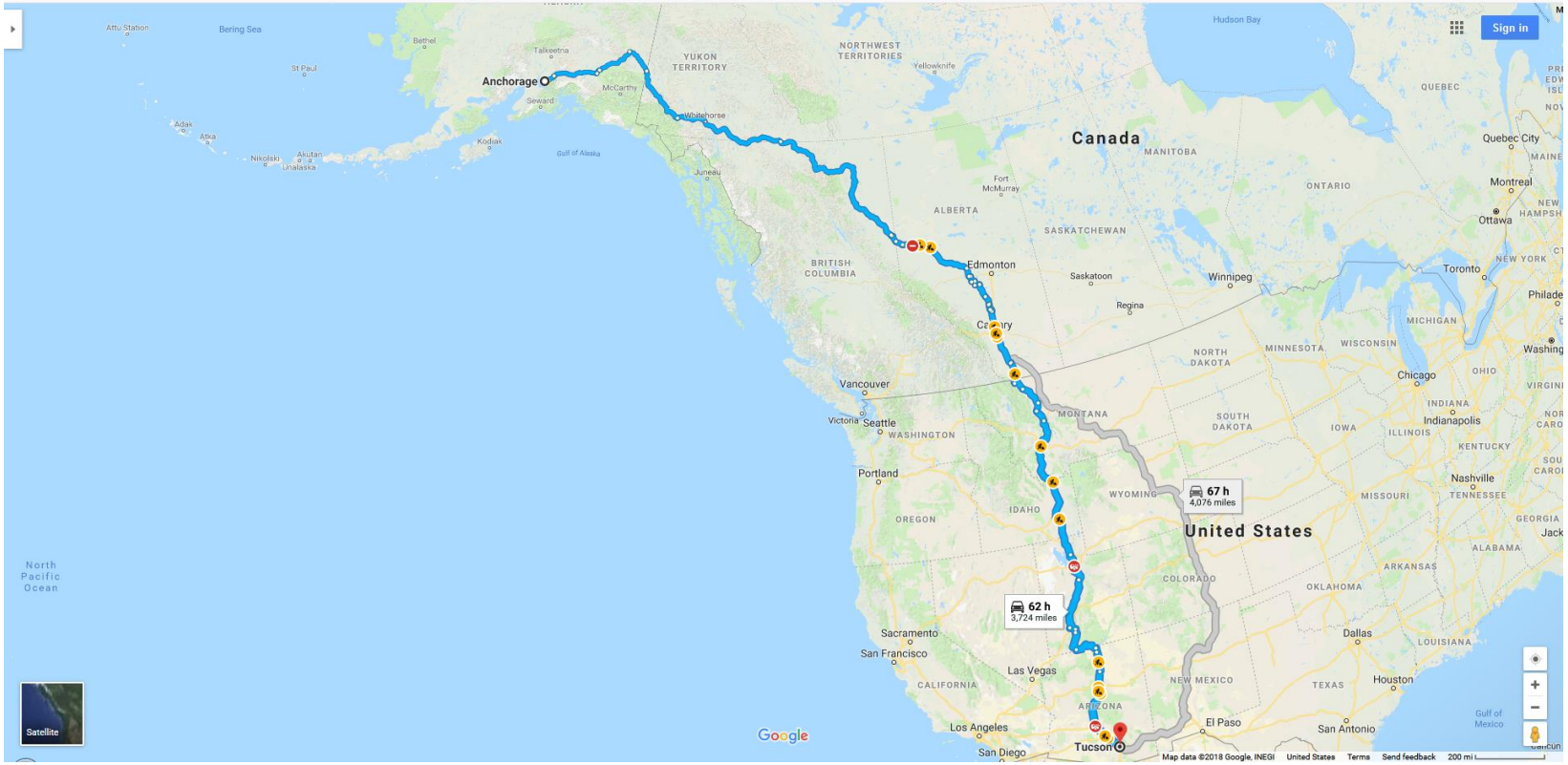
Funding Policy

- Why even have a Funding Policy?



Funding Policy

- Why even have a Funding Policy?
  - Would you ever try to drive from Tucson, Arizona to Anchorage, Alaska without a road map or a GPS device?
  - What if you got into Canada and the road you were on was closed ahead? Would you not pull out your map and search for an alternate route?
  - A Funding Policy serves the same purpose as a road map when it comes to navigating through the life of a pension plan

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Funding Policy

- What are the objectives of a Funding Policy?
  - The Government Finance Officers Association's Best Practice, "Sustainable Funding Practices of Defined Benefit Pension Plans," states:
    - The main financial objective of public employee defined benefit plans is to fund the long-term costs of promised benefits to plan participants
    - GFOA also recommends that this be done through a systematic and disciplined accumulation of resources (i.e., contributions and related investment earnings) which are sufficient to pay promised benefits to plan members over their lifetimes

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Funding Policy

- Not all funding policies are created equal
  - Open vs. Closed Period Amortization
    - Will the UAL ever get paid off?
  - Level Dollar vs. Level Percent
    - Will our contributions increase each year as a dollar amount?
  - Length of period
    - Is the UAL expected to be paid off in a reasonable period of time
- Its important to understand how your particular plan is funded

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Actuarially Determined Contribution (ADC)

- Typically plans are funded through a variation of the "Actuarially Determined Contribution"

- The contribution is set to be the sum of:
  - The normal cost for the year and
  - The amortization of the UAAL

- Another way to look at it:
  - The contribution for the current year

    plus
  - The contribution to make up any shortfall that may have occurred due to past experience or changing expectations

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PROJECTIONS AND THE MANAGEMENT OF RISK

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Projections and Risk

- Thus far, all of the topics covered have pertained to the snapshot valuation
  - Single numbers at a point in time
- Projections are a vital part of the valuation process
- Projections give us a glimpse at possible future outcomes
- This presentation will talk about some risks, but by no means is this an exhaustive study

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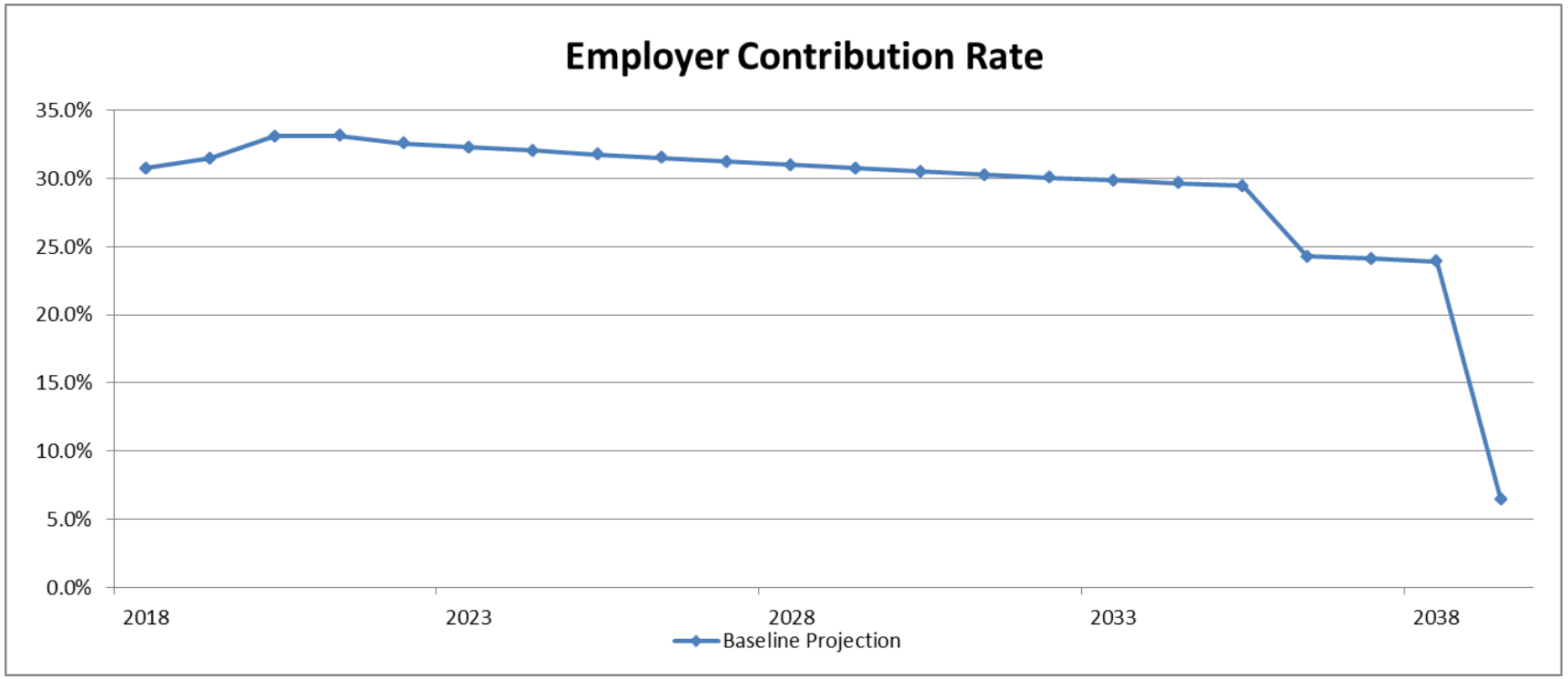
Projections and Risk

Baseline Projections – Employer Contribution Rates



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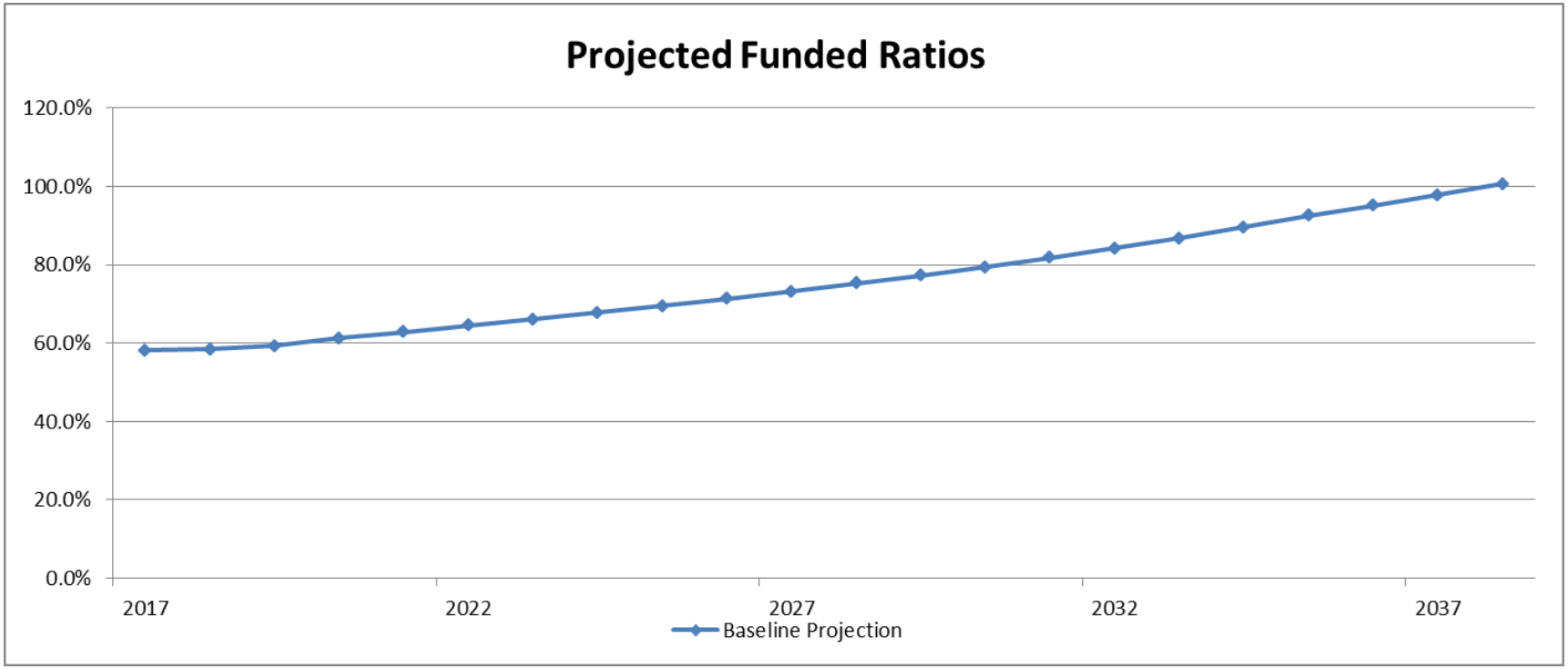
Projections and Risk

Baseline Projections – Funded Ratio



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Projections and Risk

Investment Risk (Deterministic Scenarios)

- Investment Risk (Deterministic Scenarios)
  - Current assumption is that the System will earn a return equal to 7.25% in all years going forward
  - What is the risk of actual return deviating from that assumption?
    - Studied actual returns of:
      - 7.25% in all future years
      - 6.00% in all future years
      - 8.50% in all future years

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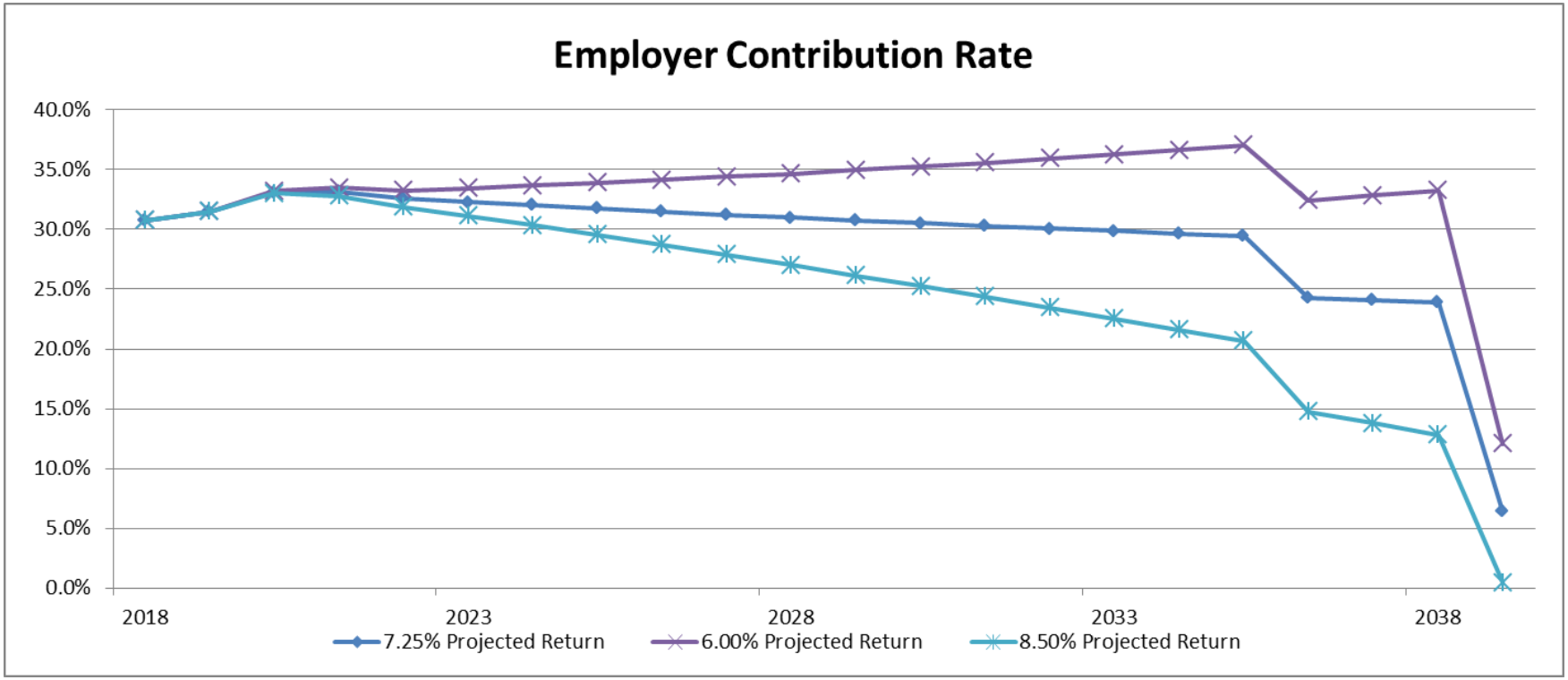
Projections and Risk

Investment Risk (Deterministic Scenarios) – Employer Contribution Rates



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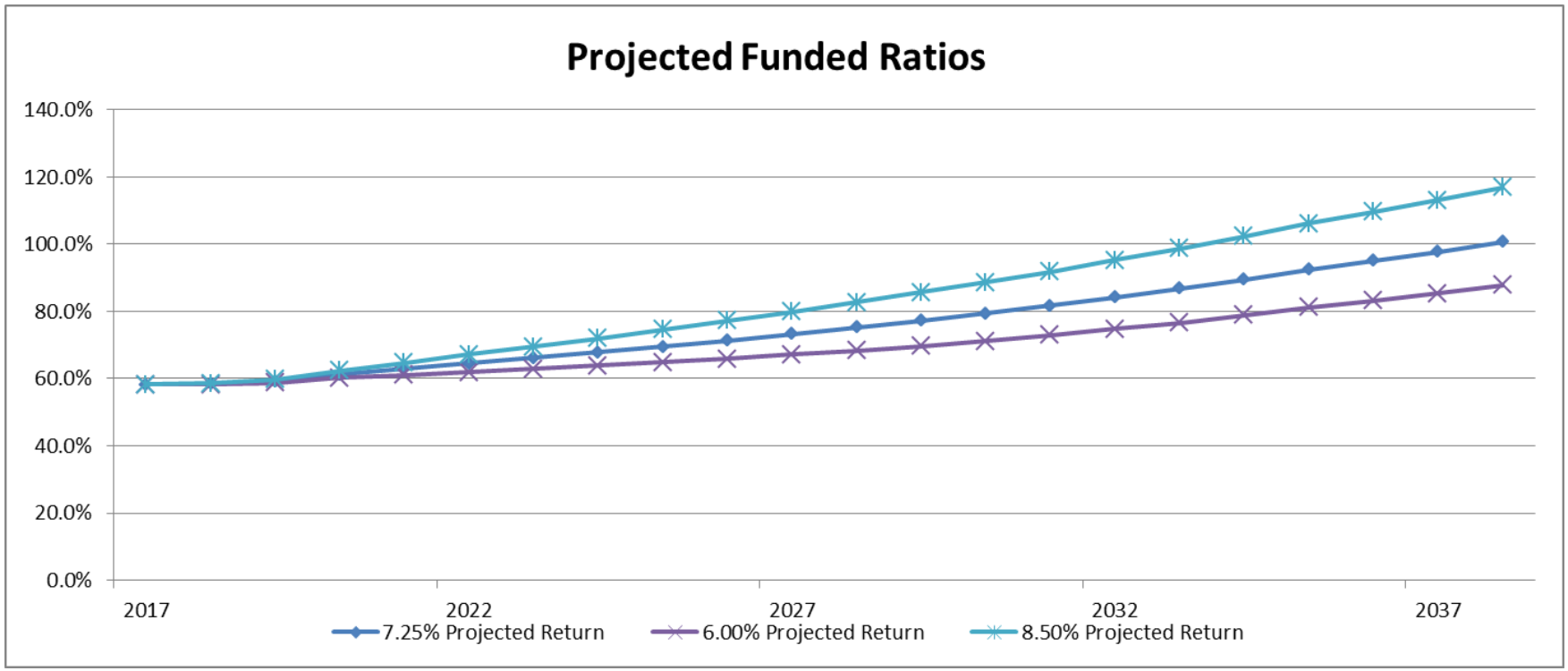
Projections and Risk

Investment Risk (Deterministic Scenarios) – Funded Ratio



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Projections and Risk

Investment Risk (Stochastic Scenarios)

- Let's take it one step further
- We could run thousands of trials and assign a likelihood to each result that occurs
- This process has a very fancy name…Stochastic Projections
- These projections help us understand the range of outcomes that could occur
- Can lead to more informed decision making

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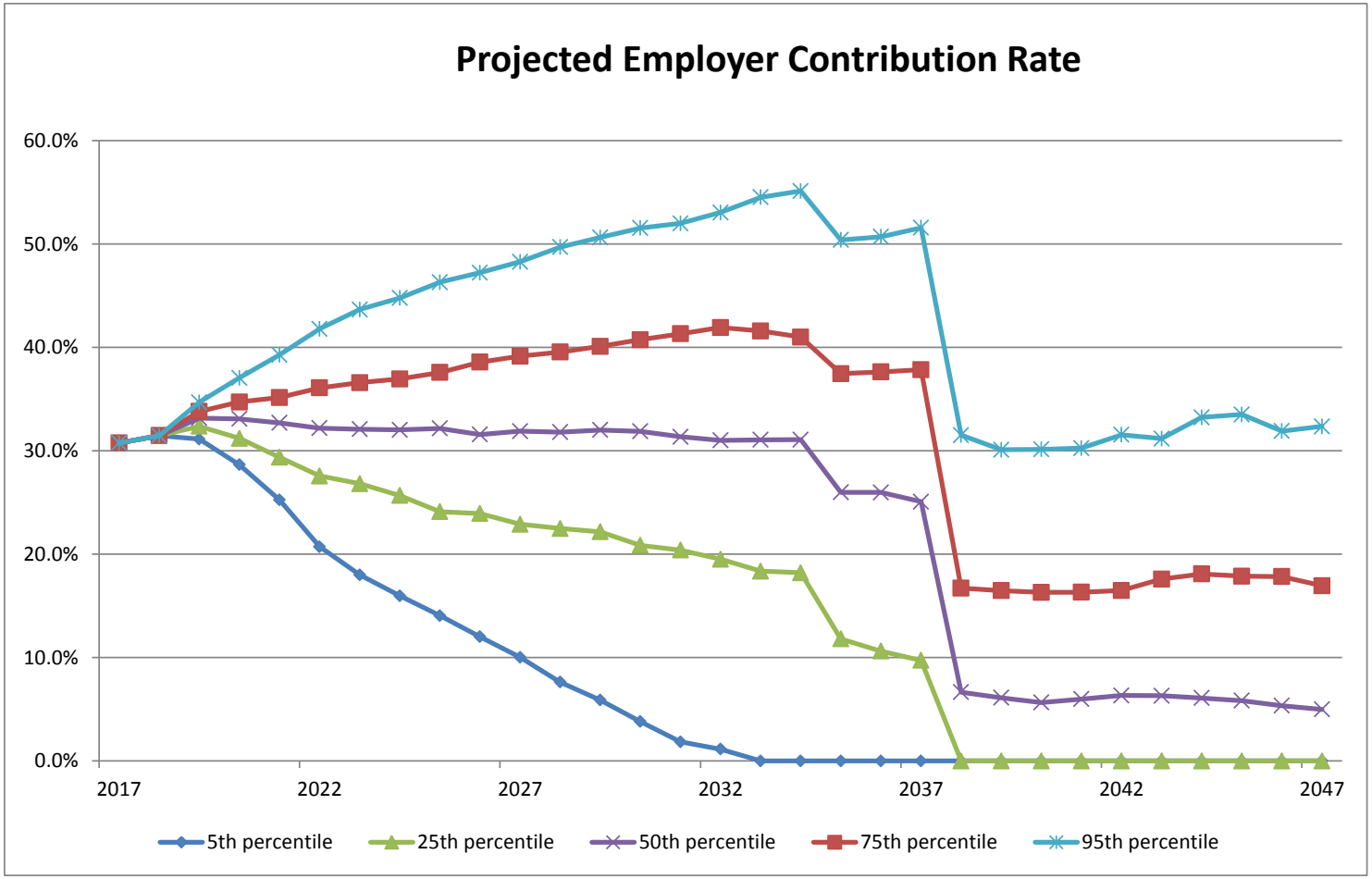
Projections and Risk

Investment Risk (Stochastic Scenarios) – Employer Contribution Rates



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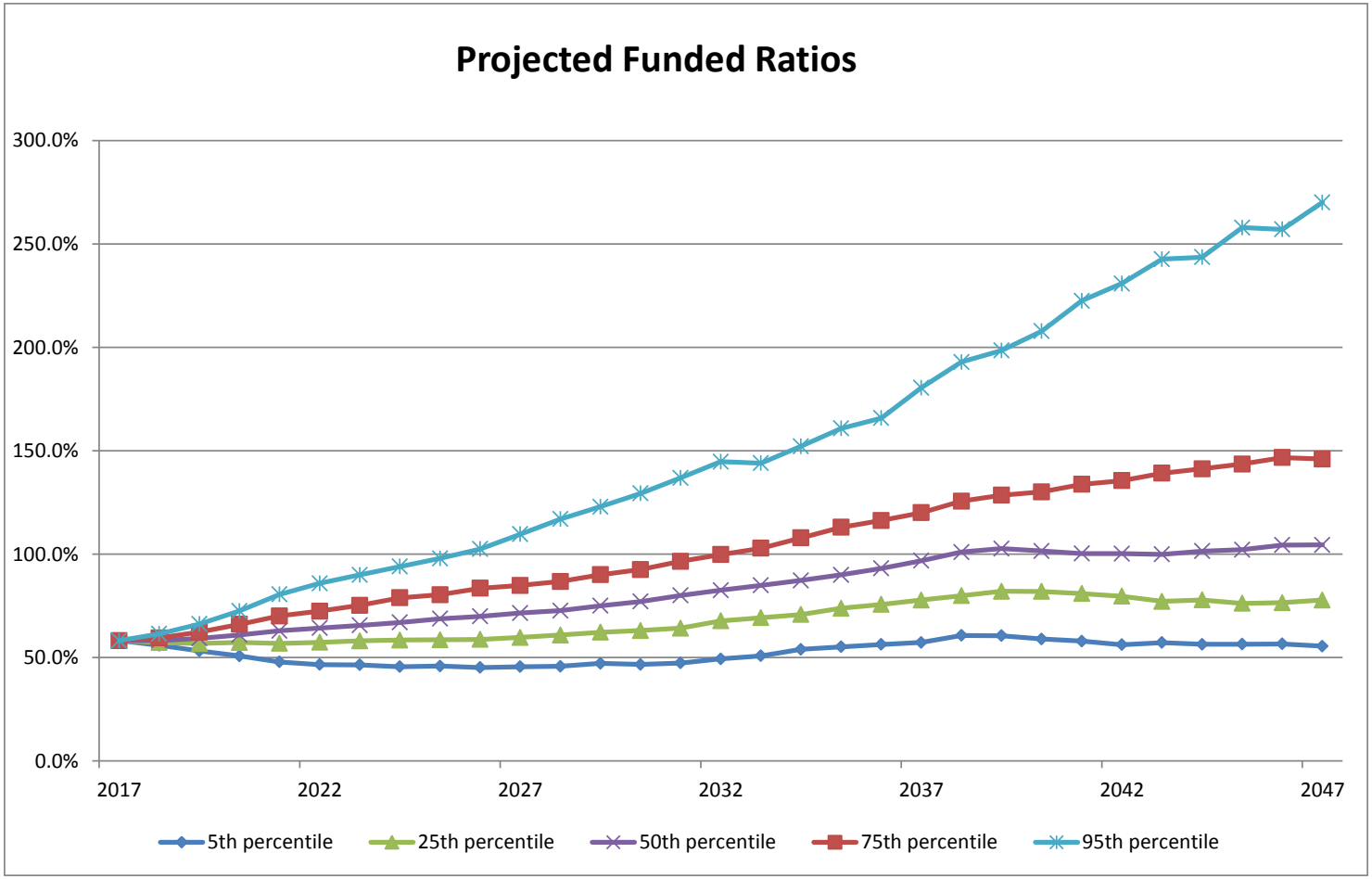
Projections and Risk

Investment Risk (Stochastic Scenarios) – Funded Ratio



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Projections and Risk

Investment Risk (Stress Testing Using Historical Returns)

- Current assumption is that the System will earn a return equal to 7.25% in all years going forward
- What would happen to the contribution rate if the returns over the next ten years looked like returns from 2008 through 2017?

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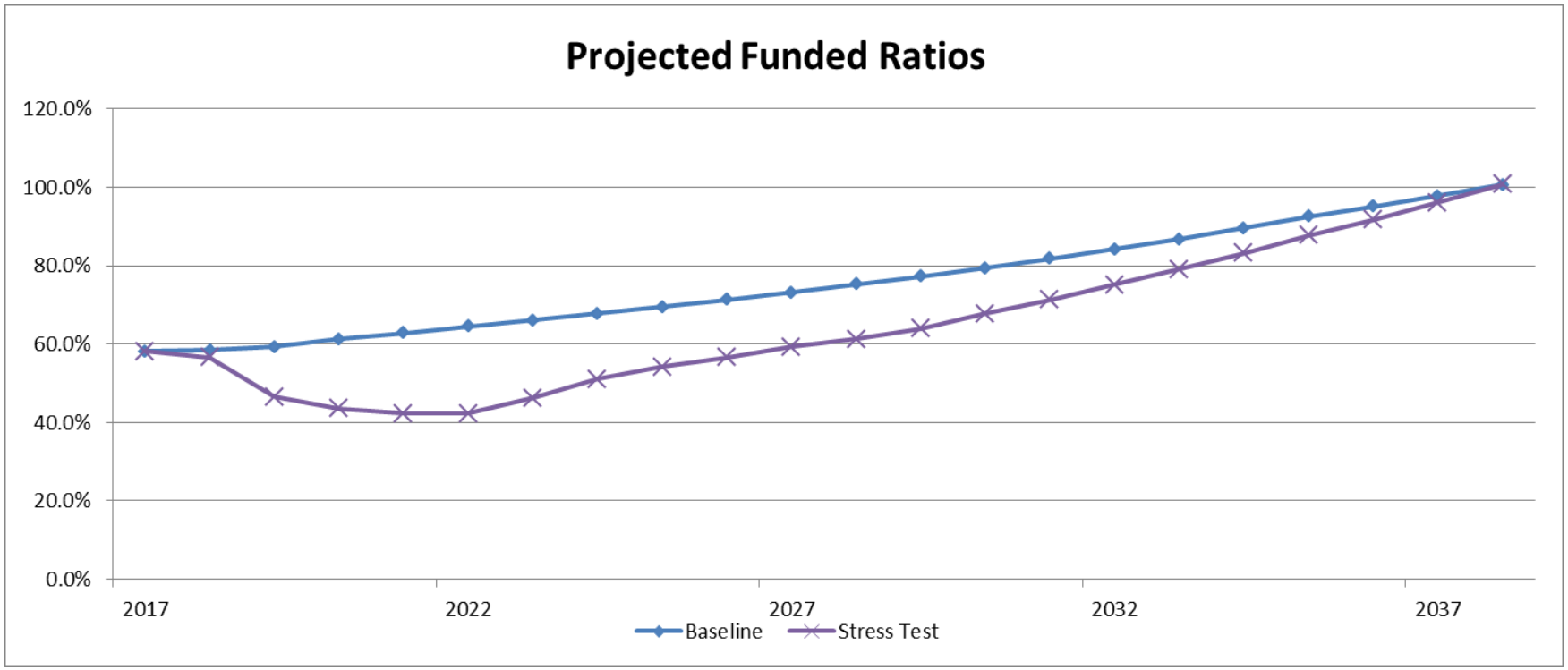
Projections and Risk

Investment Risk (Stress Testing Using Historical Returns) – Employer Contribution Rates



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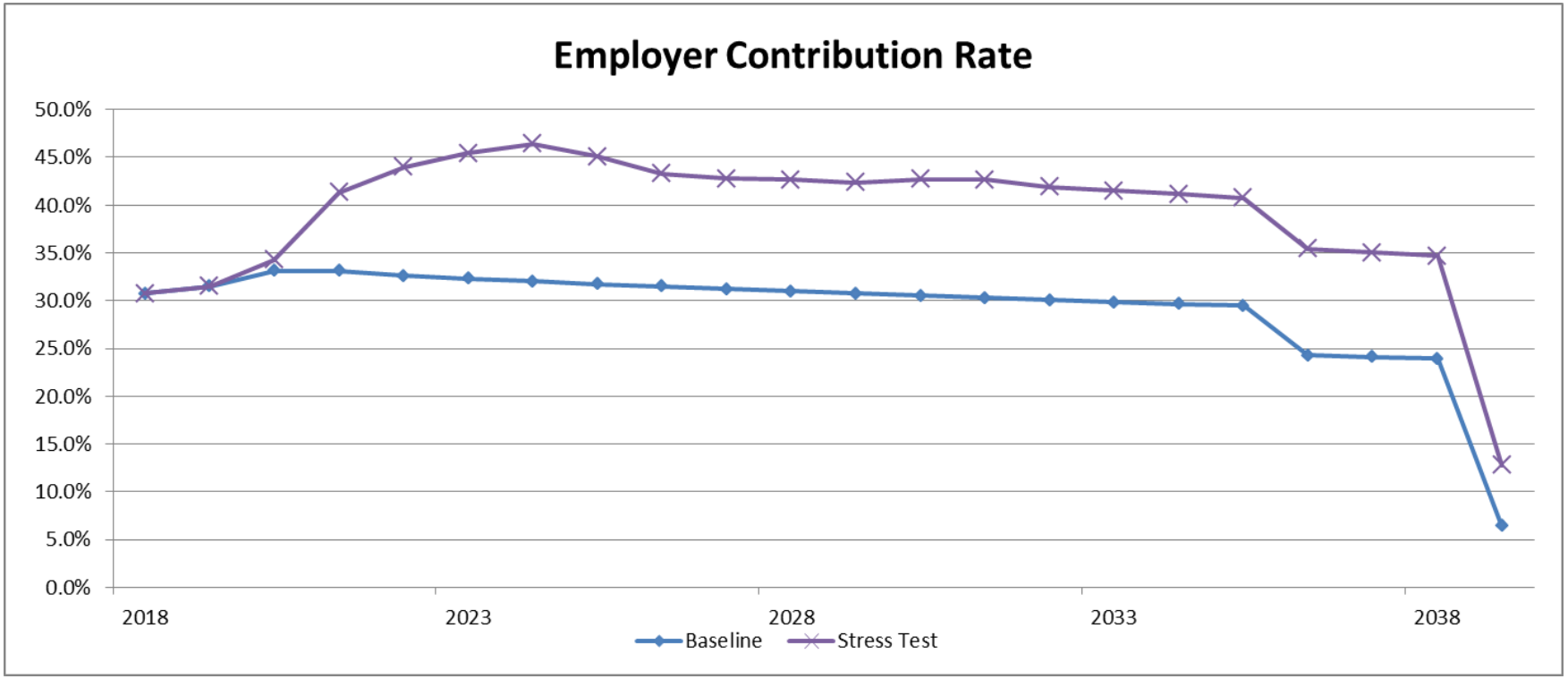
Projections and Risk

Investment Risk (Stress Testing Using Historical Returns) – Funded Ratio



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Conclusions

- We all share a common goal of providing benefit security to the hard working members of the Public Sector
- Understanding the valuation can greatly benefit your interactions with your members
- Projections are key to visualizing the impact of uncertain future events
- Don’t be afraid of your actuary or the valuation process!

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