ARIZONA STATE RETIREMENT SYSTEM SOLVENCY ANALYSIS

Prepared by:

Pension Integrity Project at Reason Foundation

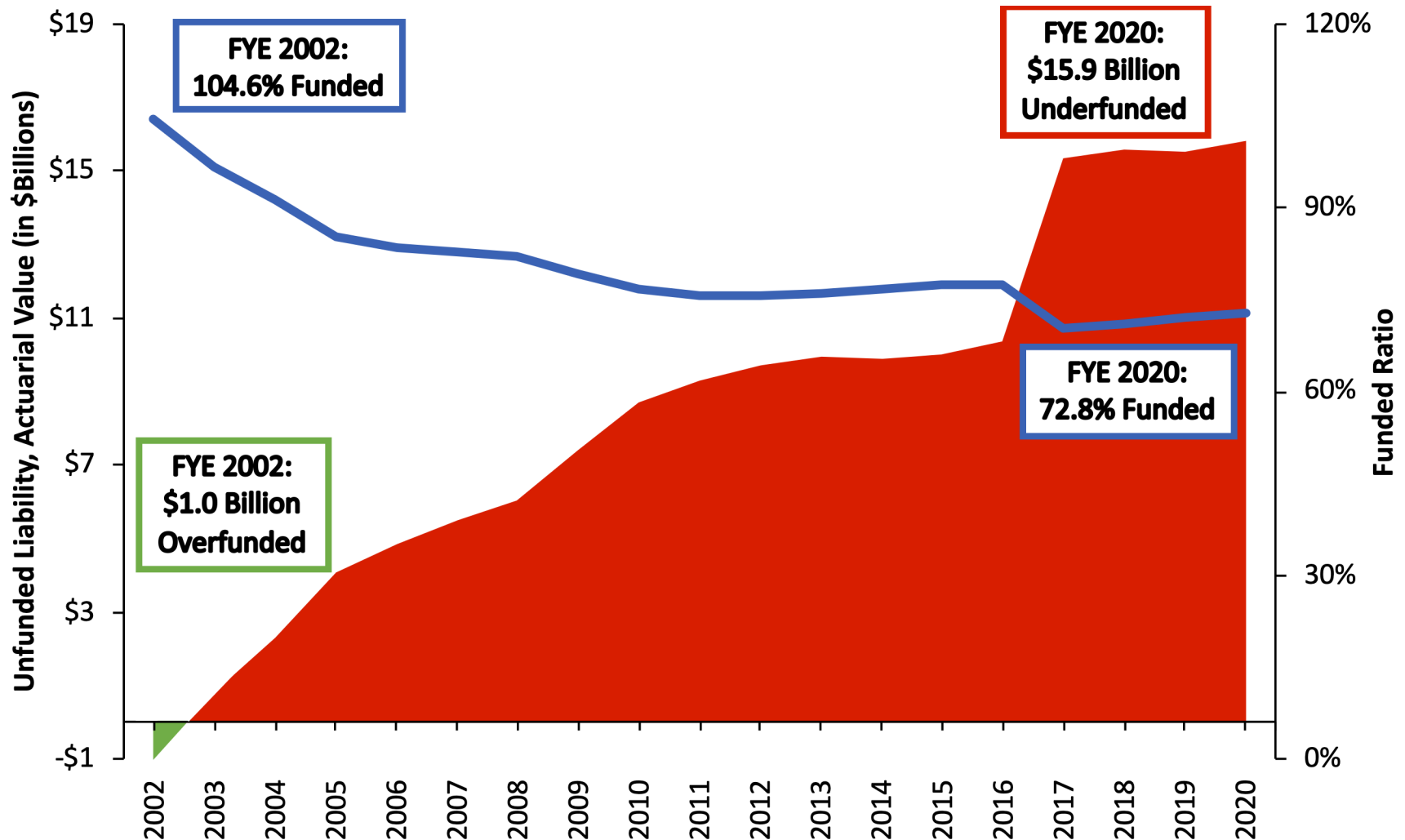**December 4, 2020**

reason FOUNDATION

About the Pension Integrity Project

We offer pro-bono technical assistance to public officials to help them design and implement pension reforms that improve plan solvency and promote retirement security, including:

- *Customized analysis* of pension system design, trends

- *Independent actuarial modeling* of reform scenarios

- Consultation and modeling around *custom policy designs*

- Latest pension reform *research and case studies*

- *Peer-to-peer mentoring* from state and local officials who have successfully enacted pension reforms

- Assistance with *stakeholder outreach*, engagement and relationship management

- Design and execution of *public education programs* and media campaigns

ASRS' Steadily Deteriorating Funding (2002-20)

FYE 2002: 104.6% Funded

FYE 2020: $15.9 Billion Underfunded

FYE 2002: $1.0 Billion Overfunded
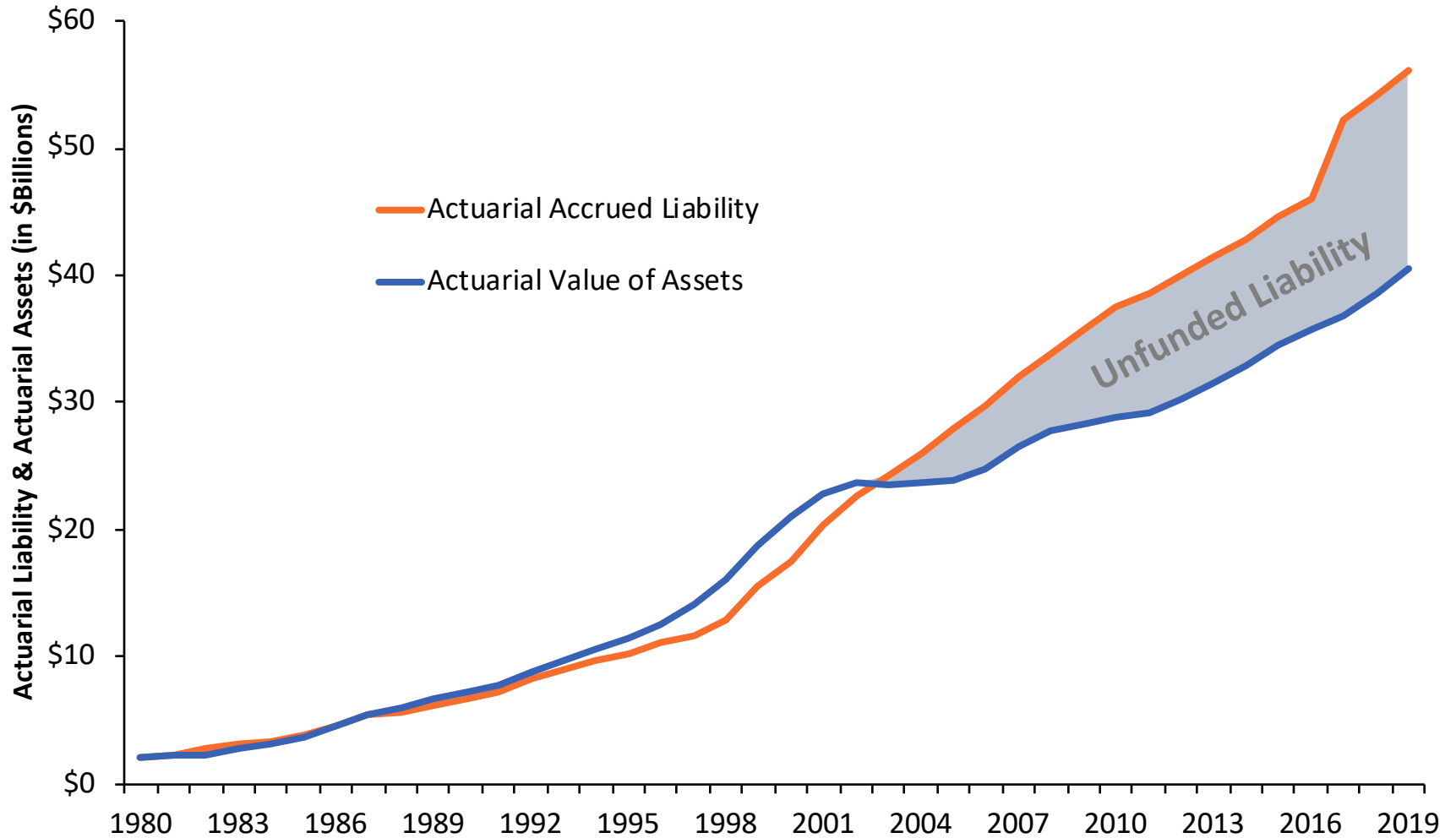
FYE 2020: 72.8% Funded

Source: Pension Integrity Project analysis of ASRS actuarial valuation reports and CAFRs.
The significant increase for FYE 2017 was due to changes in assumptions, most notably the decrease of the assumed rate of return to 7.5%.
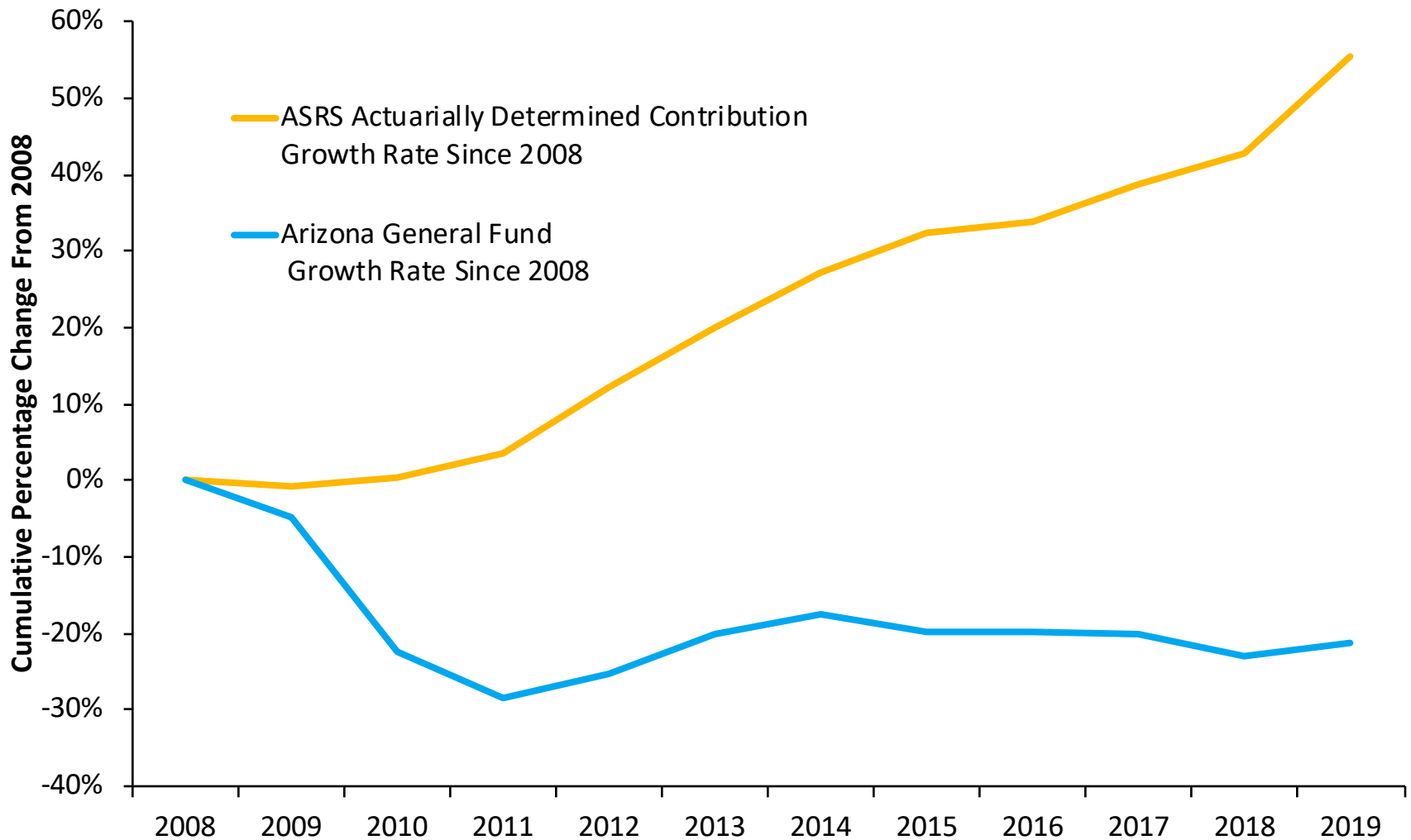
# ASRS Liabilities are Growing Faster than Assets

Source: Pension Integrity Project analysis of ASRS actuarial valuation reports through FY2019.

ASRS Costs are Growing Faster than the State Budget

Source: Pension Integrity Project analysis of ASRS actuarial valuation reports and CAFRs, and data from NASBO Fiscal Survey of States.

ASRS Unfunded Liabilities are Growing Faster than the Arizona Economy
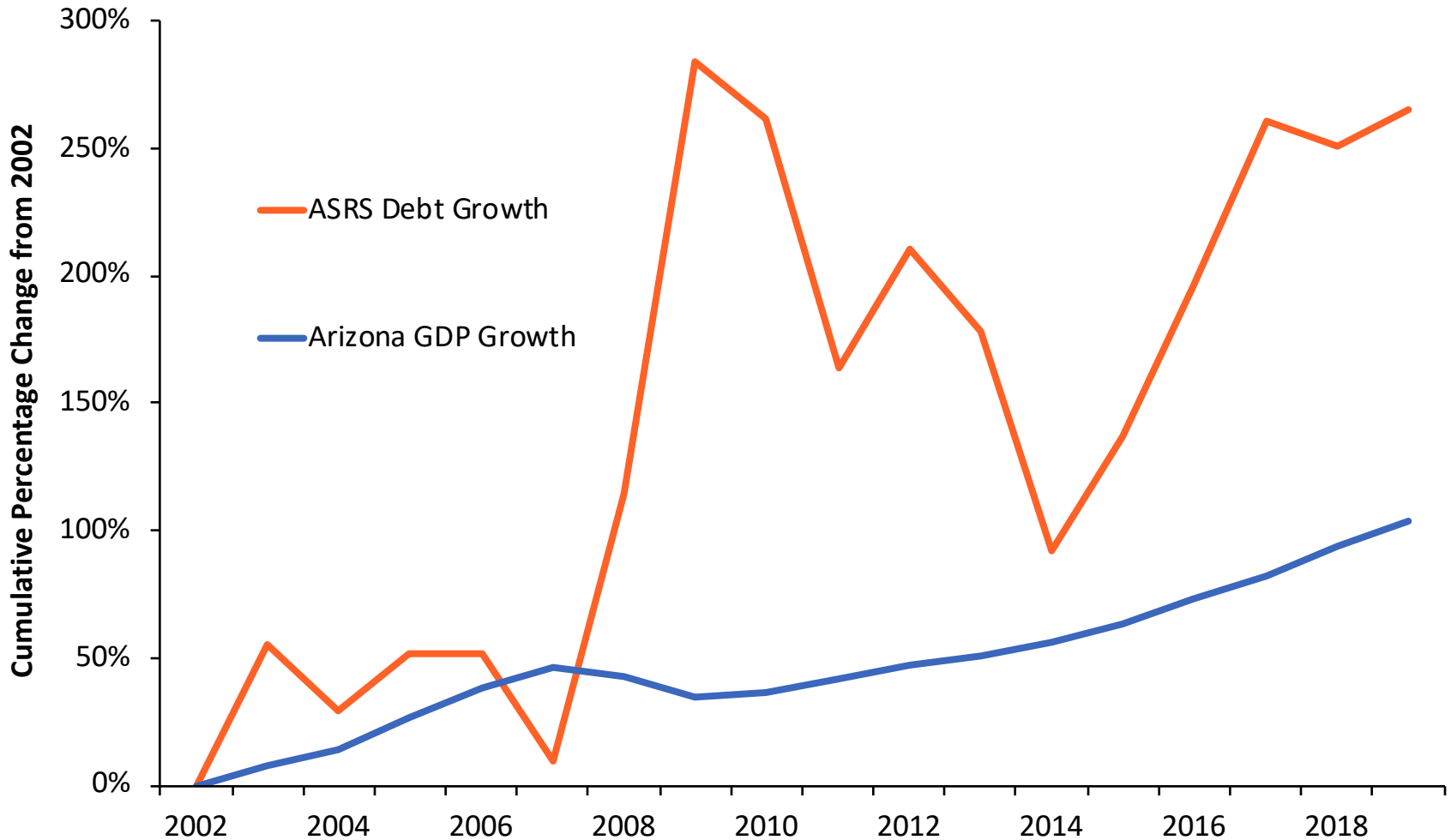
Source: Pension Integrity Project analysis of ASRS actuarial valuation reports and CAFRs, and NASBO Fiscal Survey of States.
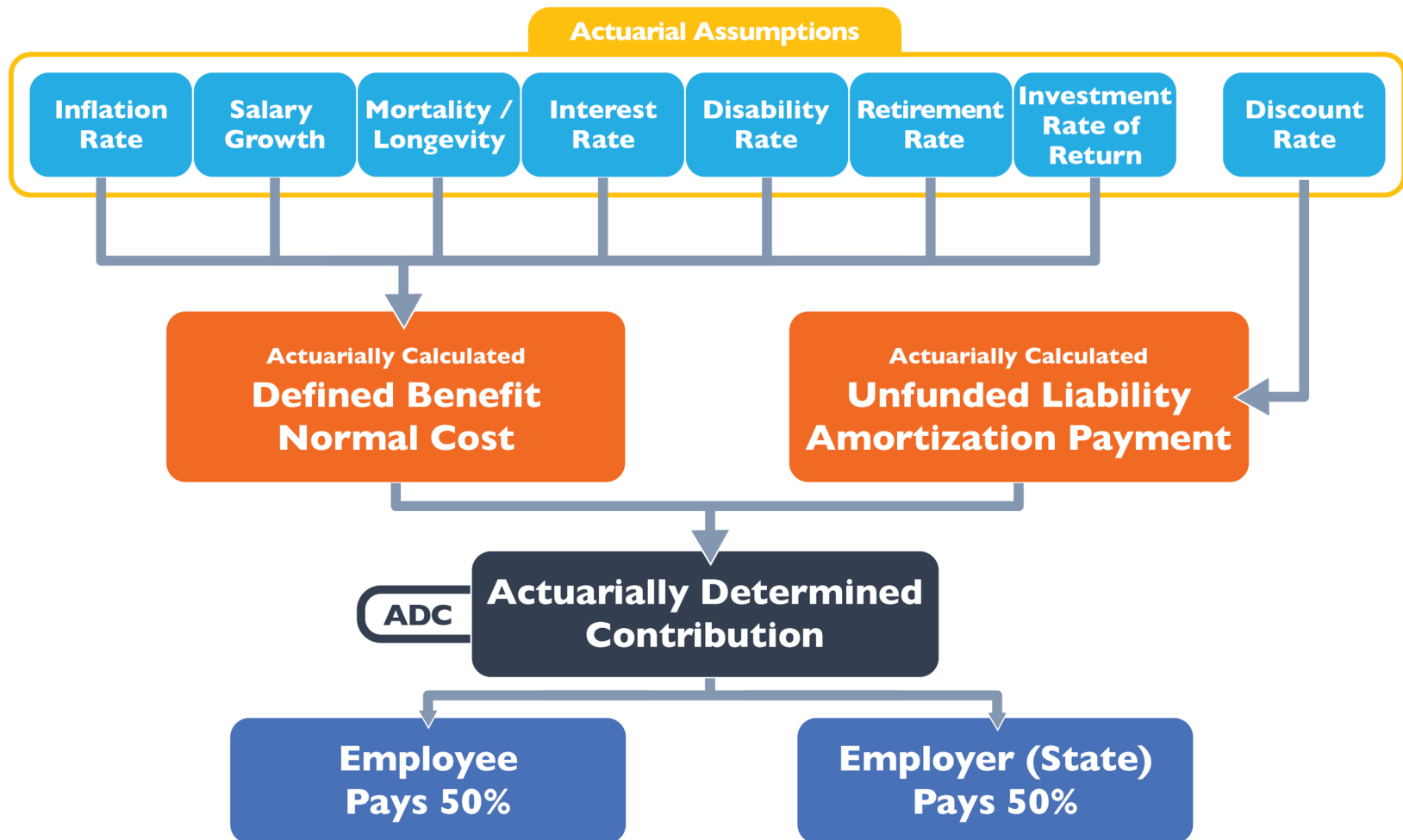
CHALLENGES CURRENTLY FACING ASRS

How ASRS is Funded

Actuarial Assumptions

Inflation Rate	Salary Growth	Mortality / Longevity	Interest Rate	Disability Rate	Retirement Rate	Investment Rate of Return	Discount Rate

Actuarially Calculated
Defined Benefit Normal Cost

Actuarially Calculated
Unfunded Liability Amortization Payment

ADC **Actuarially Determined Contribution**

Employee Pays 50%

Employer (State) Pays 50%

Makeup of ASRS Contributions

FY2021 Contributions		
	% of Payroll	**$ Value**
Employee	12.39%	$1.32 billion
Employer	12.00%	$1.27 billion
Total	24.39%	$2.59 billion
Normal Cost	14.25%	$1.51 billion
Debt Amortization	10.14%	$1.08 billion
Total	24.39%	$2.59 billion

Over the past 20 years, annually required employer contributions into ASRS have grown six fold, going from under 2% in 2002 to 12% by 2021. Contributions could rise even more if the system continues to experience the same challenges and leaves them unaddressed.

Source: Pension Integrity Project analysis of ASRS actuarial valuation reports. Figures do not include contributions to health plan.

The Causes of the Pension Debt
Actuarial Experience of ASRS, 2002-2019
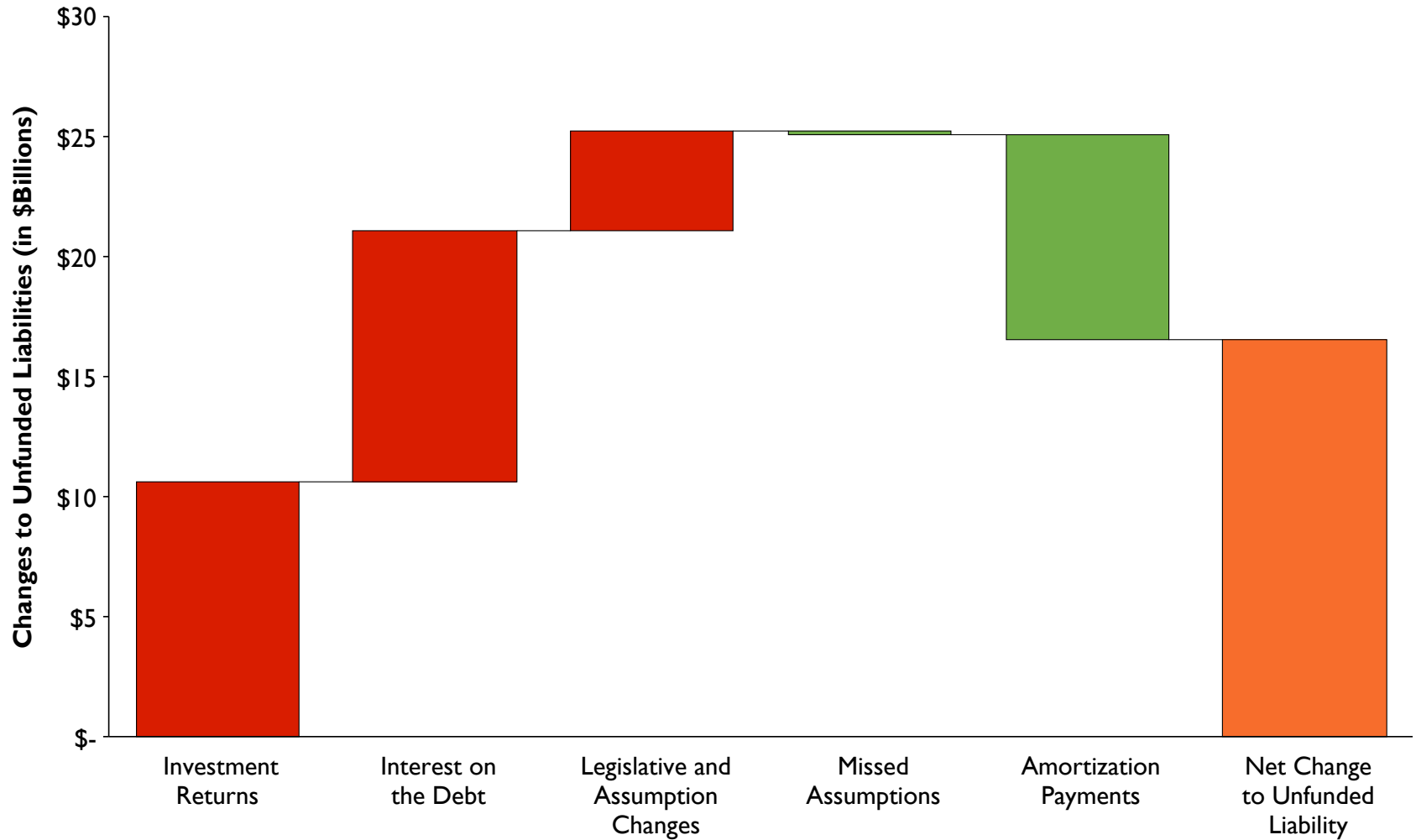
Source: Pension Integrity Project analysis of ASRS actuarial valuations. Data represents cumulative unfunded liability by gain/loss category.

Driving Factors Behind ASRS Challenges

1. **Deviations from Investment Return Assumptions** have been the largest contributor to the unfunded liability, adding $10.7 billion to the unfunded liability since 2002.

    o ASRS assets have consistently returned less than assumed, leading to growth in unfunded liabilities.

2. **Interest on Pension Debt** has added $10.5 billion to the unfunded liability since 2002.

    • Accumulated interest on unfunded pension liabilities makes a pension more expensive.
    • Interest accrual on unfunded pension liabilities has frequently exceeded amortization payments, resulting in $1.2 billion in negative amortization (interest on the unfunded liability exceeding amortization payments).

3. **Changes in methods and assumptions** have revealed roughly $4.1 billion to the unfunded liability since 2002.

4. **Undervaluing debt** through discounting methods has likely led to the tacit undercalculation of required contributions.
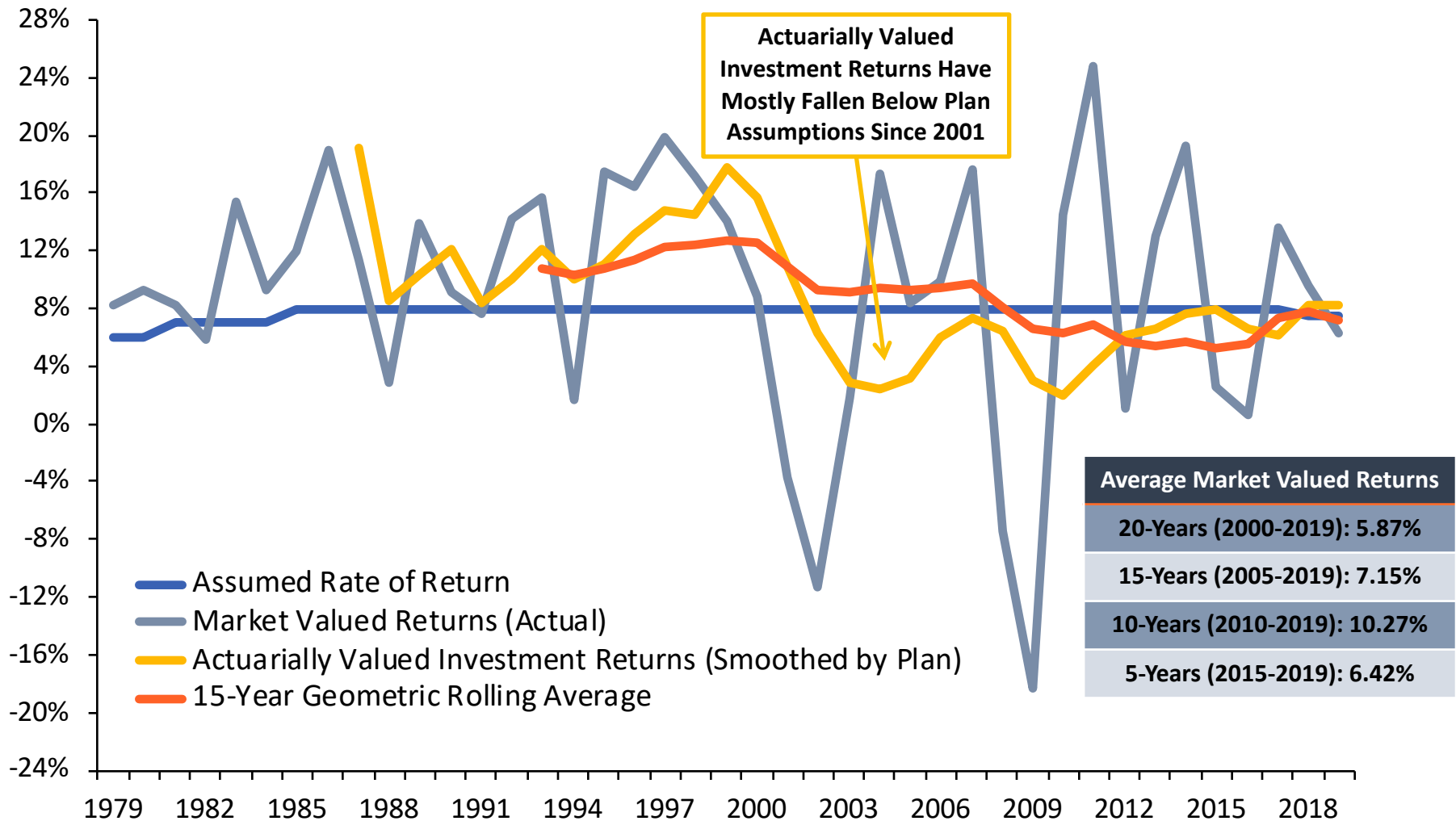
CHALLENGE 1: ASSUMED RATE OF RETURN

- **Unrealistic Expectations:** The return assumption used by ASRS is exposing taxpayers to significant investment underperformance risk.

- **Underpricing Contributions:** Using an overly optimistic investment return assumption leads to underpricing benefits and an undercalculated actuarially determined contribution rate.

ASRS Problem: Underperforming Assets
Investment Return History, 1979-2019

Actuarially Valued Investment Returns Have Mostly Fallen Below Plan Assumptions Since 2001

Legend:
- Assumed Rate of Return
- Market Valued Returns (Actual)
- Actuarially Valued Investment Returns (Smoothed by Plan)
- 15-Year Geometric Rolling Average

Average Market Valued Returns
20-Years (2000-2019): 5.87%
15-Years (2005-2019): 7.15%
10-Years (2010-2019): 10.27%
5-Years (2015-2019): 6.42%

Source: Pension Integrity Project analysis of ASRS valuation reports and CAFRs. The assumed return was 8% between 1985-2016, and lower to 7.5% in 2018.

ASRS Problem: Underperforming Assets
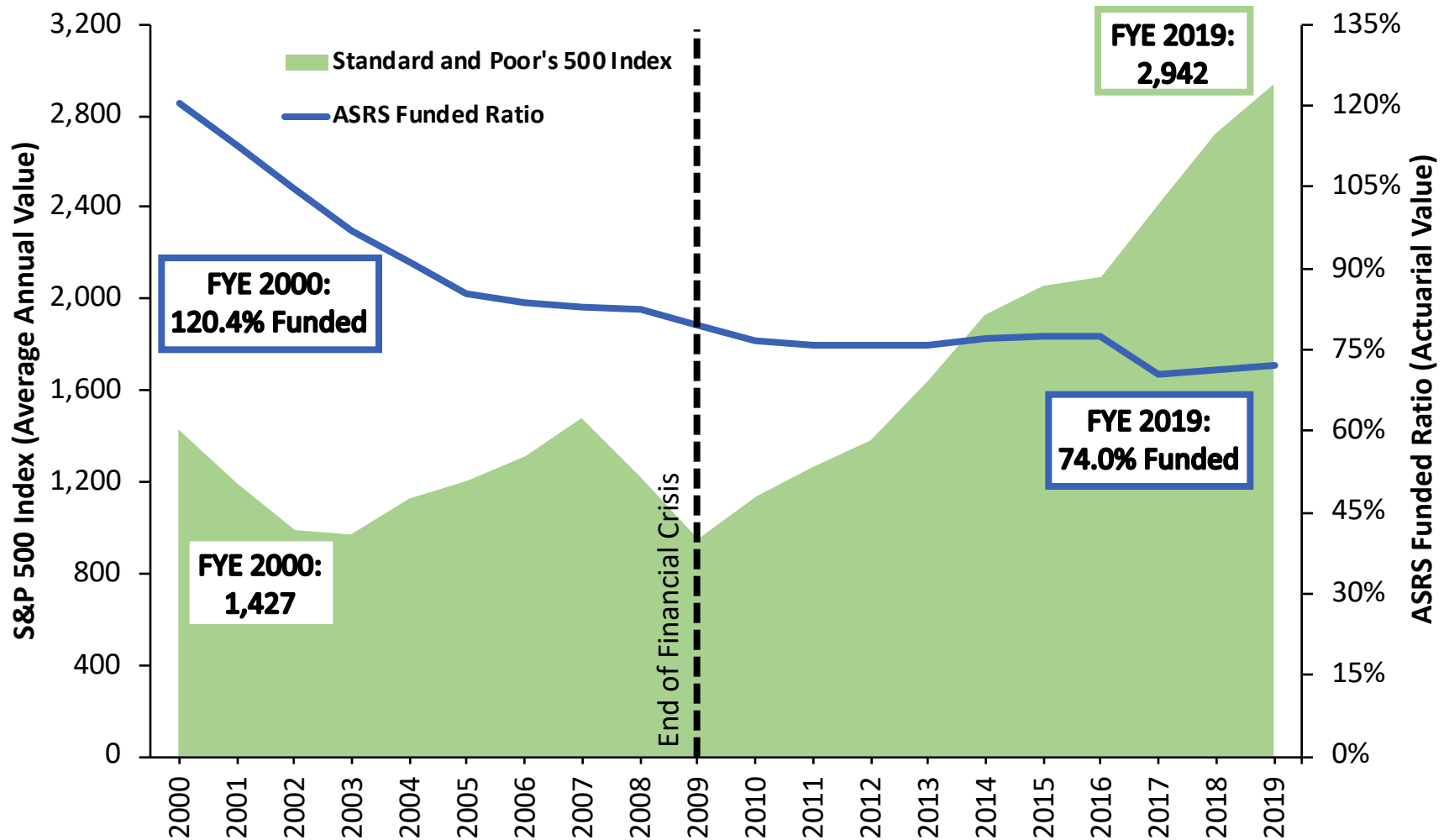
Investment Returns Have Underperformed

- ASRS actuaries have historically used an 8% assumed rate of return to calculate benefit cost to members and employers despite significant market changes, only lowering the rate to 7.5% in 2018.

- Average long-term portfolio returns have not matched long-term assumptions over different periods of time:

Average Market Valued Returns	Average Actuarially Valued Returns
20-Years (2000-2019): 5.87%	20-Years (2000-2019): 6.35%
15-Years (2005-2019): 7.15%	15-Years (2005-2019): 5.95%
10-Years (2010-2019): 10.27%	10-Years (2010-2019): 6.33%
5-Years (2015-2019): 6.42%	5-Years (2015-2019): 7.39%

Note: past performance is not the best measure of future performance, but it does help provide some context to the problem created by having an excessively high assumed rate of return.

Source: Pension Integrity Project analysis of ASRS actuarial valuation reports.
Average market valued returns represent geometric means of the actual time-weighted returns.

New Normal: Markets Have Recovered Since the Crisis—ASRS Funded Ratio Has Not

Source: Pension Integrity Project analysis of ASRS actuarial valuation reports and Yahoo Finance data.

New Normal: The Market Has Changed

The "new normal" for institutional investing suggests that achieving even a 6% average rate of return is optimistic.

1. Over the past two decades there has been a steady change in the nature of institutional investment returns.
   - 30-year Treasury yields have fallen from around 8% in the 1990s to consistently less than 4% today.
   - New phenomenon: negative interest rates, designates a collapse in global bond yields.
   - The U.S. experiences the longest economic recovery in history, yet average growth rates in GDP and inflation are below expectations.
   - Per empirical analysis (e.g. using Gordon Growth Model), subdued economic, inflation and dividend yield growth rates portend equity returns in the ballpark of 6 percent over the long-term.

2. McKinsey & Co. forecast the returns on equities will be 20% to 50% lower over the next 20 years compared to the previous 30.
   - Using their forecasts, the best-case scenario for a 70/30 portfolio of equities and bonds is likely to earn around 5% return.

3. ASRS had yet to recover from the Great Recession, and now it will be dealing with high economic uncertainty and volatility in the wake of COVID-19.
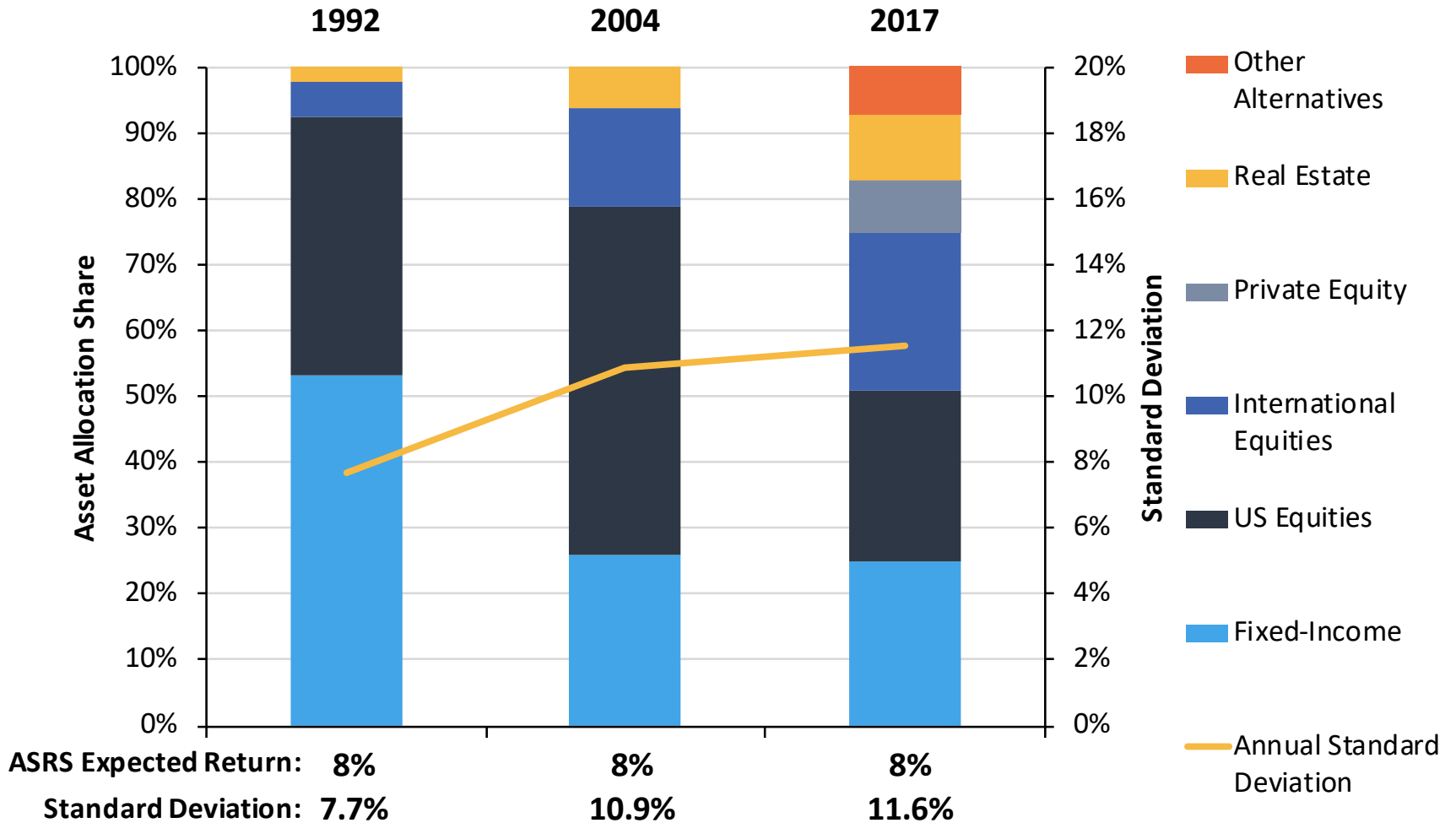
ASRS Asset Allocation (1990-2019)
Expanding Risk in Search for Yield
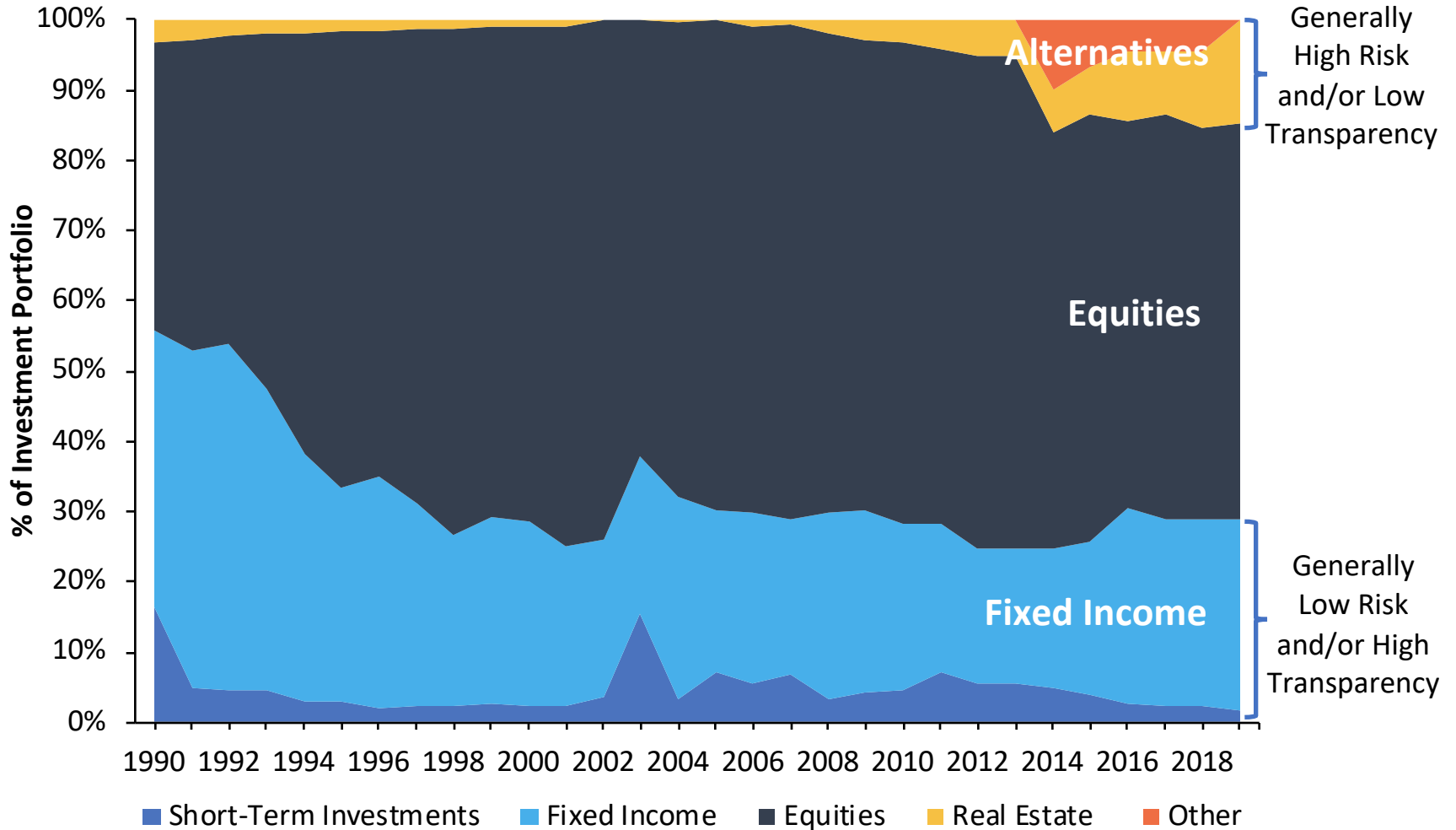
Source: Pension Integrity Project analysis of ASRS actuarial valuation reports and CAFRS.

New Normal: Market Trend Towards Risk

ASRS Has Changed its Asset Allocation Towards More Risky Investments Resulting in a Higher Annual Standard Deviation of Returns

ASRS Expected Return: 8% 8% 8%
Standard Deviation: 7.7% 10.9% 11.6%

Source: Pension Integrity Project Monte Carlo model based on ASRS asset allocation and reported expected of returns by asset class.

Probability Analysis: Measuring the Likelihood of ASRS Achieving Various Rates of Return

Possible Rates of Return	Probability of ASRS Achieving A Given Return Based On:							
	ASRS Assumptions & Experience		Short-Term Market Forecast				Long-Term Market Forecast	
	Based on ASRS Assumptions	ASRS Historical Returns	BNY Mellon 10-Year Forecast	JP Morgan 10-15 Year Forecast	Research Affiliates 10-Year Forecast	Horizon 10-Year Market Forecast	BlackRock 20-Year Forecast	Horizon 20-Year Market Forecast
8.0%	47.4%	20.7%	20.1%	22.7%	8.6%	30.7%	39.1%	44.2%
7.5%	54.5%	26.9%	27.0%	29.2%	12.3%	37.5%	46.4%	51.7%
7.0%	61.7%	34.1%	35.0%	36.5%	17.2%	44.7%	53.6%	58.8%
6.5%	68.3%	42.5%	44.1%	45.1%	23.3%	51.9%	60.5%	66.1%
6.0%	74.6%	50.7%	53.0%	53.7%	30.2%	58.9%	67.3%	72.2%
5.5%	80.2%	58.4%	61.8%	61.8%	37.3%	65.5%	74.0%	77.4%
5.0%	85.3%	66.5%	70.2%	69.8%	45.3%	72.0%	79.8%	82.4%
4.5%	89.0%	73.5%	77.3%	76.6%	53.5%	77.3%	84.7%	86.9%

Source: Pension Integrity Project Monte Carlo model based on ASRS asset allocation and reported expected returns by asset class.
Forecasts of returns by asset class generally by BNYM, JPMC, BlackRock, Research Affiliates, and Horizon Actuarial Services were matched to the specific asset class of ASRS. Probability estimates are approximate as they are based on the aggregated return by asset class. For complete methodology contact Reason Foundation.

Probability Analysis: Measuring the Likelihood of ASRS Achieving Various Rates of Return

ASRS Assumptions & Experience

- A probability analysis of ASRS historical returns over the past 20 years (1999-2019) indicates only a modest chance (27%) of hitting the plan's 7.5% assumed return.
- ASRS actuaries calculate an approximately 50% (+/-) chance of achieving their investment return target each year.

Short-Term Market Forecast

- Returns over the short to medium term can have significant negative effects on funding outcomes for mature pension plans like ASRS.
- Analysis of capital market assumptions publicly reported by the leading financial firms (BlackRock, BNY Mellon, JPMorgan, and Research Affiliates) suggests that over a 10-15 year period, ASRS returns are likely to fall short of assumptions.

Long-Term Market Forecast

- Longer-term projections typically assume ASRS investment returns will revert back to historical averages.
  - ✓ The "reversion to mean" assumption **should be viewed with caution** given historical changes in interest rates and other market conditions that increase uncertainty over longer projection periods, relative to shorter ones.
- Forecasts showing long-term returns near 7.5% being likely also show a significant chance that the actual long-term average return will fall far shorter than expected.
  - ✓ For example, according to BlackRock's 20-year forecast the probability of achieving an average return of 7.5% or higher is about 46%, the probability of earning a rate of return below 5% is about 20%.

RISK ASSESSMENT

- How resilient is ASRS to volatile market factors?

Important Funding Concepts

All-in Employer Cost

- The true cost of a pension is not only in the annual contributions, but also in whatever unfunded liabilities remain. The "All-in Employer Cost" combines the total amount paid in employer contributions and adds what unfunded liabilities remain at the end of the forecasting window

Baseline Rates

- The baseline describes ASRS current assumptions using the plan's existing contribution and funding policy and shows the status quo before the 2020 market shock

Employee Rates

- The scenarios in this analysis assume that employee and employer contributions will take equal shares of the annual actuarially determined rate

Quick Note:

With actuarial experiences of public pension plans varying from one year to the next, and potential rounding and methodological differences between actuaries, projected values shown onwards are not meant for budget planning purposes. **For trend and policy discussions only.**

Stress Testing ASRS Using Crisis Simulations

Stress on the Economy:

- Market watchers expect dwindling consumption and incomes to severely impact near-term tax collections – applying more pressure on state and local budgets.
- Revenue declines are likely to undermine employers' ability to make full pension contributions, especially for those relying on more volatile tax sources (e.g., sales taxes) and those with low rainy-day fund balances.
- Many financial advisors project double-digit drops in U.S. GDP for Q2 2020. In Q1 2020 alone the S&P500 dropped by 20%, while the Federal Reserve lowered federal funds rate virtually to zero.

Methodology:

- Adapting the Dodd-Frank stress testing methodology for banks and Moody's Investors Service recession preparedness analysis, the following scenarios assume one year of -26.4% returns in 2020, followed by three years of 11% average returns.
- Recognizing expert consensus regarding a diminishing capital market outlook, the scenarios assume a long-term investment return on 6% once markets rebound.
- Given the increased exposure to volatile global markets and rising frequency of Black Swan economic events, we include a scenario incorporating a second Black Swan crisis event in 2035.
- In the event plan sponsors and members are unable to appropriate their full actuarially determined employer contributions amid budget stress, additional scenarios show the impact of a five-year employer and employee contribution freeze.

Stress Testing Scenarios:

1. 6% Constant Annual Return
2. 2020-23 Crisis + Average 6.0% Long-Term
3. 2020-23 Crisis + 2035-38 Crisis + Average 6.0% Long-Term
4. Scenario 2 + 5-Year Employer & Employee Contribution Freeze
5. Scenario 3 + 5-Year Employer & Employee Contribution Freeze

ASRS Stress Testing: All-in Employer Cost Projections
How a Crisis Increases ASRS Costs
Discount Rate: 7.5%, Assumed Return: 7.5%, Actual Return: Varying, Amo. Period: 25-Year, Closed
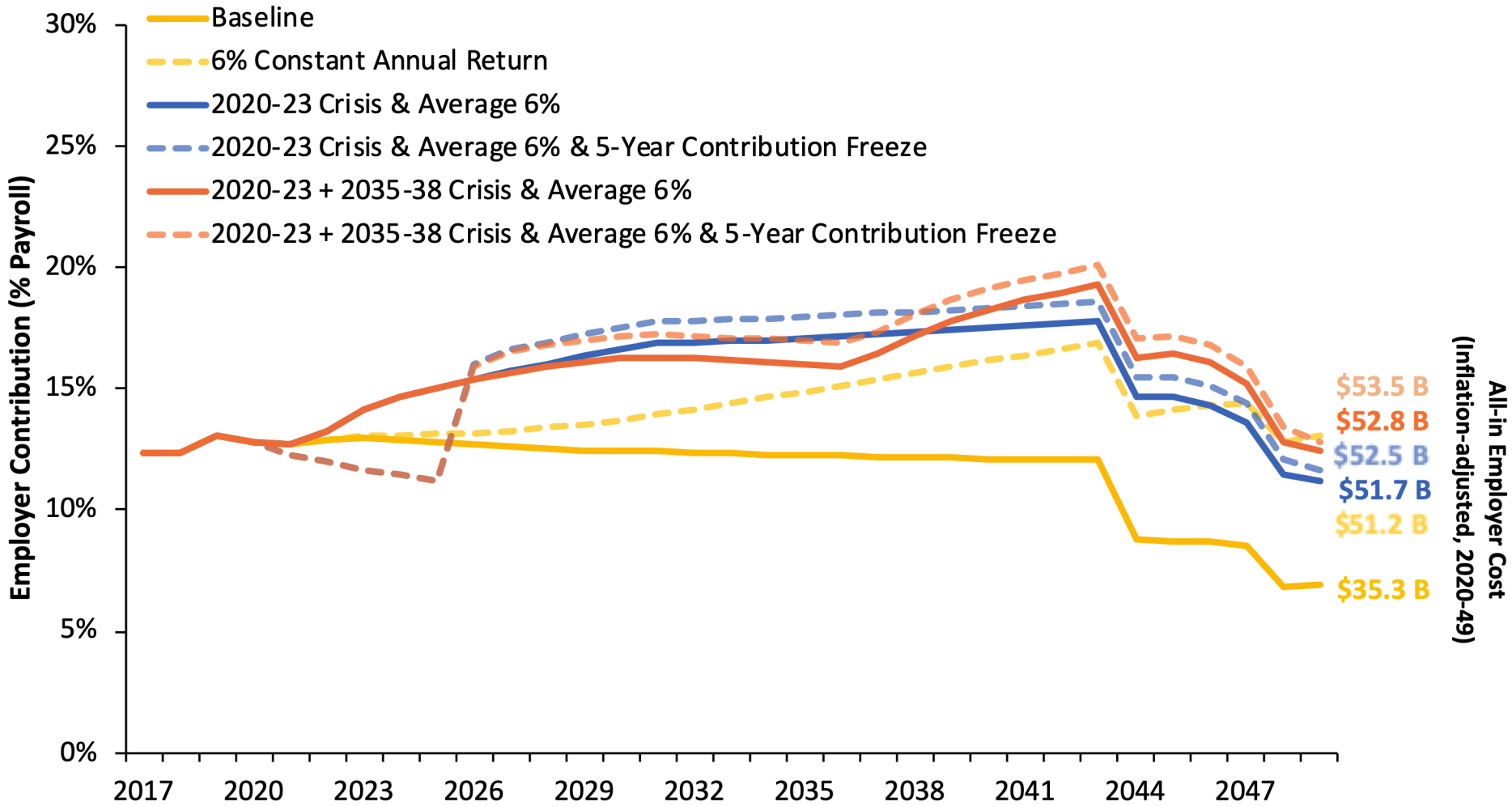
Source: Pension Integrity Project actuarial forecast of ASRS. Values are rounded and adjusted for inflation. State is assumed to make actuarial contributions. The "All-in Cost" includes all employer contributions over the 30-year timeframe, and the ending unfunded liability accrued by the end of the forecast period.
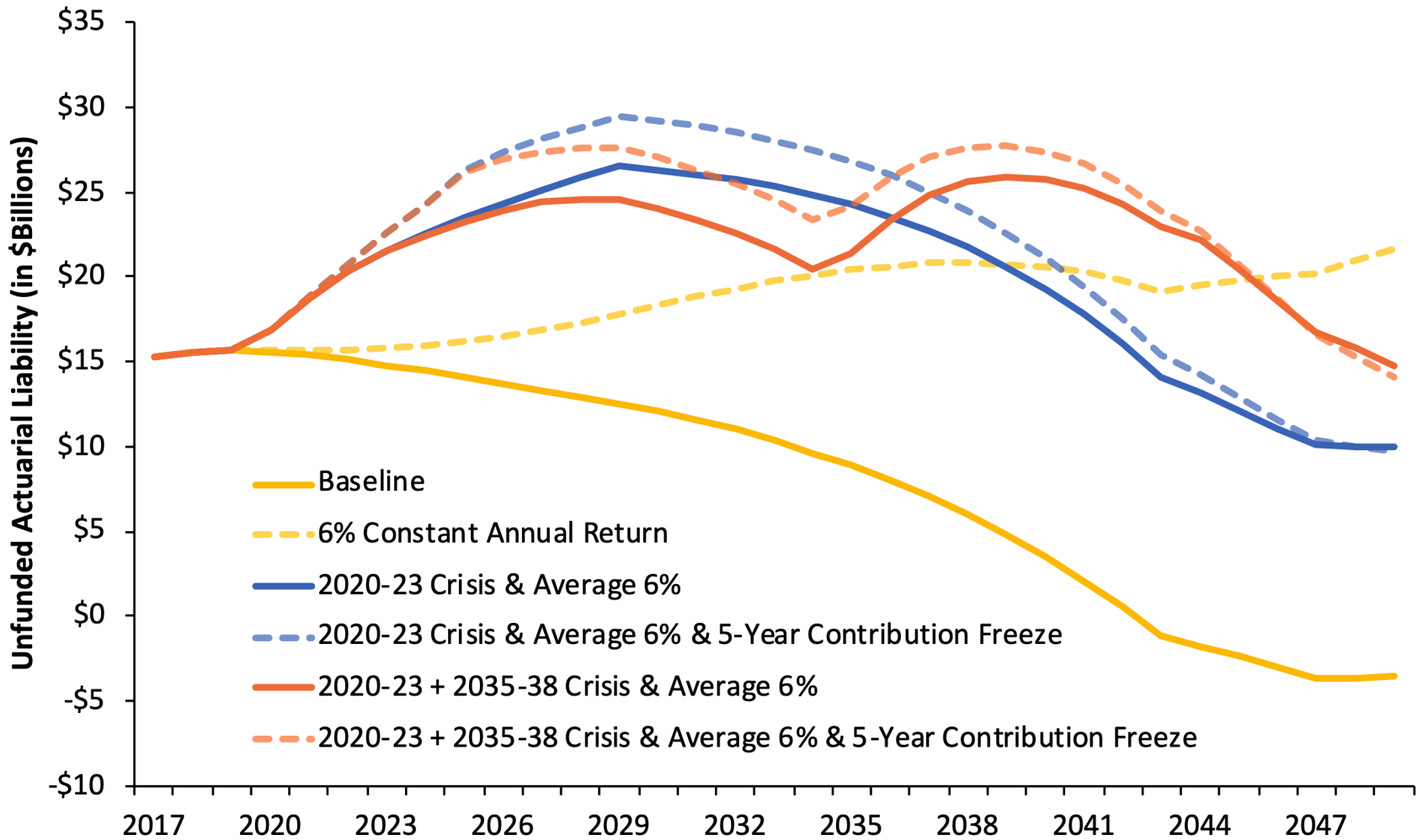
Scenario Comparison of Employer Costs

Scenarios	30-Year Employer Contributions	2049 Unfunded Liability (Market Value)	Total All-in Employer Costs
Pre-Crisis Baseline	$35.9 B	$(0.6) B	$35.3 B
6% Constant Annual Return	$44.4 B	$6.8 B	$51.2 B
2020-23 Crisis + Average 6%	$48.5 B	$3.2 B	$51.7 B
Two Crises + Average 6%	$49.4 B	$3.1 B	$52.5 B
2020-23 Crisis + Average 6% + 5-Year Cont. Freeze	$49.2 B	$3.5 B	$52.8 B
Two Crises + Average 6% + 5-Year Cont. Freeze	$50.1 B	$3.4 B	$53.5 B

Source: Pension Integrity Project actuarial forecast of ASRS funding. Values are rounded and adjusted for inflation.
The "All-in Cost" includes all employer contributions over the 30-year timeframe, and the ending unfunded liability accrued by the end of the forecast period.

ASRS Stress Testing: Unfunded Liability Projections

Crisis Scenarios Drive Unfunded Liabilities Higher

Discount Rate: 7.5%, Assumed Return: 7.5%, Actual Return: Varying, Amo. Period: 25-Year, Closed

Legend:
- Baseline
- 6% Constant Annual Return
- 2020-23 Crisis & Average 6%
- 2020-23 Crisis & Average 6% & 5-Year Contribution Freeze
- 2020-23 + 2035-38 Crisis & Average 6%
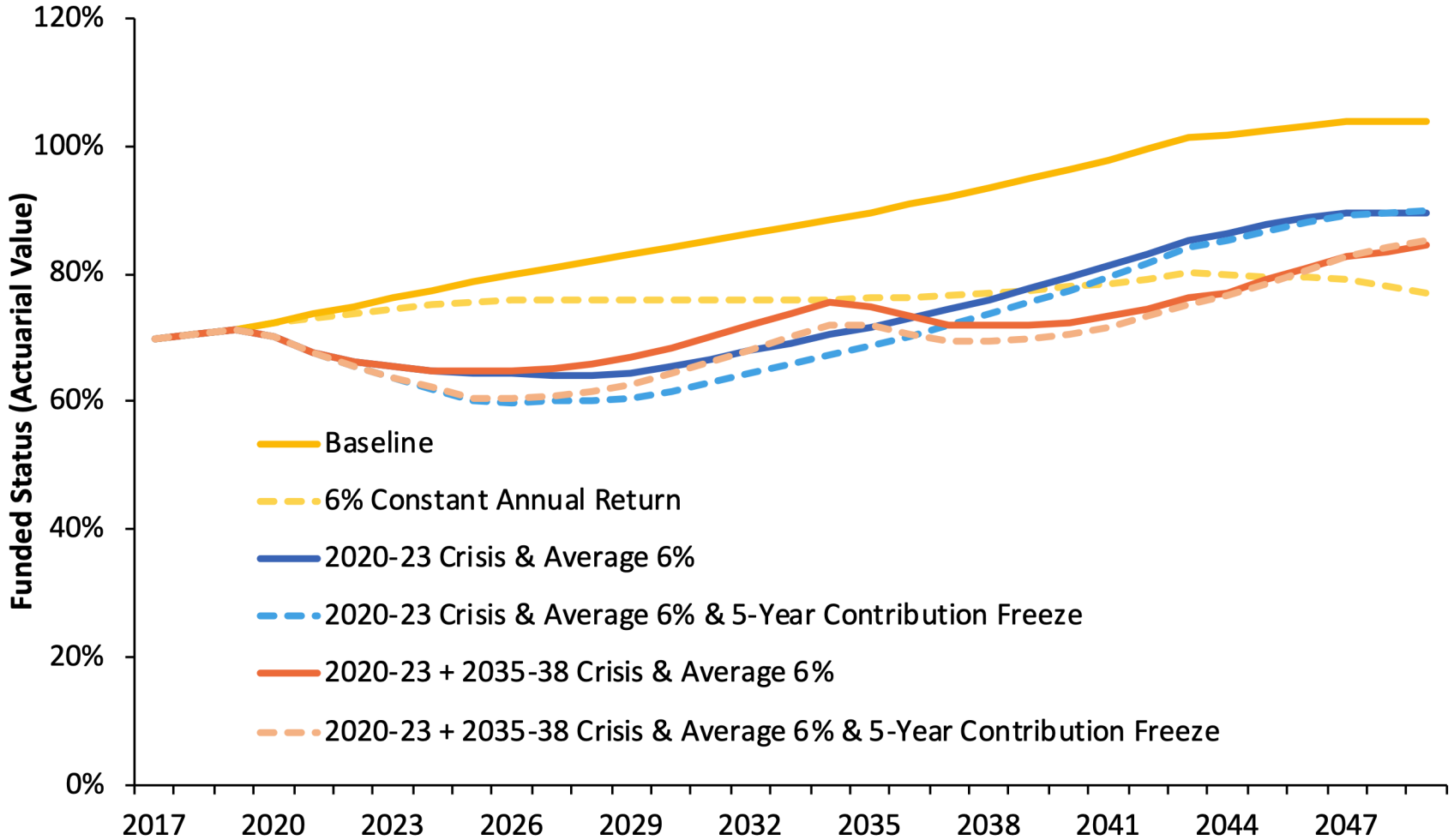- 2020-23 + 2035-38 Crisis & Average 6% & 5-Year Contribution Freeze

Source: Pension Integrity Project actuarial forecast of ASRS funding. Values are rounded and adjusted for inflation. State is assumed to make statutory contributions. The "All-in Cost" includes all employer contributions over the 30-year timeframe, and the ending unfunded liability accrued by the end of the forecast period.

ASRS Stress Testing: Funded Status Projections

Crisis Scenarios Impede Progress to Full Funding

Discount Rate: 7.5%, Assumed Return: 7.5%, Actual Return: Varying, Amo. Period: 25-Year, Closed

Legend:
- Baseline
- 6% Constant Annual Return
- 2020-23 Crisis & Average 6%
- 2020-23 Crisis & Average 6% & 5-Year Contribution Freeze
- 2020-23 + 2035-38 Crisis & Average 6%
- 2020-23 + 2035-38 Crisis & Average 6% & 5-Year Contribution Freeze

Source: Pension Integrity Project actuarial forecast of ASRS funding. State is assumed to make actuarial contributions.
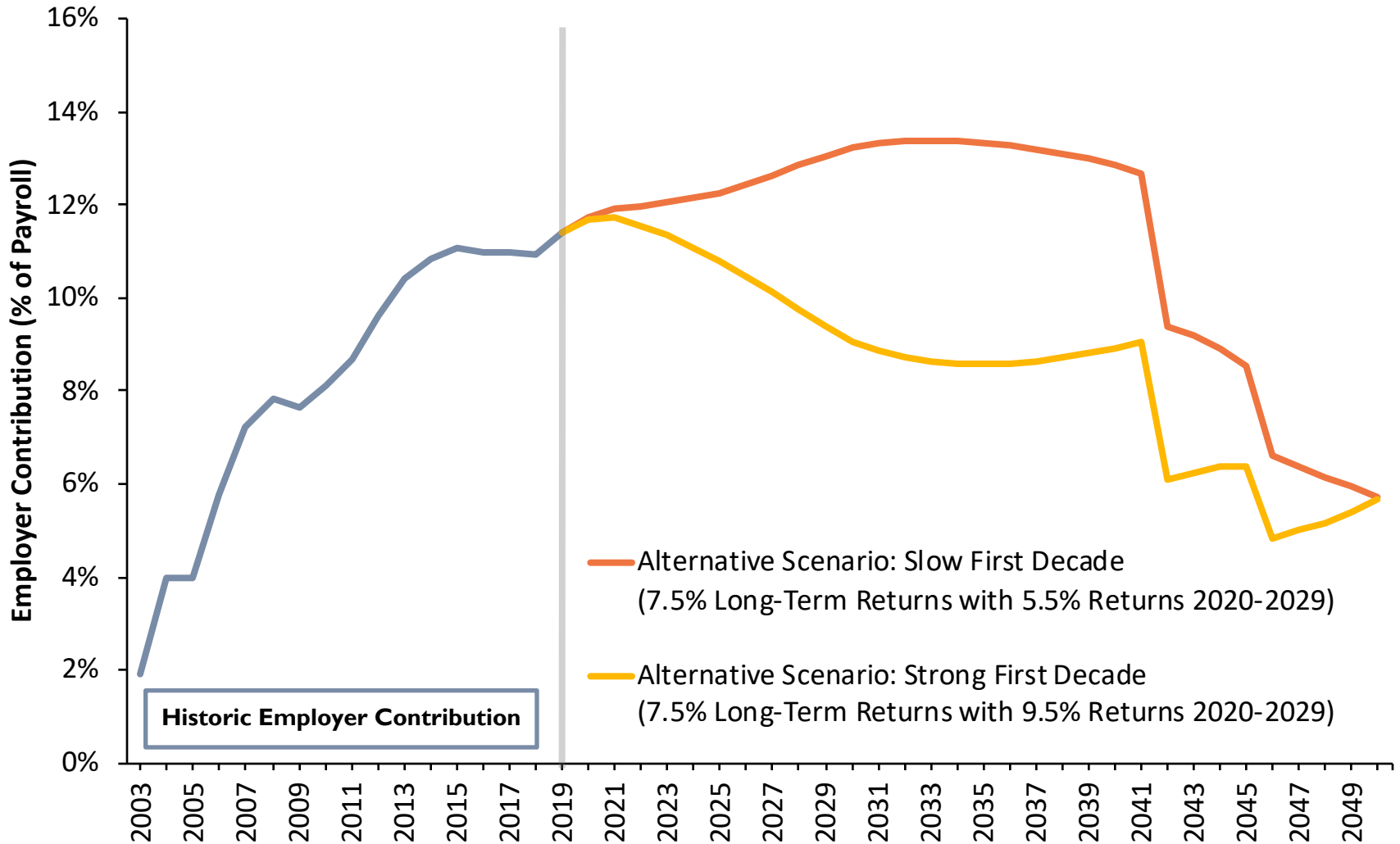The "All-in Cost" includes all employer contributions over the 30-year timeframe, and the ending unfunded liability accrued by the end of the forecast period.

30-year Employer Contribution Forecast

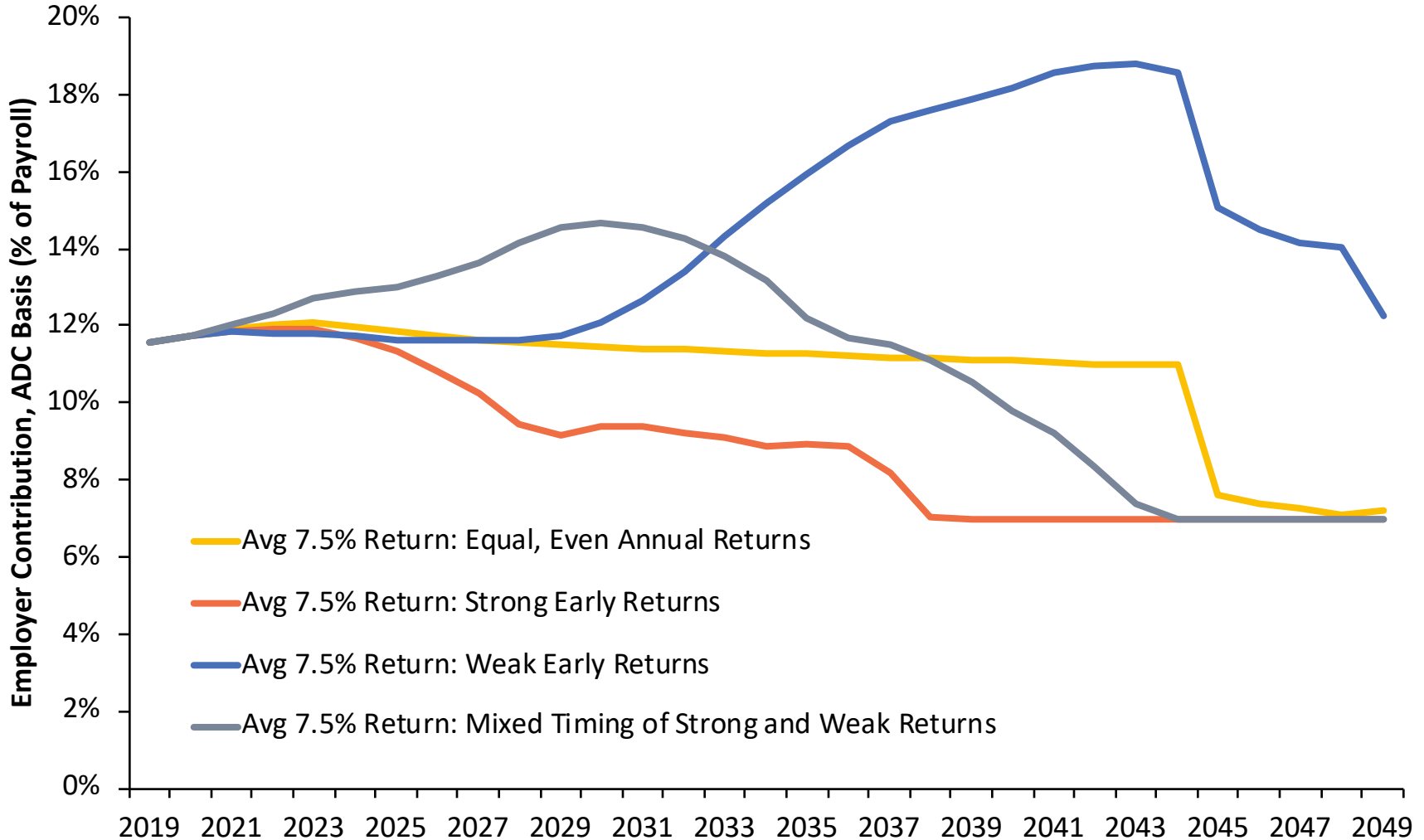# Timing of Returns Affects What Arizona Pays

Long-Term Average Returns of 7.5%

Source: Pension Integrity Project actuarial forecast of ASRS.

30-year Employer contribution Forecast

All Paths to a 7.5% Average Return Are Not Equal

Long-Term Average Returns of 7.5%

Source: Pension Integrity Project actuarial forecast of ASRS plan. Strong early returns (TWRR = 7.5%, MWRR = 8.6%), Even, equal annual returns (Constant Return = 7.5%), Mixed timing of strong and weak returns (TWRR = 7.5%, MWRR = 7.5%), Weak early returns (TWRR = 7.5%, MWRR = 6.6%) Scenario assumes that ASRS pays the actuarially required rate each year. Years are plan's fiscal years.

Forecasting the Impact of Market Volatility

Random Investment Return Analysis

What is it?	**Why use it?**

- Model generates 10,000 different random investment return scenarios, creating ranges in required contributions and funding outcomes
- The analysis displays 50 percent of all outcomes that are closest to the median outcome
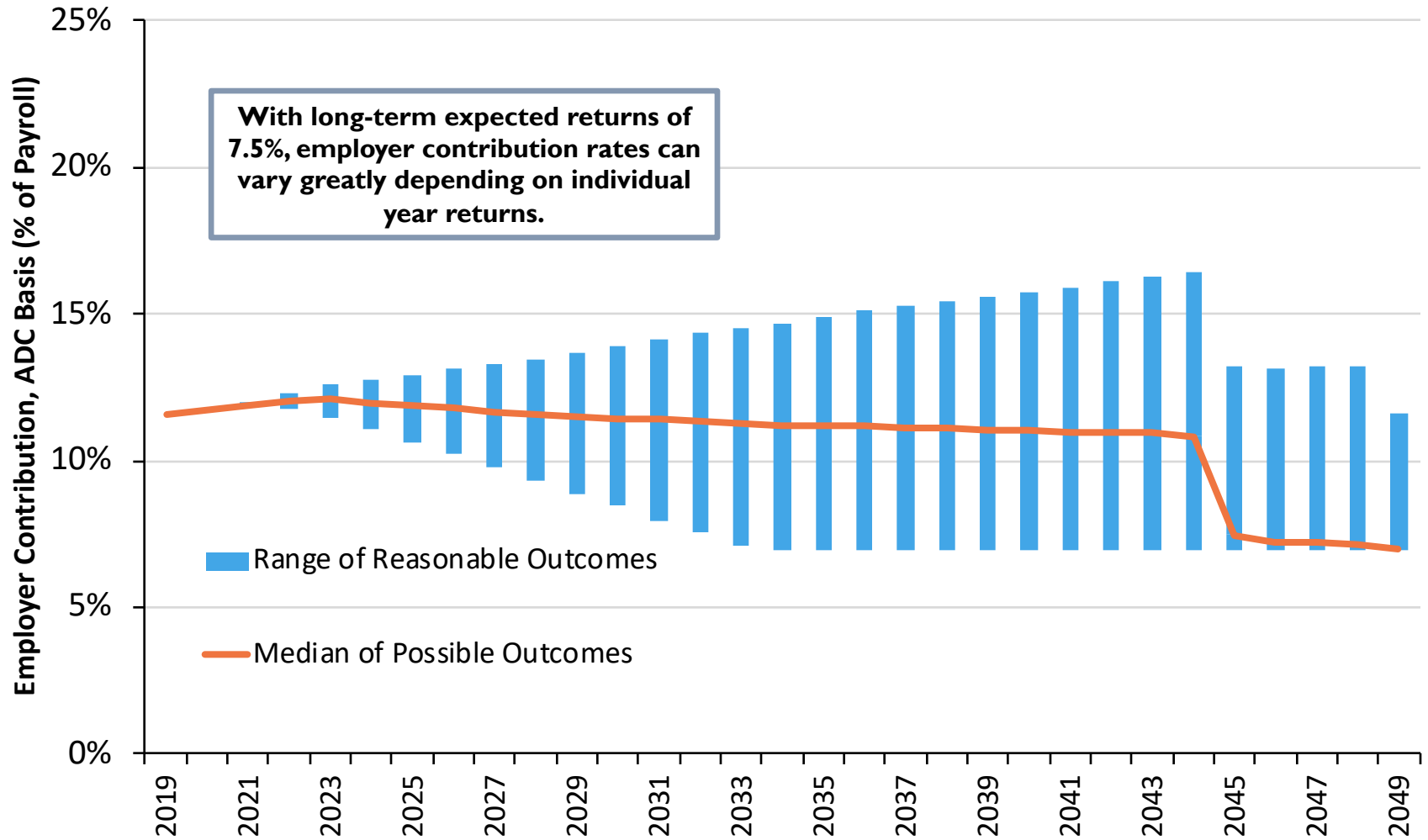
- Using a large sample of potential 30-year return scenarios can show the differences in how plan's funding will react to high or low investment fluctuations.
- The cone of displayed outcomes and the median illustrates the level of risk placed on the plan
- A narrow cone suggests a plan is more resilient—and has less investment risk—than that of a wider cone

30-year Employer Contribution Forecast
If ASRS Performs as Expected, Rates Can Still Vary
Long-term Average Expected Returns of 7.5%

With long-term expected returns of 7.5%, employer contribution rates can vary greatly depending on individual year returns.

Employer Contribution, ADC Basis (% of Payroll)

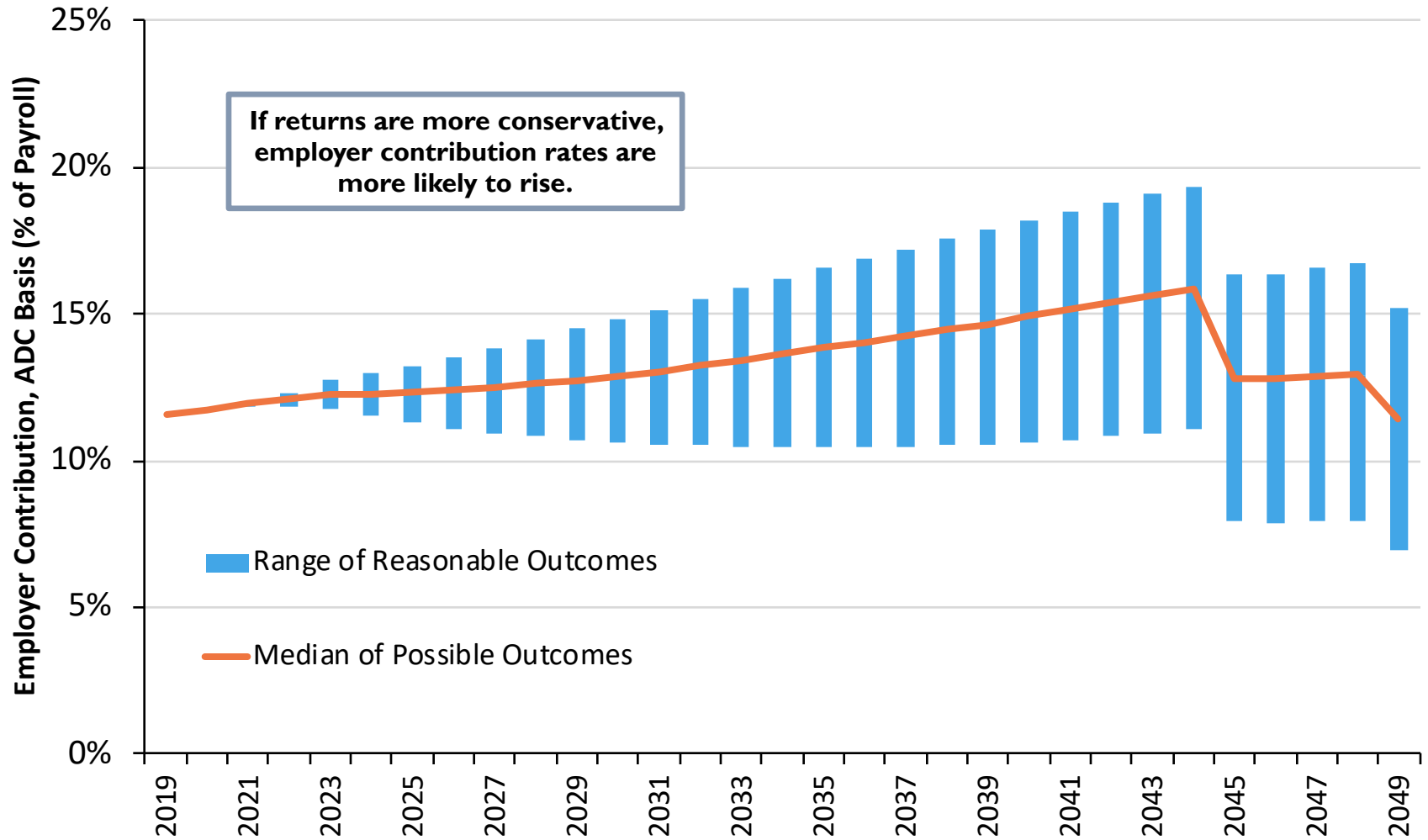■ Range of Reasonable Outcomes

— Median of Possible Outcomes

Source: Pension Integrity Project actuarial forecast of ASRS. Scenario assumes that the state continues to pay 100% of the statutory contribution each year. Range of Reasonable Outcomes represents the 50% of possible outcomes closest to the median. Figures are rounded and adjusted for inflation.

30-year Employer Contribution Forecast
If ASRS Underperforms, Expect Higher Contribution Rates
More Conservative Long-term Average Expected Returns

> If returns are more conservative, employer contribution rates are more likely to rise.

Legend:
- Range of Reasonable Outcomes
- Median of Possible Outcomes

Y-axis: Employer Contribution, ADC Basis (% of Payroll)

Source: Pension Integrity Project actuarial forecast of ASRS plan using the return and risk assumptions of the Monte Carlo analysis. Conservative returns are 5.72%, which are the result of combining the long-term capital market assumptions from four prominent financial firms (see slide 18)
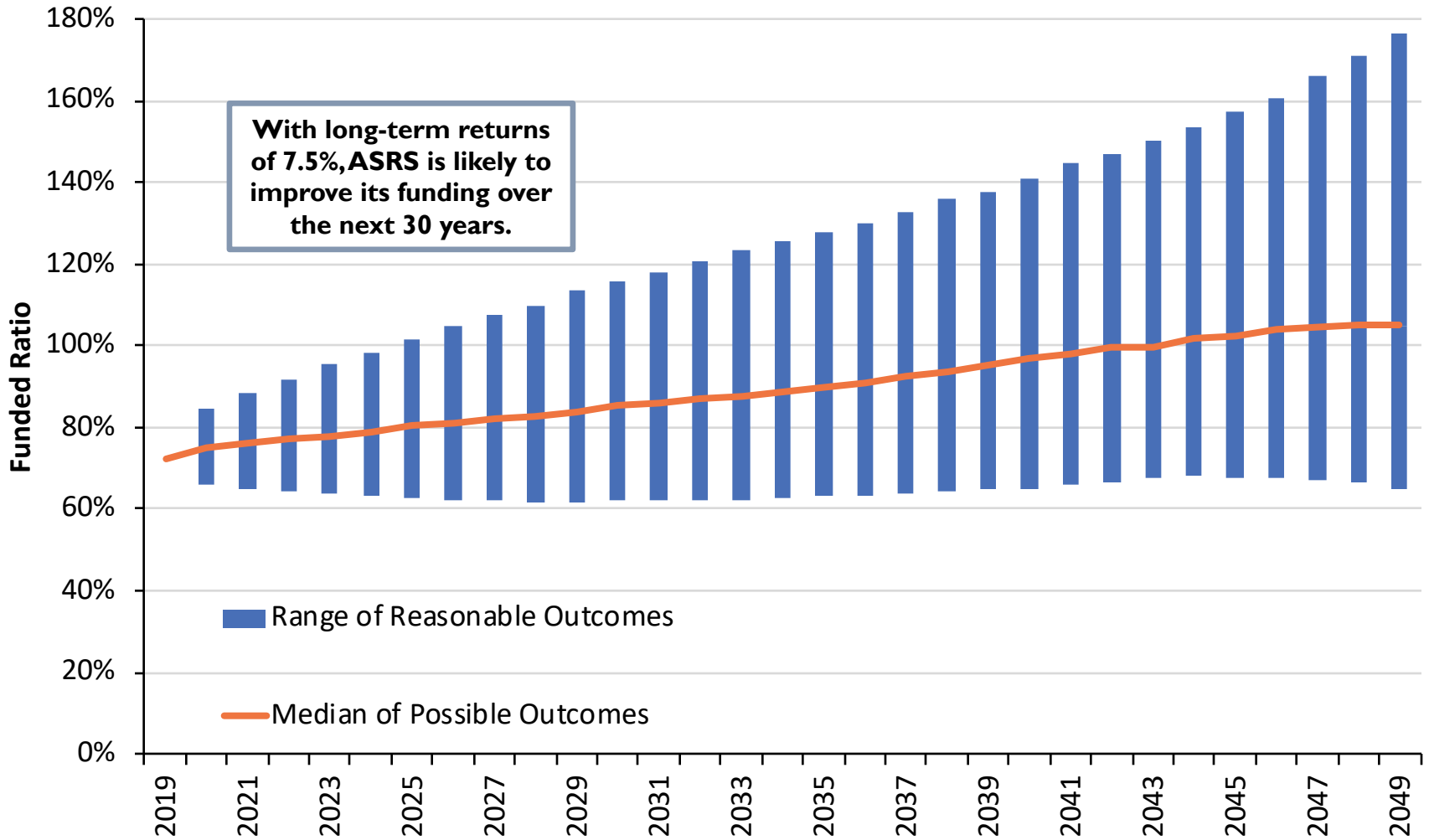
30-year Funded Ratio Forecast
Funded Ratio Outcomes Can Vary Significantly
Long-term Average Returns of 7.5%

With long-term returns of 7.5%, ASRS is likely to improve its funding over the next 30 years.

Legend:
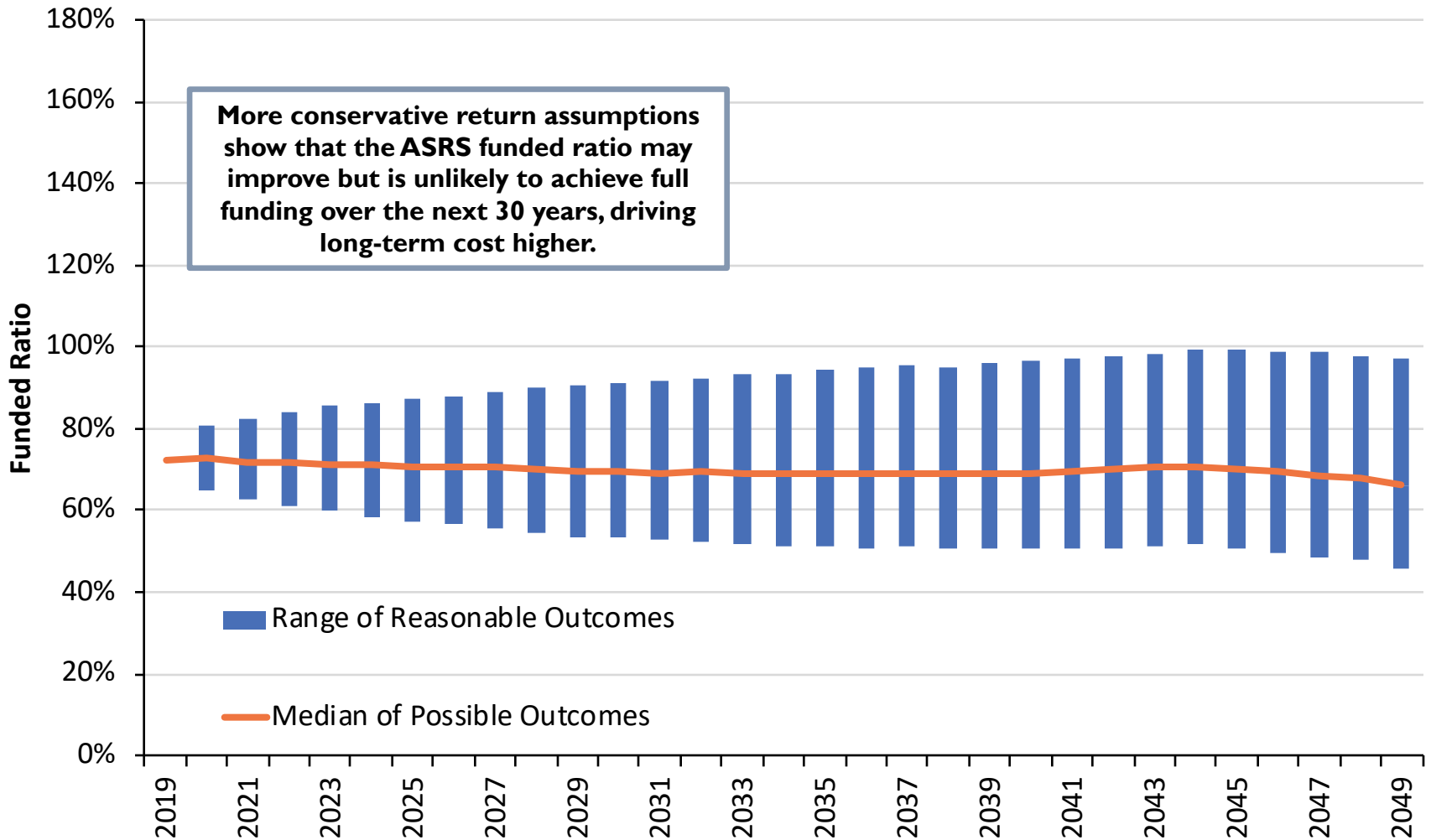- Range of Reasonable Outcomes
- Median of Possible Outcomes

Source: Pension Integrity Project actuarial forecast of ASRS plan based on plan return and risk assumptions.
Range of Reasonable Outcomes represents the 50% of possible outcomes closest to the median.

30-year Funded Ratio Forecast
ASRS Funding in a "New Normal" Future
More Conservative Long-term Average Returns

> More conservative return assumptions show that the **ASRS** funded ratio may improve but is unlikely to achieve full funding over the next 30 years, driving long-term cost higher.

Legend:
- Range of Reasonable Outcomes
- Median of Possible Outcomes

Source: Pension Integrity Project actuarial forecast of ASRS plan using the return and risk assumptions of the Monte Carlo analysis.
Conservative returns are 5.72%, which are the result of combining the long-term capital market assumptions from four prominent financial firms (see slide 18)

Sensitivity Analysis: Normal Cost Comparison Under Alternative Assumed Rates of Return

(Amounts to be Paid in 2021-22 Contribution Fiscal Year, % of projected payroll)

	Gross Normal Cost	Employer Normal Cost	Employee Normal Cost (Average)
7.5% Assumed Return (FYE 2019 Baseline)	13.46%	6.73%	6.73%
7.0% Assumed Return	14.58%	7.29%	7.29%
6.5% Assumed Return	15.80%	7.90%	7.90%
6.0% Assumed Return	17.18%	8.59%	8.59%

Note: These alternative gross normal cost figures should be considered approximate guides to how much more normal cost should be under different discount rates. Any policy changes should be based on more precise normal cost forecasts using detailed plan data. Alternative normal cost rates based on reported liability sensitivity from the FYE 2019 ASRS CAFR.

Source: Pension Integrity Project analysis based on ASRS actuarial valuation reports and CAFRs.

CHALLENGE 2: AMORTIZATION METHODS

- Long amortization schedules for unfunded liabilities are creating negative amortization and higher long-term costs

Debt Management Policies
# Back-Loaded Pension Debt Payments

> ASRS uses a 25-year, level-percentage amortization on a layered basis method to amortize newly accrued unfunded liability.

- **What is level percent of payroll amortization?**
  - Sets the amortization payment as a fixed share of total member payroll
  - Often results in back-loaded pension debt payments, especially if payroll growth slows

- **What does amortizing unfunded liabilities using a layered-base approach mean?**
  - Any new ASRS unfunded liabilities in a given year are amortized over a 25-year period, meaning that there is no fixed-end date for the complete elimination of unfunded liabilities

- **What does a long amortization period mean?**
  - Professional actuaries generally recommend layering in periods 20 years or less in order to pay down unfunded liabilities faster, ensure sufficient contributions, and minimize the risk that pension debt is exposed to ongoing market risk
  - Makes it more likely unfunded liabilities will never be paid off
  - Often leaves debt payments each year short of the interest accrued on the debt (e.g. negative amortization)

Debt Management Policies

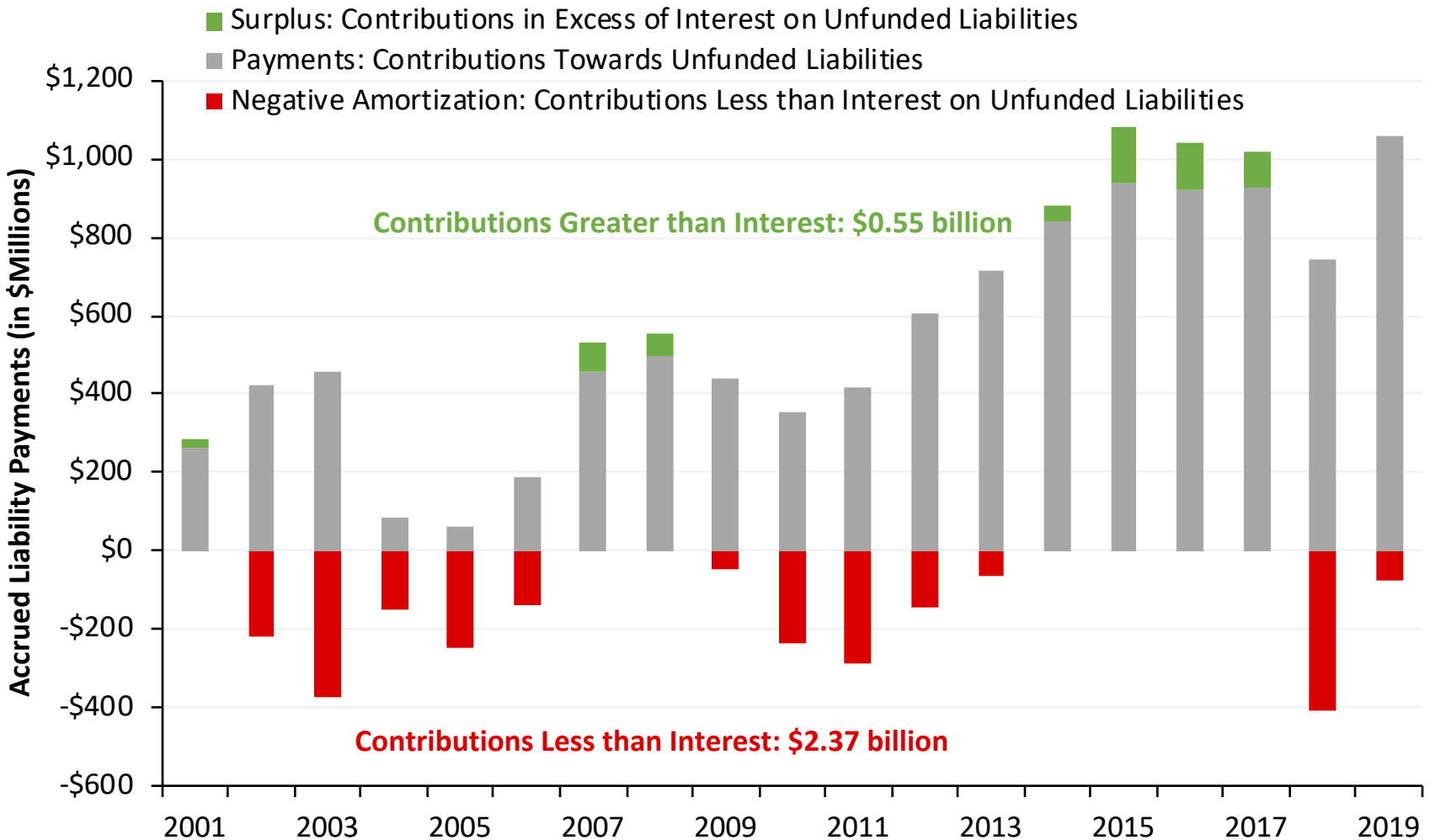# Interest on Debt vs. Amortization Payments

ASRS Negative Amortization Growth, 2006-2019
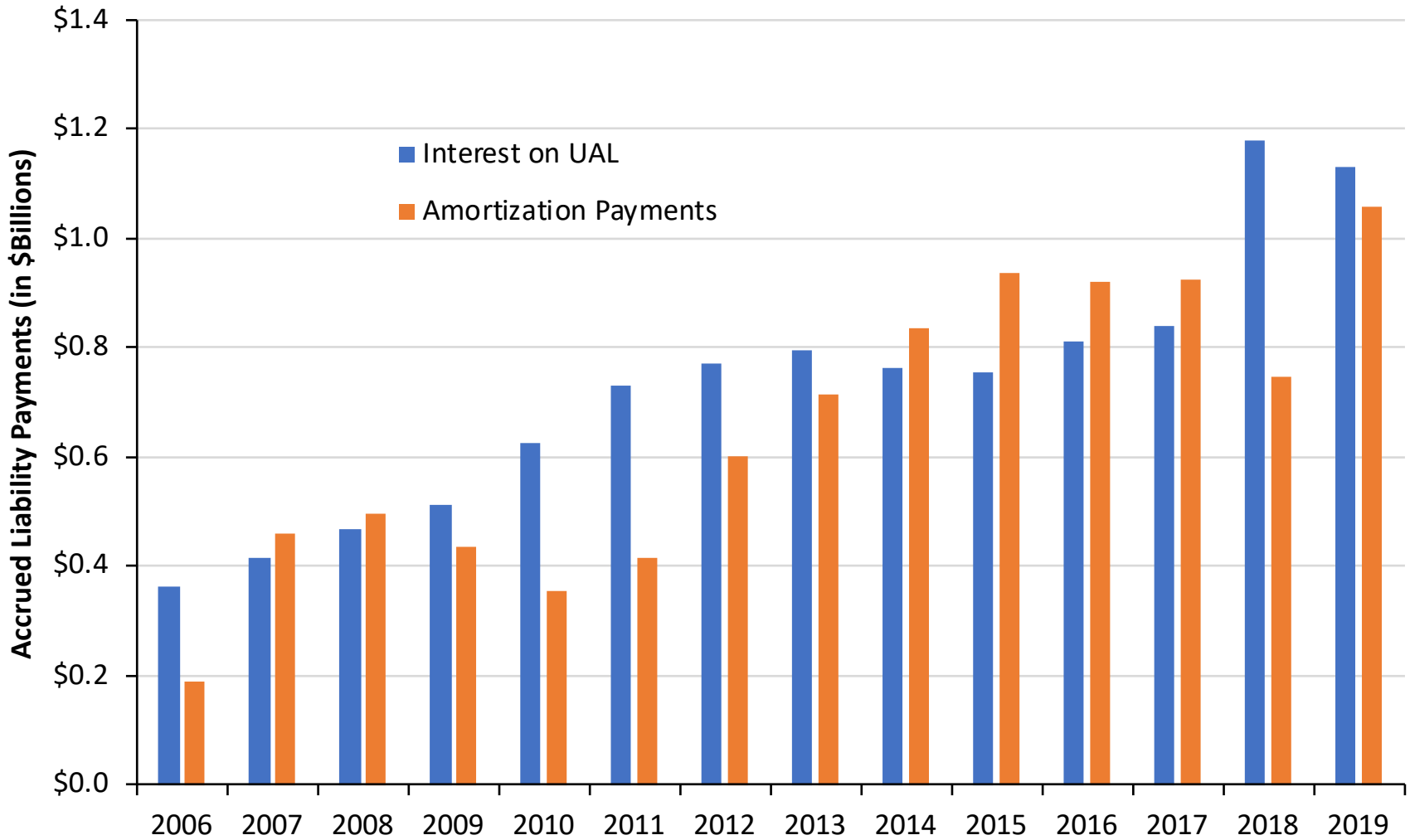
Source: Pension Integrity Project analysis of ASRS actuarial reports and CAFRs.

Negative Amortization Growth (2001-2019)
Interest on the Debt v. Accrued Liability Payments

Legend:
- Surplus: Contributions in Excess of Interest on Unfunded Liabilities
- Payments: Contributions Towards Unfunded Liabilities
- Negative Amortization: Contributions Less than Interest on Unfunded Liabilities

Y-axis: Accrued Liability Payments (in $Millions)

Contributions Greater than Interest: $0.55 billion

Contributions Less than Interest: $2.37 billion

Source: Pension Integrity Project analysis and forecast of ASRS Actuarial Valuation Reports and CAFRs. Figures are rounded.
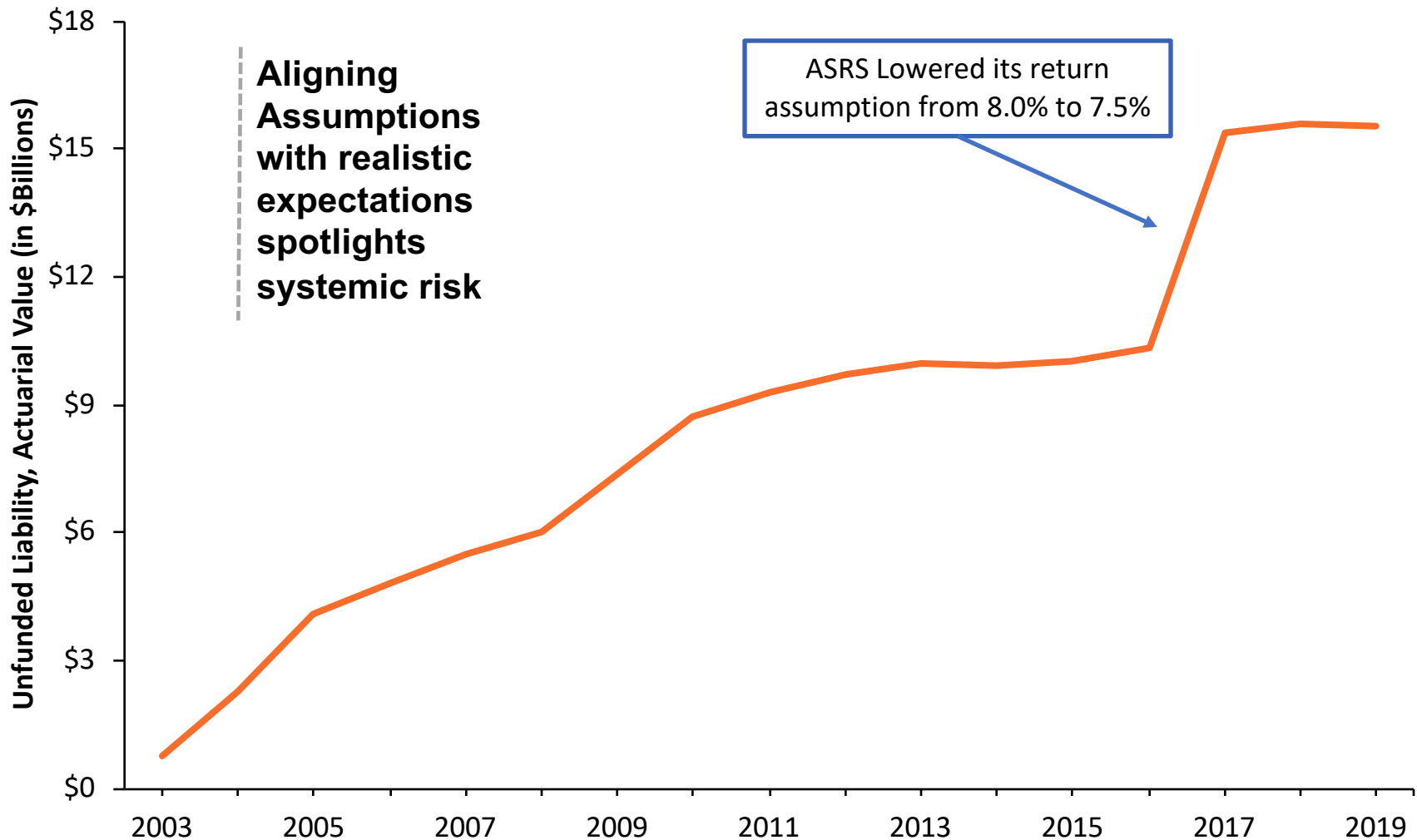
CHALLENGE 3: UNCOVERING HIDDEN COSTS

- Adjusting actuarial assumptions to reflect the changing demographics and new normal in investment markets exposes hidden pension cost by uncovering existing but unreported unfunded liabilities.

Challenges in Making Prudent Assumptions
Recognition of More Accurate Debt Levels

Source: Pension Integrity Project analysis of ASRS actuarial reports and CAFRs.

Challenges from Aggressive Actuarial Assumptions
Actual Experience Different from Actuarial Assumptions

(-) New Member Rate Assumptions

- ASRS new hire and rehire rates have *differed from expectations* resulting in a $543 million growth in unfunded liabilities from 2009-2014.

(-) Withdrawal Rate Assumptions

- ASRS assumptions on the rates of employer withdrawal have *differed from expectations* resulting in a $21 million growth in unfunded liabilities from 2009-2014.

(-) Disability Rate Benefits

- ASRS disability claims have been more than expected, resulting in a $14 million growth in unfunded liabilities from 2009-2014.

(-) Active Mortality Rate Benefits

- ASRS survivor claims for active members have been more than expected, resulting in a $13 million growth in unfunded liabilities from 2009-2014.

Challenges from Aggressive Actuarial Assumptions
Actual Experience Different from Actuarial Assumptions

(-) Age and Service Retirement

- ASRS members have been retiring at younger than expected ages, resulting in a larger liability than expected and $7 million in growth in unfunded liabilities from 2009 to 2014.

(-) Other Missed Assumptions

- Other ASRS assumptions (not specified in financial documents) have *differed from expectations* resulting in a $285 million growth in unfunded liabilities from 2009-2014.

(+) Inactive Mortality Rate Benefits

- ASRS survivor claims for inactive members have been less than expected, resulting in a $154 million reduction in unfunded liabilities from 2009-2014

Challenges from Aggressive Actuarial Assumptions
Actual Experience Different from Actuarial Assumptions

(+) Overestimated Payroll Growth

- ASRS employers have not raised salaries as fast as expected, resulting in lower payrolls and thus lower earned pension benefits. This has meant a $2 billion reduction in unfunded liabilities from 2009-2014.

(-) Overestimated Payroll Growth

- However, overestimating payroll growth is creating a long-term problem for ASRS because of its combination with the level-percentage of payroll amortization method used by the plan.

- This method *backloads pension debt payments* by assuming that future payrolls will be larger than today (a reasonable assumption). But when payroll does not grow as fast as expected, employer contributions must rise as a percentage of payroll. This means the amortization method combined with the inaccurate assumption is delaying debt payments.

Challenges from Aggressive Actuarial Assumptions
Actual Change in Payroll v. Assumption
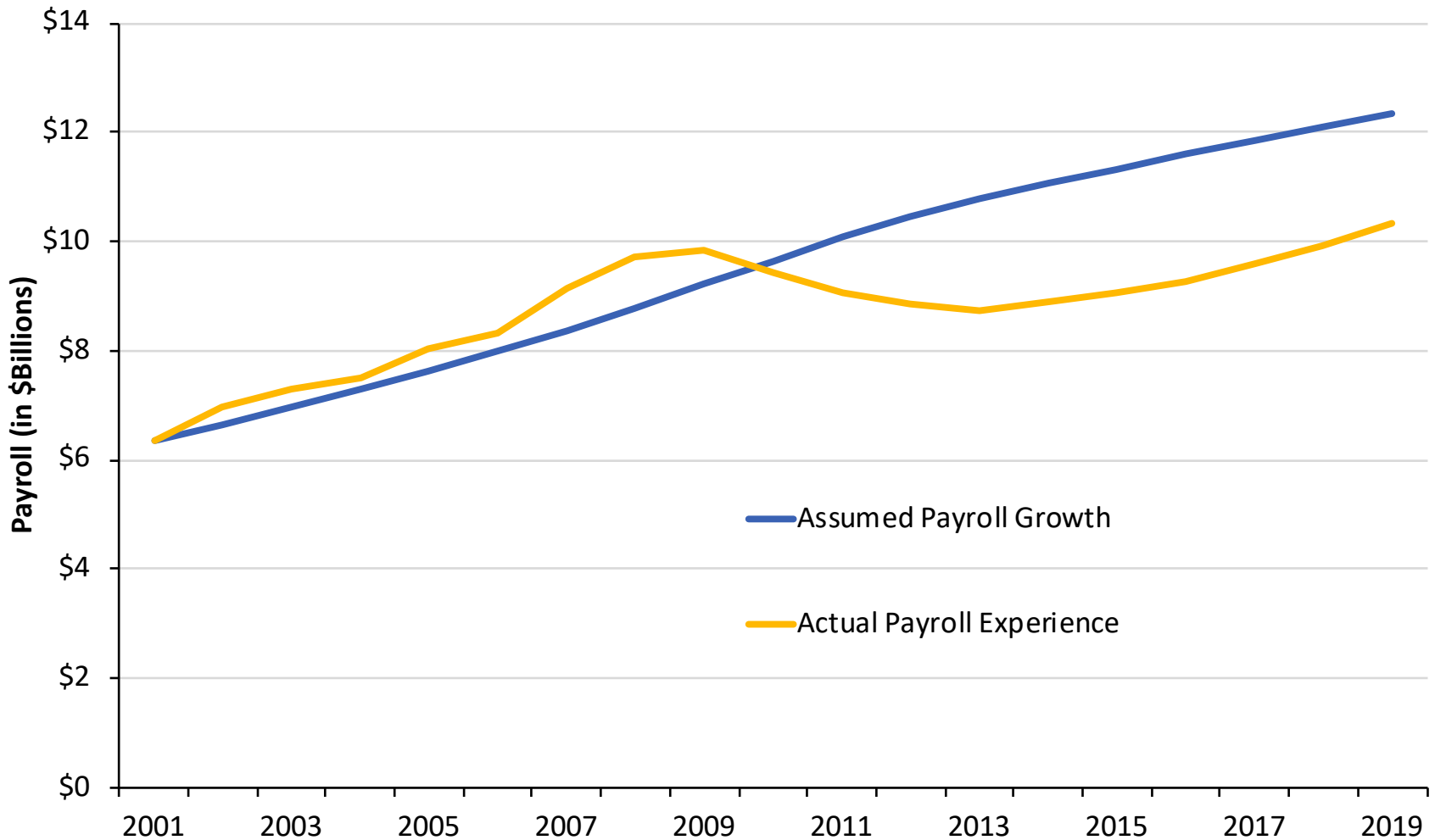
Source: Pension Integrity Project analysis of ASRS actuarial valuation reports and CAFRS.

Challenges from Aggressive Actuarial Assumptions
Assumption & Method Changes

- ## Inflation Assumption
  - Lowered from 4.25% to 3.75% in 2009
  - Lowered from 3.75% to 3.25% in 2011
  - Lowered from 3.25% to 3.00% in 2013
  - Lowered from 3.00% to 2.30% in 2017

- ## Payroll Growth Assumption
  - Lowered from 4.50% to 4.00% in 2011
  - Lowered from 4.00% to 3.00% in 2013
  - Lowered from 3.00% to 2.50% in 2017

CHALLENGE 4: DISCOUNT RATE AND UNDERVALUING DEBT

- The discount rate undervalues the measured amount of existing pension obligations

ASRS Discount Rate
Methodology is Undervaluing Liabilities

1. **The "discount rate" for a public pension plan should reflect the risk inherent in the pension plan's liabilities**:

   • Most public sector pension plans — including ASRS — use the assumed rate of return and discount rate interchangeably, even though each serve a different purpose.

   • The **Assumed Rate of Return** (ARR) adopted by ASRS estimates what the plan will return on average in the long run and is used to calculate contributions needed each year to fund the plans.

   • The **Discount Rate** (DR), on the other hand, is used to determine the net present value of all of the already promised pension benefits and supposed to reflect the risk of the plan sponsor not being able to pay the promised pensions.

ASRS Discount Rate Methodology is Undervaluing Liabilities

2. **Setting a discount rate too high will lead to undervaluing the amount of pension benefits actually promised**:
   - If a pension plan is choosing to target a high rate of return with its portfolio of assets, and that high assumed return is then used to calculate/discount the value of existing promised benefits, the result will likely be that the actuarially recognized amount of accrued liabilities is undervalued.

3. **It is reasonable to conclude that there is almost no risk that Arizona would pay out less than 100% of promised retirement income benefits to members and retirees.**
   - Arizona Constitution—Article 29

4. **The discount rate used to account for this minimal risk should be appropriately low.**
   - The higher the discount rate used by a pension plan, the higher the implied assumption of risk for the pension obligations.

ASRS Pension Debt Sensitivity
## FYE 2019 Unfunded Liability Under Varying Discount Rates

	Funded Ratio	Unfunded Liability	Actuarial Accrued Liability
7.50% Discount Rate	71.3%	$15.7 billion	$54.6 billion
6.50% Discount Rate	65.8%	$20.7 billion	$60.5 billion
5.50% Discount Rate	58.8%	$27.9 billion	$67.7 billion
4.50% Discount Rate	52.5%	$36.1 billion	$75.9 billion

Source: Pension Integrity Project analysis of ASRS GASB Statements. Current ASRS discount rate is set at 7.5%.
All dollar figures are market values. Market values used are fiduciary net position and actuarial accrued liability is total pension liability. Figures are rounded.

Change in the Risk-Free Rate Compared to ASRS Discount Rate (1990-2019)
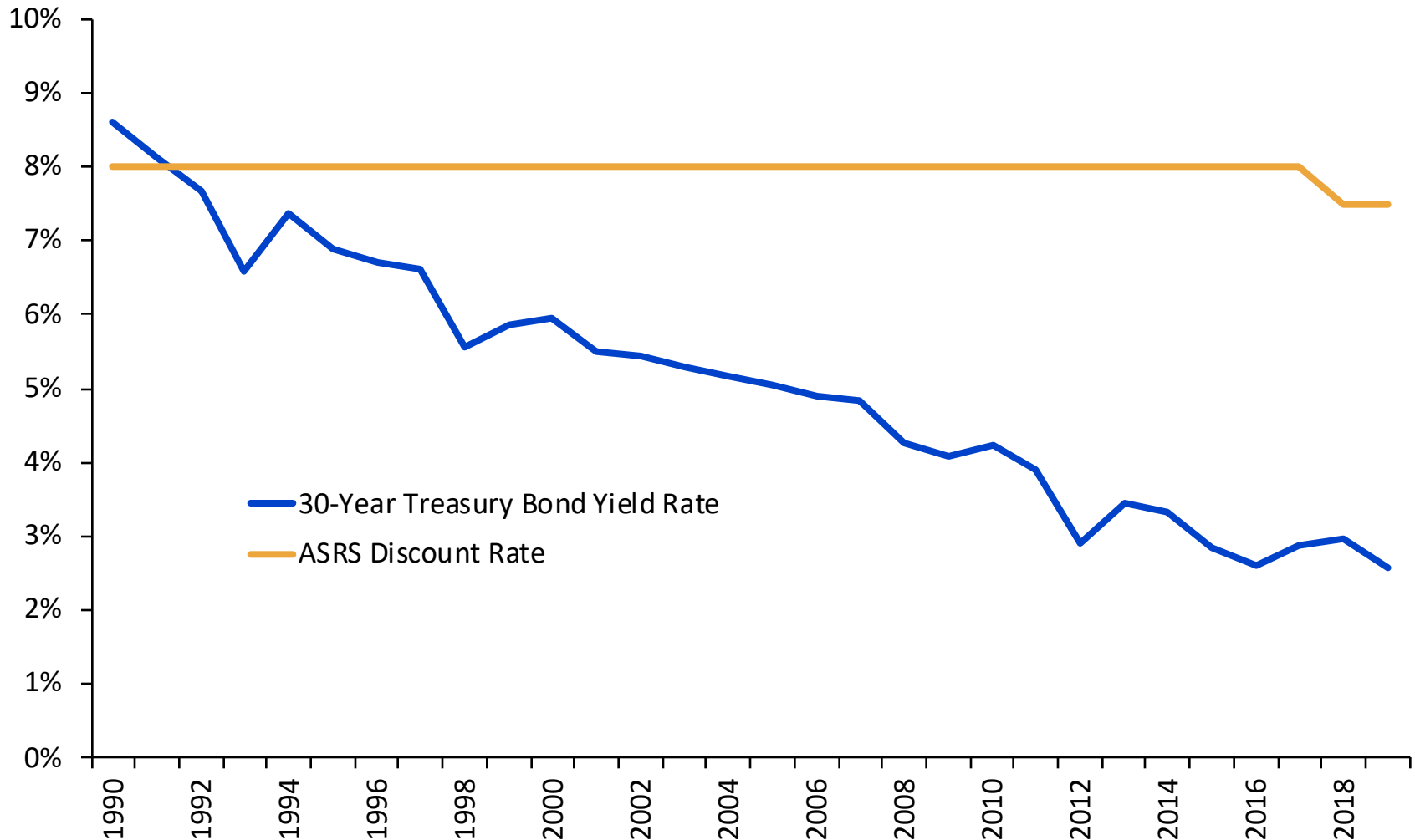
Source: Federal Reserve average annual 30-year treasury constant maturity rate

Comparing Change in Discount Rate to the Change in the Risk-Free Rate, 2001-2019
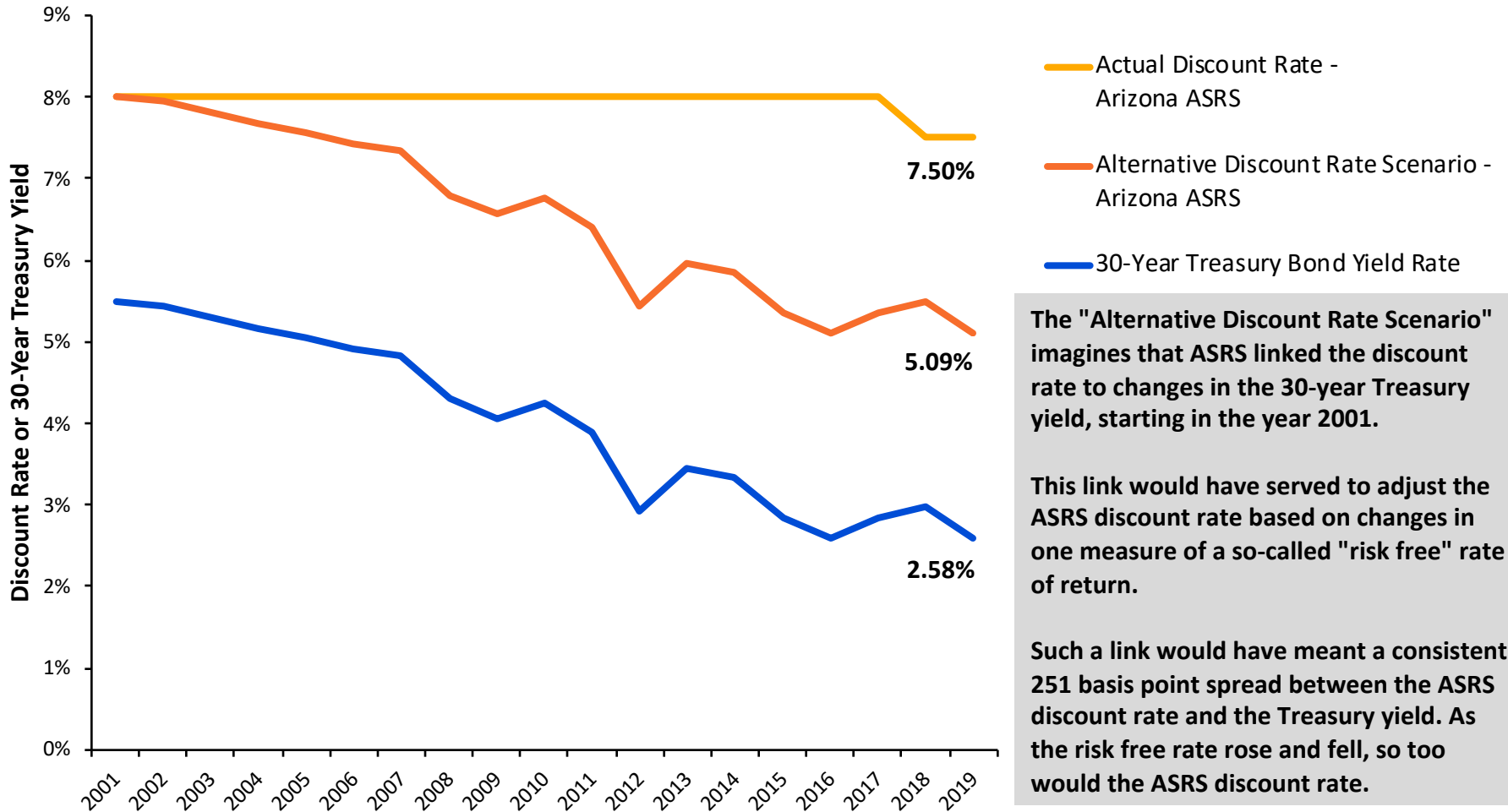
Source: Federal Reserve average annual 30-year treasury constant maturity rate
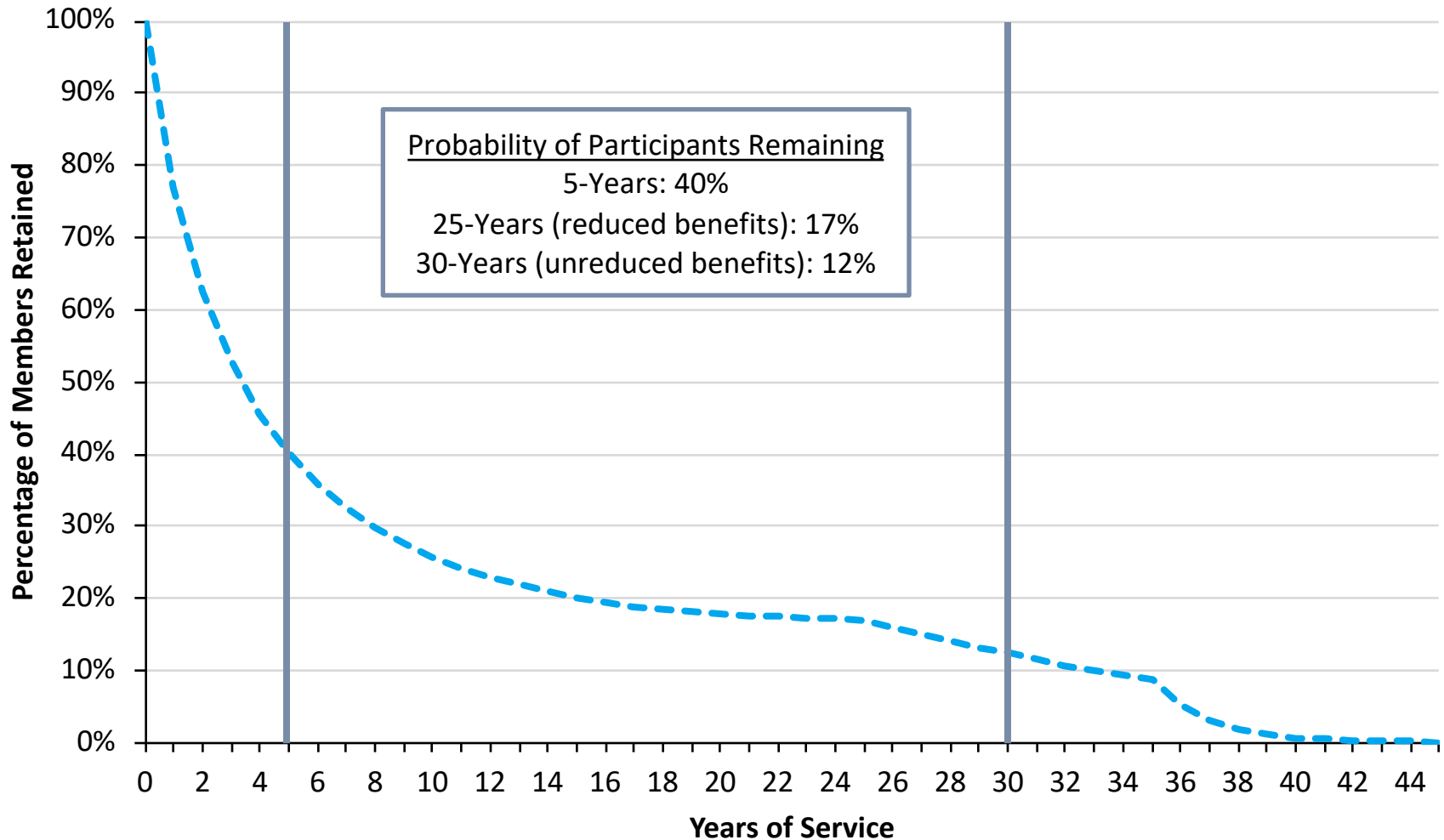
CHALLENGE 5: THE EXISTING BENEFIT DESIGN DOES NOT WORK FOR EVERYONE

- High pre-retirement withdrawal rates signal challenges in recruiting and retaining new public employees.

Probability of Members Remaining in ASRS

Probability of Participants Remaining
5-Years: 40%
25-Years (reduced benefits): 17%
30-Years (unreduced benefits): 12%

Source: Pension Integrity Project analysis of ASRS actuarial reports and CAFRs. Analysis assumes worker is hired after 2011 at age 25.

Does the ASRS Retirement Plan Work for Today's Employees?

- **60%** of new workers leave before 5 years of service

- **74%** of new workers leave before 10 years of service

- Just **17%** of ASRS workers remain in the system from start to finish to receive **partial** benefits at age 50

- Under **12%** of ASRS workers remain in the system from start to finish to receive **full** benefits at ages 55 to 65 (depending on their age at hiring)

Source: Pension Integrity Project analysis of ASRS turnover and withdraw assumptions. Estimated percentages are based on the expectations used by the plan actuaries; if actual experience is differing substantially from the assumptions then these forecasts would need to be adjusted accordingly.

ASRS Benefit Overview

DB Plan Design for New Hires

- **Multiplier:**
  - 2.10% for less than 20 years
  - 2.15% for 20-25 years
  - 2.20% for 25-30 years
  - 2.30% for more than 30 years
- **Final Average Salary:** Five highest years
- **Vesting:** immediate
- **Normal Retirement Eligibility:** Age 65 or age 55 with 30 years of service
- **2019 Employee Contribution:** 22.8%
- **Participation in Social Security:** Yes
- **Benefit Summary *(Retirees as of 2018)*:**
  - Monthly Benefit for 45+ years: $5,577
  - Number of Retirees and Beneficiaries: 151,878

FRAMEWORK FOR SOLUTIONS & REFORM

Policy Objectives

- **Keeping Promises:** Ensure the ability to pay 100% of the benefits earned and accrued by active workers and retirees
- **Retirement Security:** Provide retirement security for all current and future employees
- **Predictability:** Stabilize contribution rates for the long-term
- **Risk Reduction:** Reduce pension system exposure to financial risk and market volatility
- **Affordability:** Reduce long-term costs for employers/taxpayers and employees
- **Attractive Benefits:** Ensure the ability to recruit 21st Century employees
- **Good Governance:** Adopt best practices for board organization, investment management, and financial reporting

Pension Resiliency Strategies

1. Adopt better funding policy, risk assessment, and actuarial assumptions
   - Lower the assumed rate of return to align with independent actuarial recommendations.
   - These changes should aim at minimizing risk and contribution rate volatility for employers and employees.

2. Establish a plan to pay off the unfunded liability as quickly as possible.
   - The Society of Actuaries Blue Ribbon Panel recommends amortization schedules be no longer than 15 to 20 years.
   - Reducing the amortization schedule would save the state billions in interest payments.

3. Review current plan options to improve retirement security
   - Consider offering additional retirement options that create a pathway to lifetime income for employees that do not stay in public service.

1. Adopt Better Funding Policy, Risk Assessment, and Actuarial Assumptions

- **Risk Assessment and Actuarial Assumptions**
  - Look to lower the assumed return such that it aligns with more realistic probability of success
  - Work to reduce fees and costs of active management
  - Consider adopting an even more conservative assumption for a new hire defined benefit plan
  - Require stress testing for contribution rates, funded ratios, and cash flows with look-forward forecasts for a range of scenarios

2. Establish a Plan to Pay Off the Unfunded Liability as Quickly as Possible

- **Current amortization time horizons are too long**
  - ASRS' 30-year layered level percent of payroll amortization policy leaves unfunded liabilities significantly exposed to additional market risk and should be shortened similar to PSPRS' policies.
  - The Society of Actuaries Blue Ribbon Panel recommends amortization schedules be no longer than 15 to 20 years.

- **The legislature could put maximum amortization periods in place and/or require a gradual reduction in the funding period to target a lower number of years**
  - Other states have phased in changes by reducing the amortization schedules one year at a time
  - The legislature could require that ASRS be funded on a certain time period under specific scenarios, such as alternative assumptions and/or stress test scenarios

3. Create a Path to Retirement Security for All Participants of ASRS

- **ASRS is not providing a path for retirement income security to all Arizona public workers**
  - For example, only 12% of public employees make it to the 30 years necessary for a full pension. This means the majority of members would be better served by having the choice of an alternative plan design built for portability and an increasingly mobile workforce, such as a Cash Balance, Hybrid or DC plan.

- **Employees should have a choice to select a retirement plan design that fits their career and lifestyle goals**
  - Cash balance plans can be designed to provide a steady accrual rate, offer portability, and ensure a path to retirement security
  - Defined contribution plans can be designed to auto-enroll members into professionally managed accounts with low fees that target specified retirement income and access to annuities

Questions?

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