PUBLIC EMPLOYEES' RETIREMENT SYSTEM OF MISSISSIPPI SOLVENCY ANALYSIS

Prepared by:

Pension Integrity Project at Reason Foundation

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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:
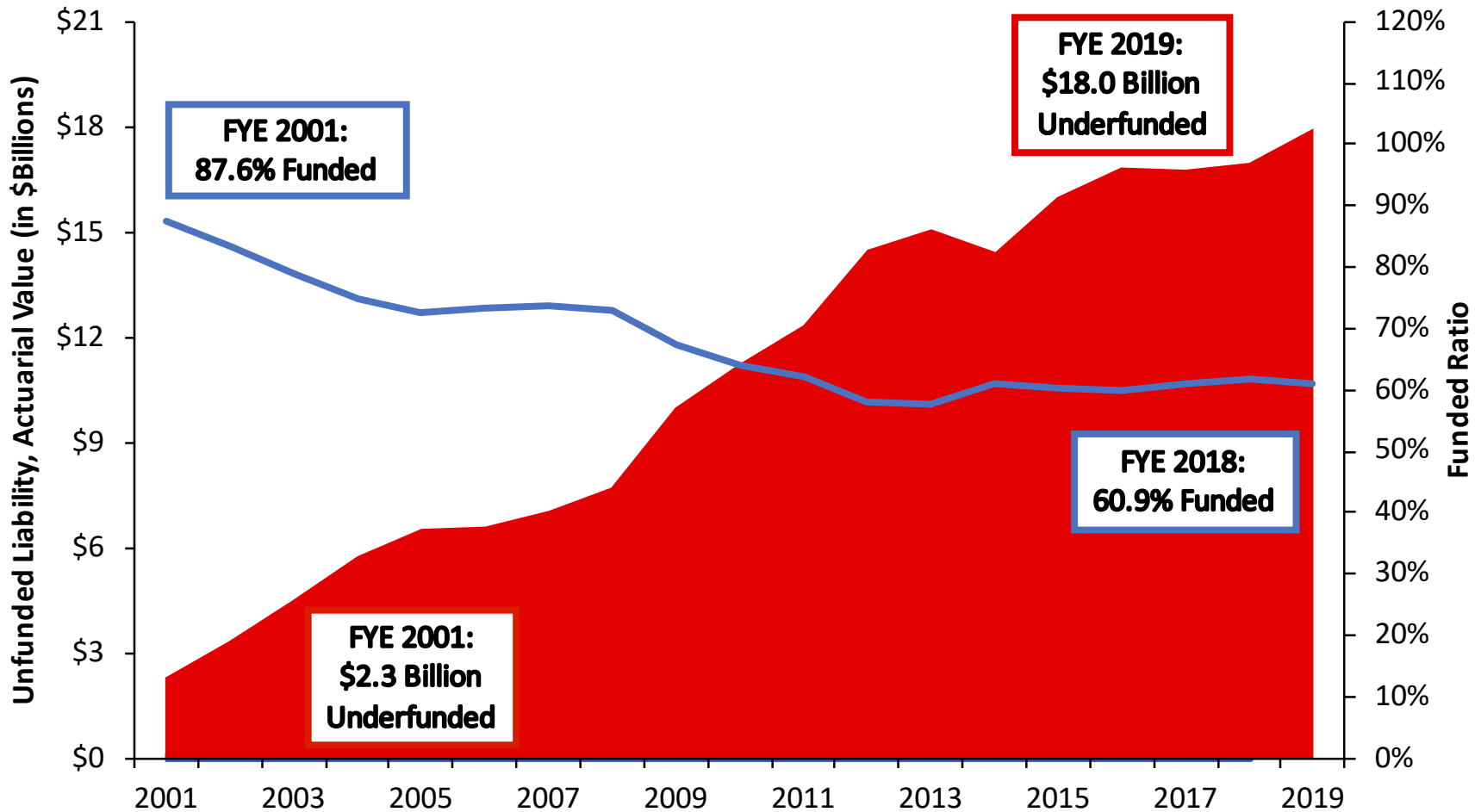
- *Customized analysis* of pension system design, trends

- *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
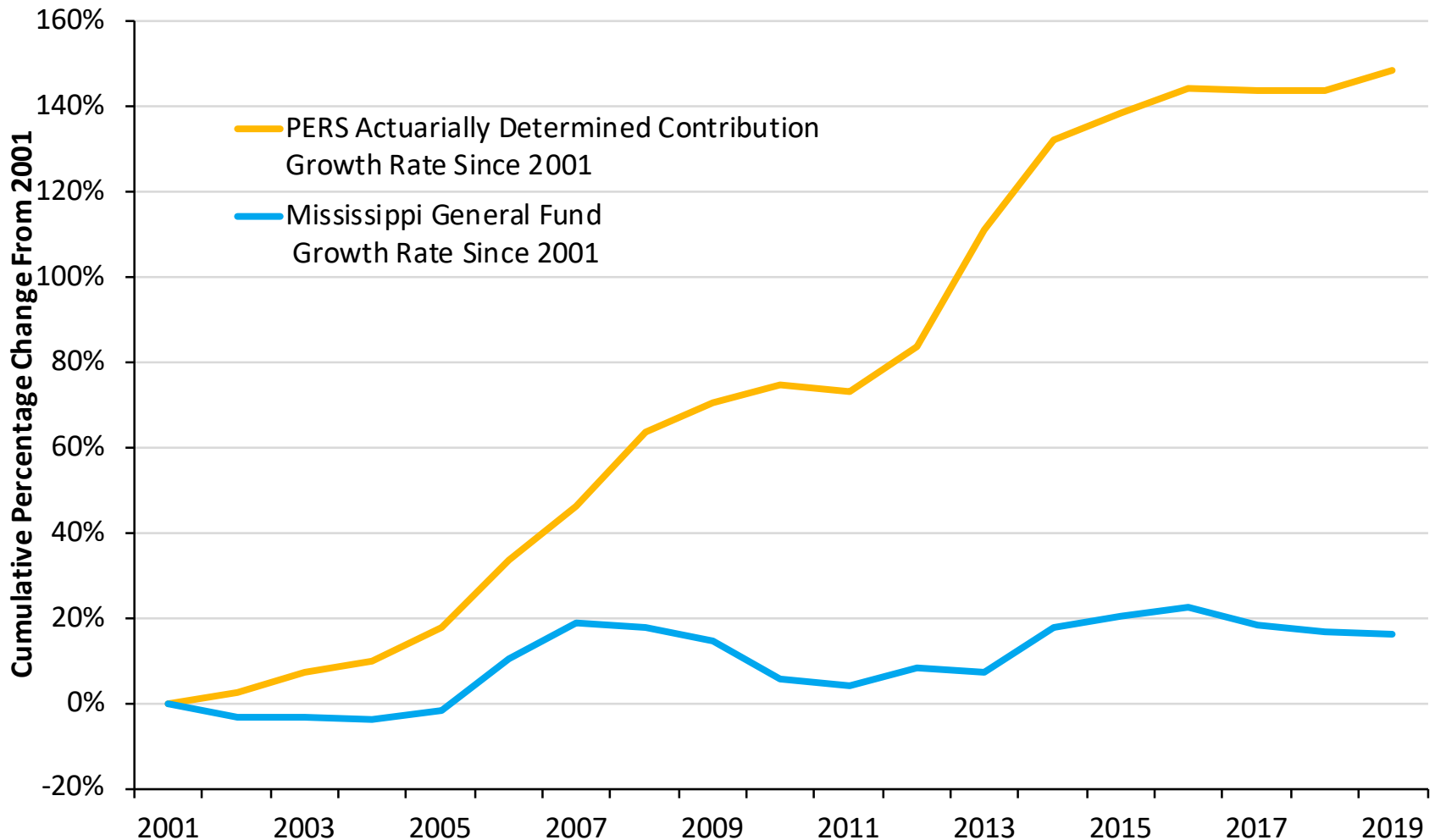
MPERS Liabilities are Growing Faster than Assets
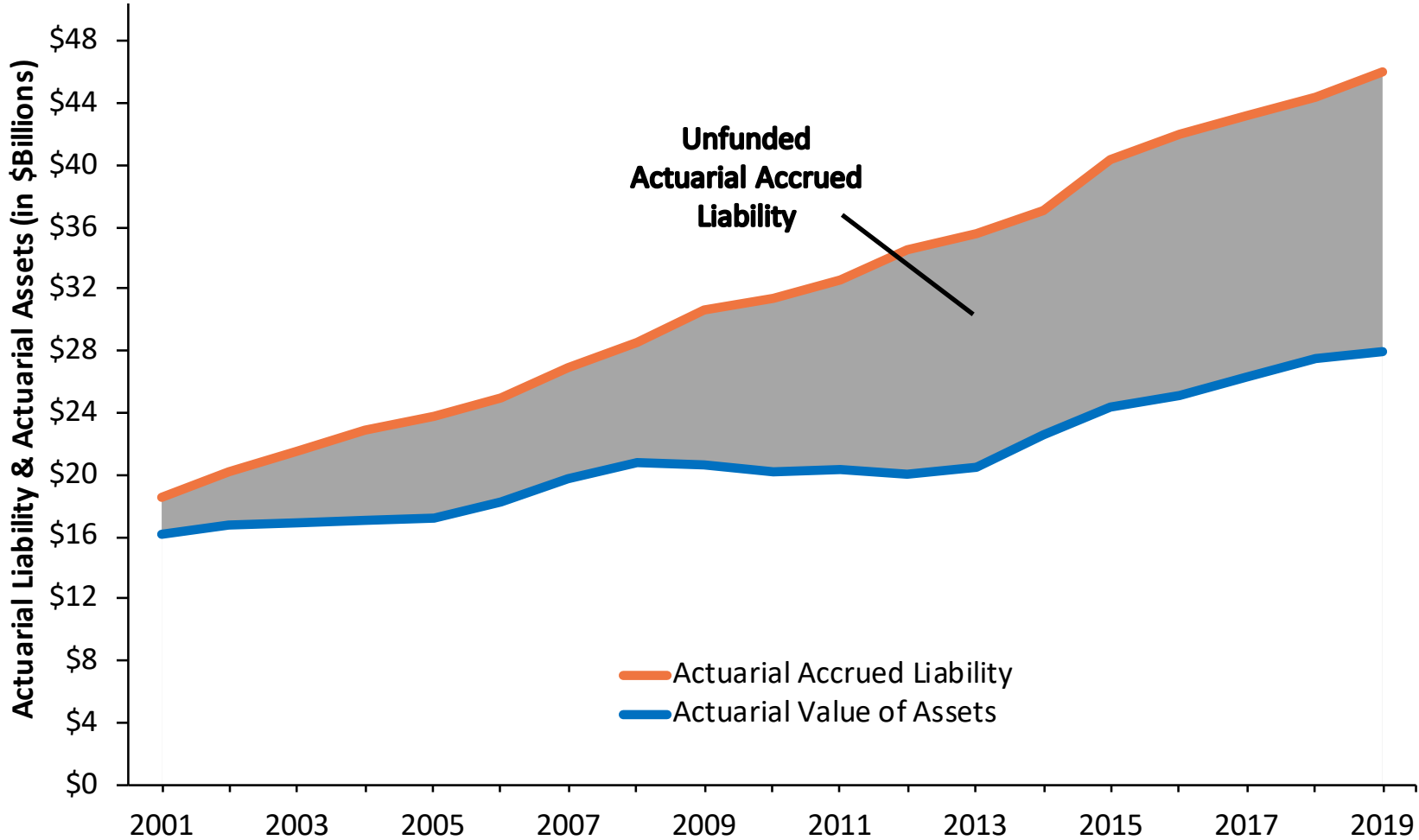
Source: Pension Integrity Project analysis of MPERS actuarial valuation reports through FY2019.

A History of Weakening Solvency (2001-2019)

FYE 2019:
$18.0 Billion
Underfunded

FYE 2001:
87.6% Funded

FYE 2001:
$2.3 Billion
Underfunded

FYE 2018:
60.9% Funded

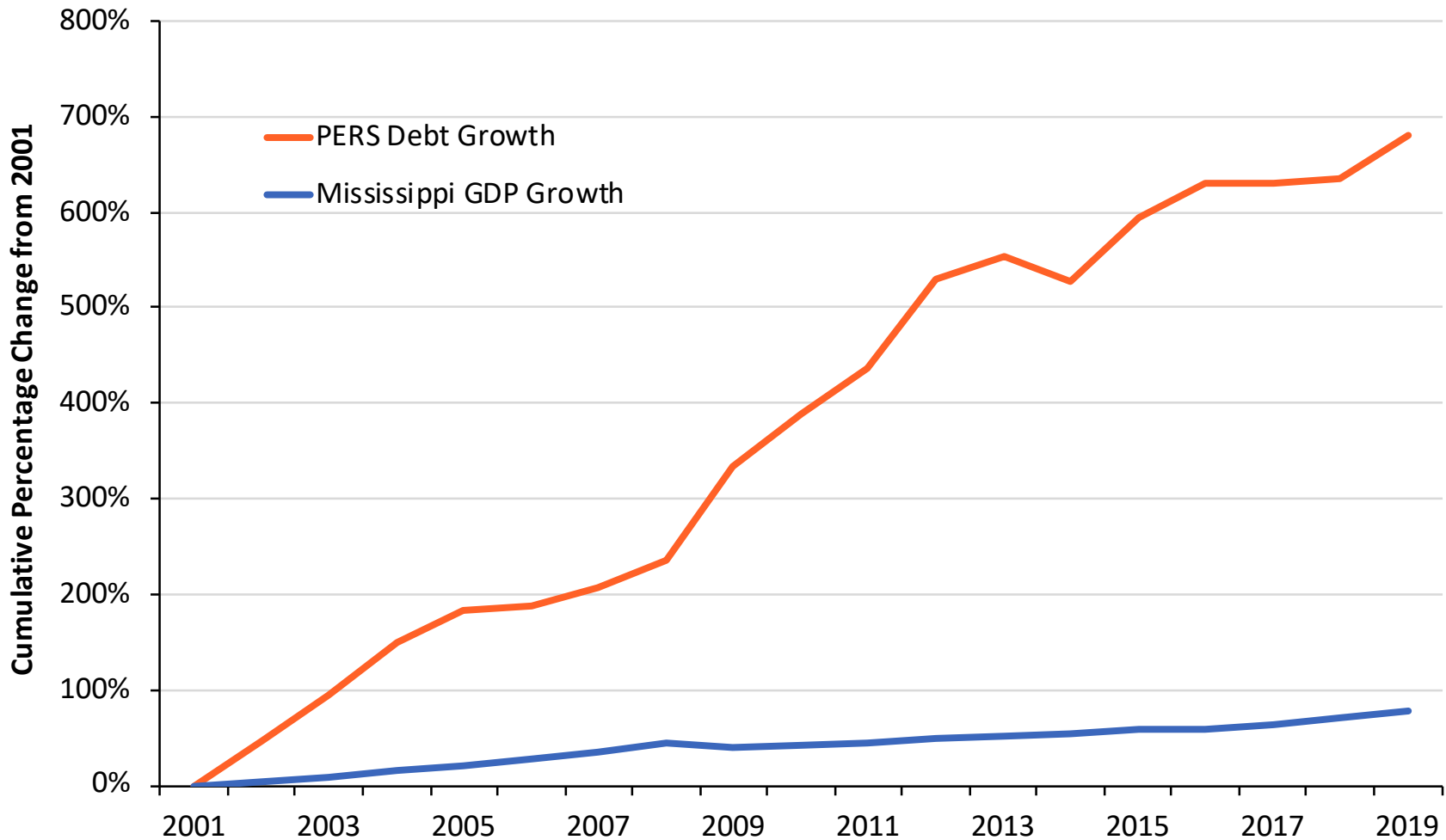Source: Pension Integrity Project analysis of MPERS actuarial valuation reports and CAFRs.

MPERS Costs are Growing Faster than the State Budget

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

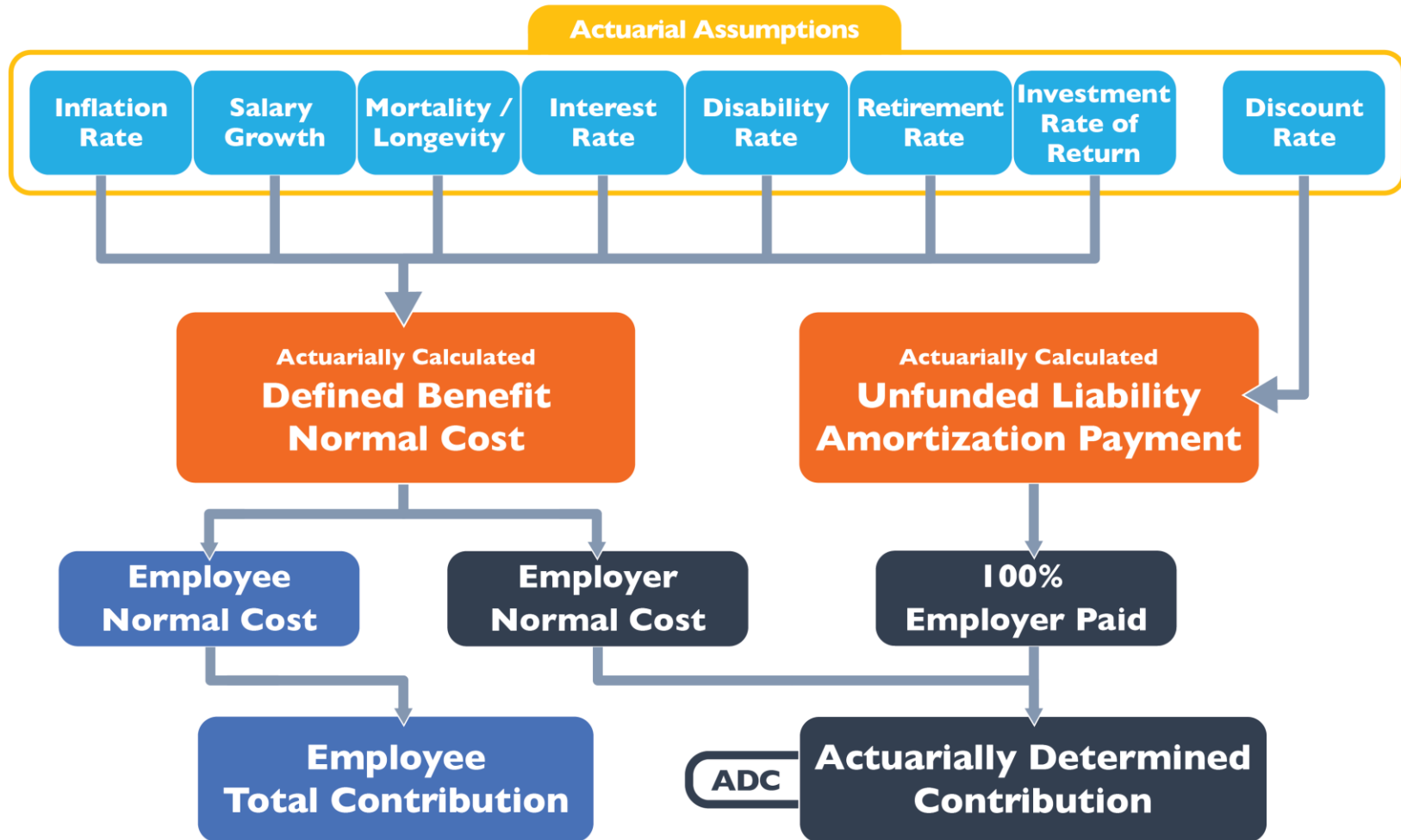# MPERS Unfunded Liabilities are Growing Faster than the Mississippi Economy

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

CHALLENGES CURRENTLY FACING MPERS

How a Pension Plan 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**

**Employee
Normal Cost**

**Employer
Normal Cost**

**100%
Employer Paid**

**Employee
Total Contribution**

ADC

**Actuarially Determined
Contribution**

Makeup of MPERS Contributions

FY2019 Contributions		
	% of Payroll	**$ Value**
Employees (Normal Cost)	8.06%	$553 million
Employer (Normal Cost)	1.47%	$90 million
Employer (Debt Amortization)	14.28%	$976 million
Total Employer	15.75%	$1.62 billion

In FY2020, MPERS contribution rates will increase from 15.75% to 17.40% of annual compensation. The 2019 amortization period extended to 36.2 years, compared to 30.9 years in 2018.

Source: Pension Integrity Project analysis of MPERS actuarial valuation reports.

The Origins of the Pension Debt
Actuarial Experience of MPERS, 2001-2019
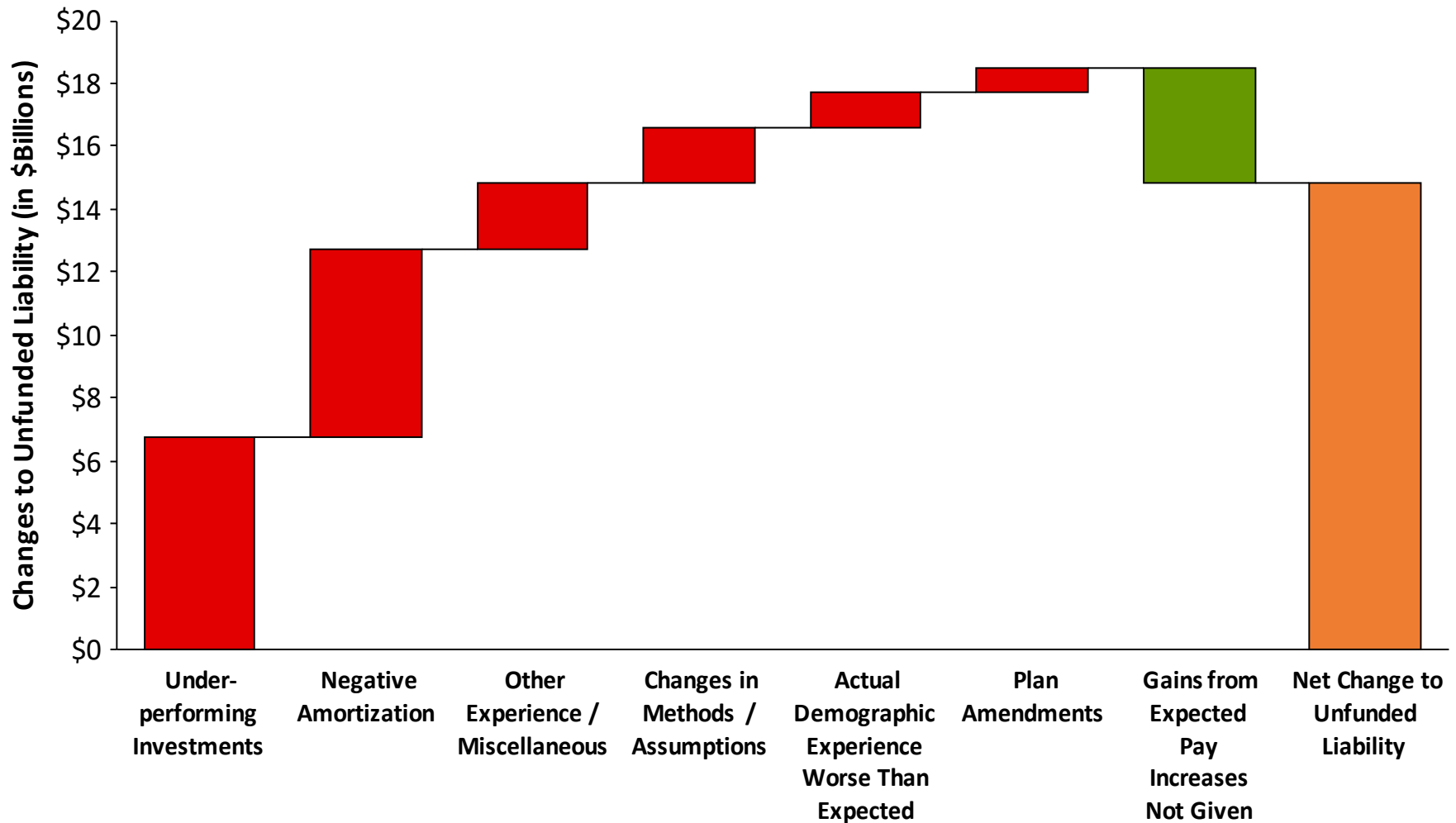
Source: Pension Integrity Project analysis of MPERS valuation reports and CAFRs. Data represents cumulative unfunded liability by gain/loss category. Demographic experiences include age & service retirements, withdrawal from employment, number of new members.

MPERS Reporting Limitations

- "Other Experience / Miscellaneous" make for the 3rd largest driver of unfunded liabilities, accruing over $2 billion in debt since 2001

- MPERS defines these "other" expenses as "miscellaneous gains and losses, data adjustments, timing of financial transactions, etc."

- The lack of detailed reporting on this category limits stakeholders' capacity to directly measure, mitigate and prevent further debt growth.

Quick Fact:

✓ MPERS publishes two annual system health reports: the Comprehensive Annual Financial Report (CAFR) and the MPERS annual valuation.

✓ Neither report specifies what qualifies for "miscellaneous" expenses, nor do they specify what percentage each expense represents.

Source: Pension Integrity Project analysis of MPERS valuation reports and CAFRs.

Driving Factors Behind MPERS Challenges

1. **<u>Underperforming investment returns</u>** have been the largest contributor to the unfunded liability, adding $6.8 billion to the unfunded liability since 2001.

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

2. **<u>Insufficient prefunding and negative amortization</u>** have resulted in accrued interest exceeding amortization payments (a.k.a. negative amortization) and a net $5.9 billion increase in the unfunded liability since 2001.

3. **<u>Changes in methods and assumptions</u>** have revealed roughly $1.8 billion to the unfunded liability since 2001.

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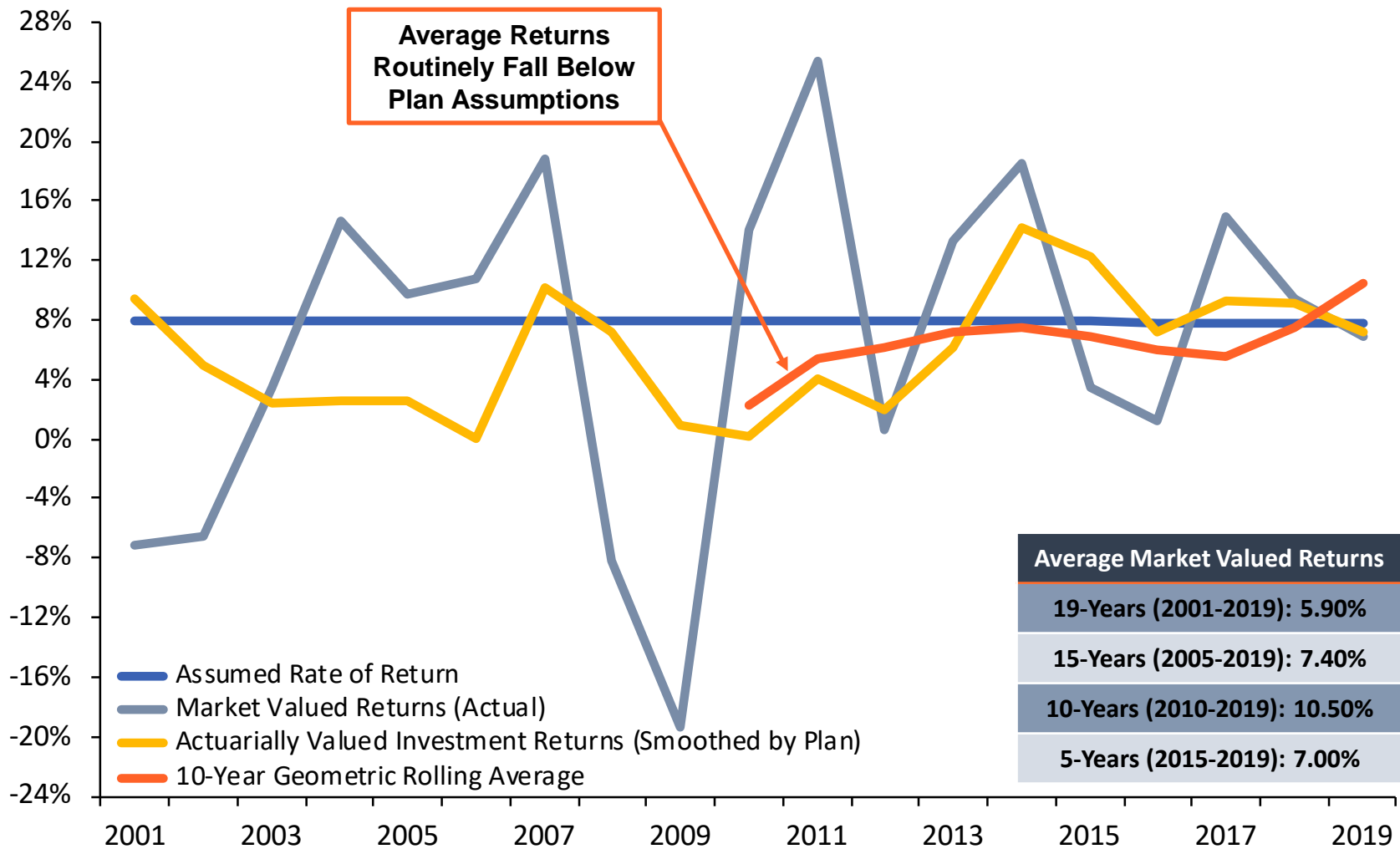
CHALLENGE 1:
ASSUMED RATE OF RETURN

- **Unrealistic Expectations:** The MPERS assumed return exposes taxpayers to significant investment underperformance risk.

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

MPERS Problem: Underperforming Assets
Investment Return History, 2001-2019

Average Returns Routinely Fall Below Plan Assumptions

Average Market Valued Returns

| 19-Years (2001-2019): 5.90% |
| 15-Years (2005-2019): 7.40% |
| 10-Years (2010-2019): 10.50% |
| 5-Years (2015-2019): 7.00% |

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

Source: Pension Integrity Project analysis of ATRS valuation reports and CAFRs. The assumed return was 8% between 1998-2016, and lower to 7.5% in 2017.

PERS Problem: Underperforming Assets
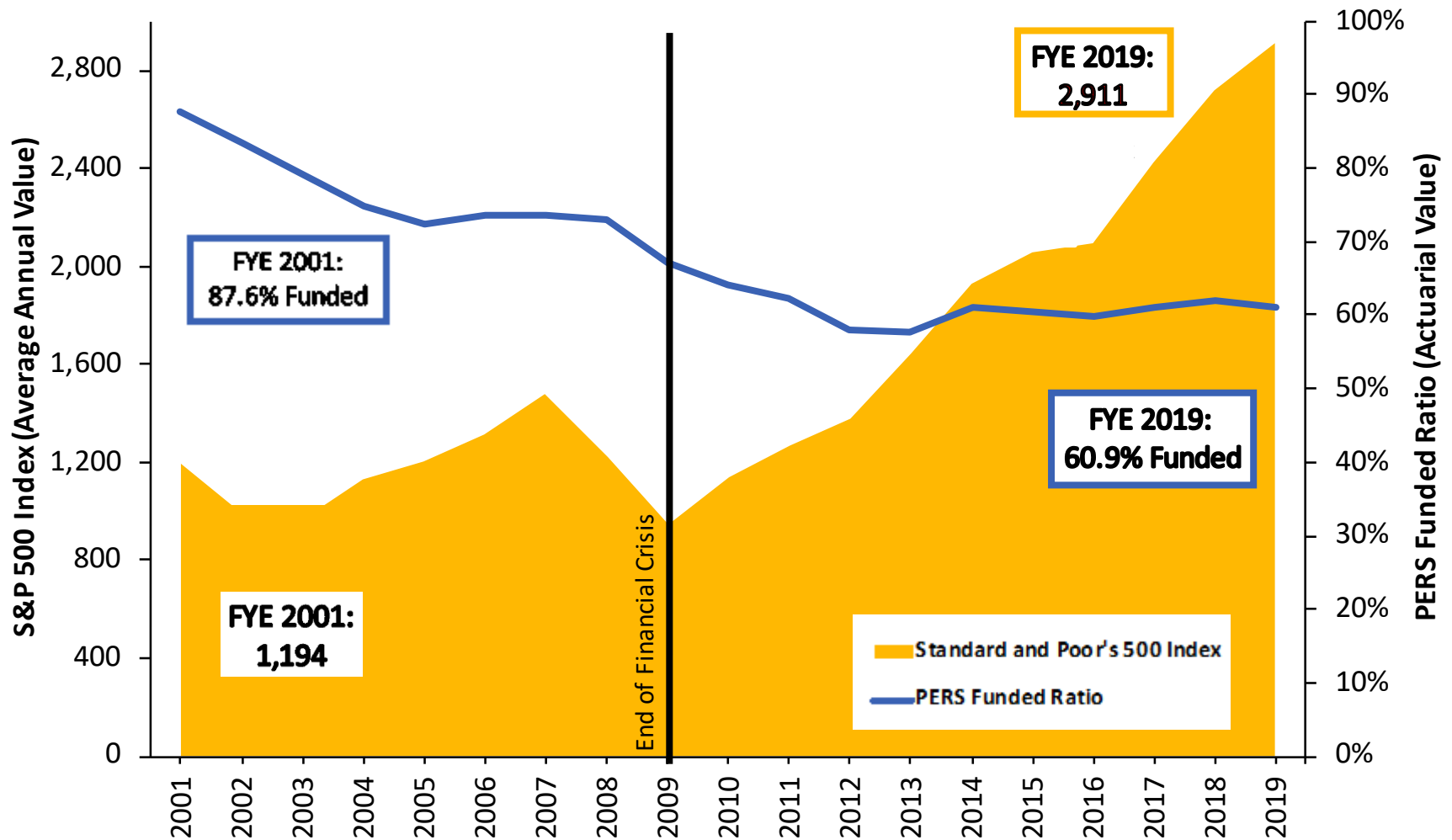
Investment Returns Have Underperformed

- MPERS 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 7.75% in 2015.

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

Average Market Valued Returns	Average Actuarially Valued Returns
18-Years (2001-2019): 5.94%	18-Years (2001-2019): 5.80%
15-Years (2005-2019): 7.38%	15-Years (2005-2019): 6.07%
10-Years (2010-2019): 10.53%	10-Years (2010-2019): 7.08%
5-Years (2015-2019): 7.06%	5-Years (2015-2019): 9.02%

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 MPERS actuarial valuation reports.
Average market valued returns represent geometric means of the actual time-weighted returns.

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

FYE 2019: 2,911

FYE 2001: 87.6% Funded

FYE 2019: 60.9% Funded

End of Financial Crisis

FYE 2001: 1,194

Standard and Poor's 500 Index

PERS Funded Ratio

Source: Pension Integrity Project analysis of MPERS 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 two decades compared to the previous three decades.
   - Using their forecasts, the best-case scenario for a 70/30 portfolio of equities and bonds is likely to earn around 5% return.

3. ATRS has yet to recover from the 2009 recession, and now it will be dealing with the fallout of COVID-19.

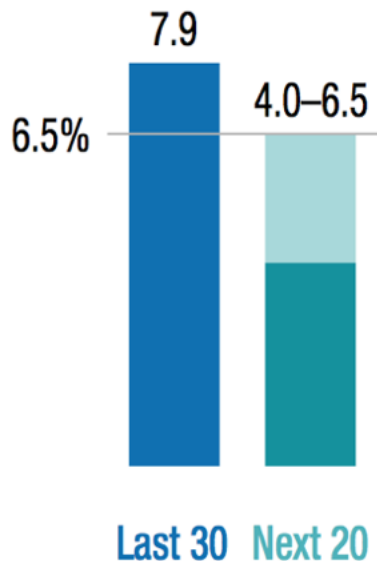# New Normal: Forecasts for Future Returns are Significantly Lower than Past Returns

The past 30 years saw returns that exceeded the long-run average

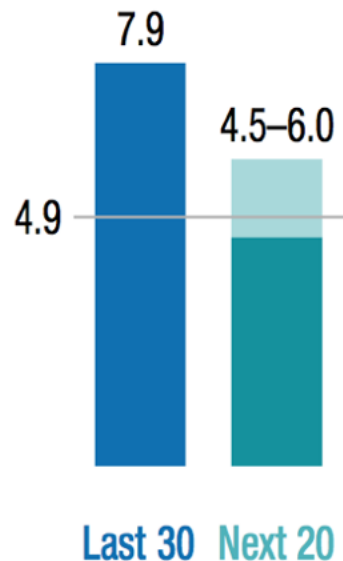■ Historical real returns
— Last 100 years average return

The next 20 years could be more challenging

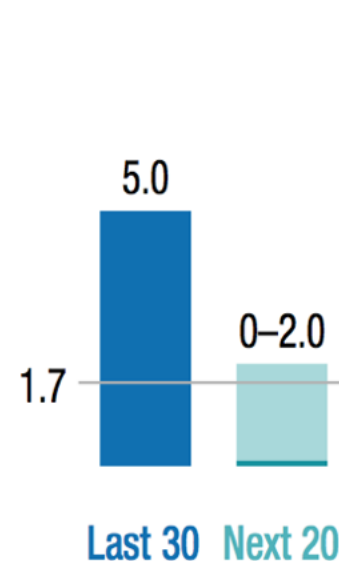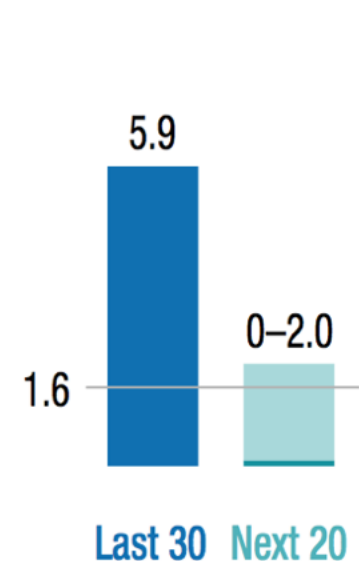■ Growth-recovery scenario
■ Slow-growth scenario

US equities

7.9
6.5% —
4.0–6.5

Last 30   Next 20

European equities

7.9
4.9 —
4.5–6.0

Last 30   Next 20

US bonds

5.0
1.7 —
0–2.0

Last 30   Next 20

European bonds

5.9
1.6 —
0–2.0

Last 30   Next 20

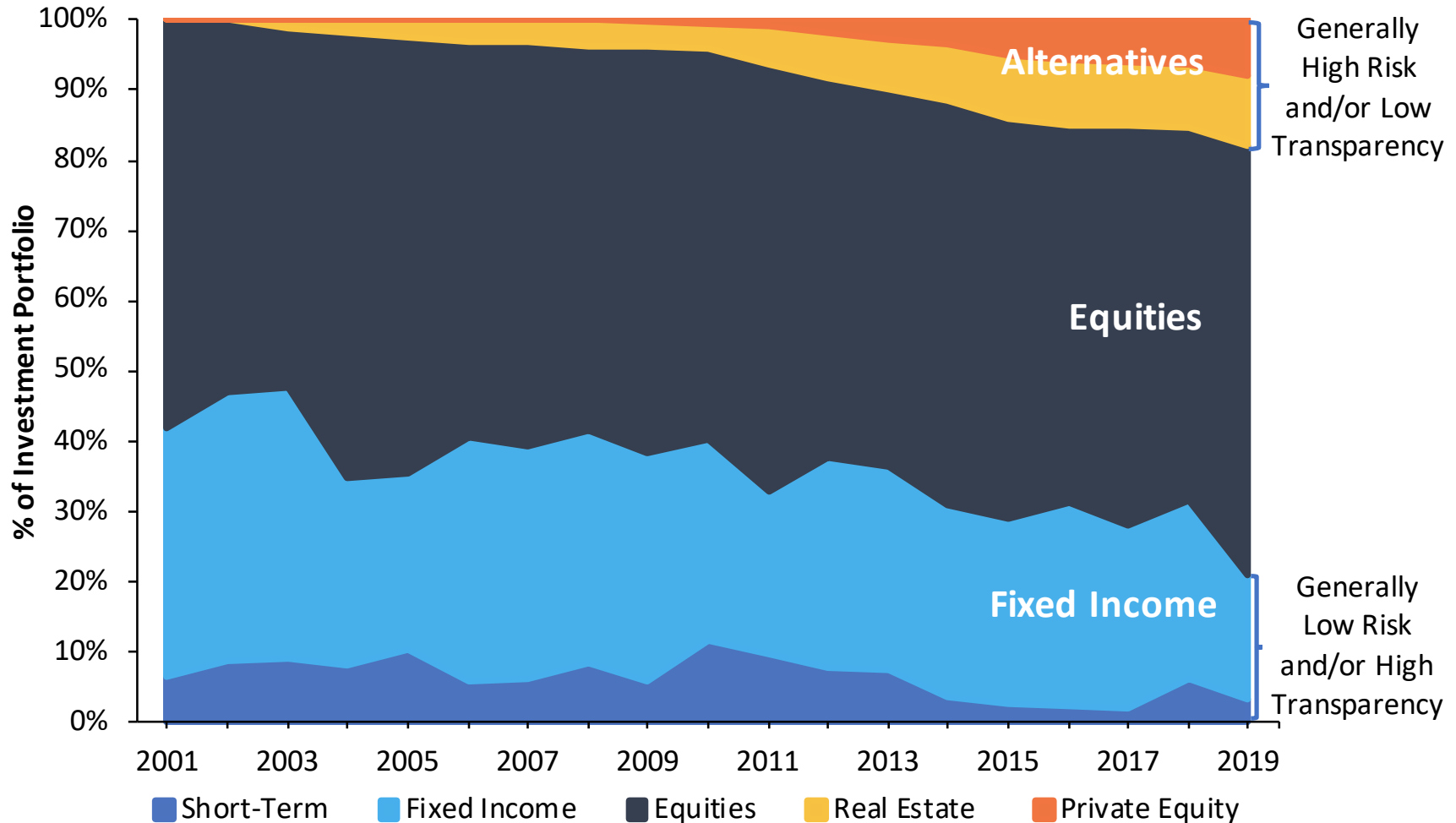Image & Data Source: McKinsey & Company, *Diminishing Returns: Why Investors May Need To Lower Their Expectations* (May 2016)

PERS Asset Allocation (2001-2019)
# Expanding Risk in Search for Yield

Source: Pension Integrity Project analysis of MPERS actuarial valuation reports and CAFRS.
Short-term assets are defined as predominately cash equivalent and short-term investments with maturity of one year or less.

New Normal: Market Trend Towards Risk

PERS Has Changed its Asset Allocation Towards More Risky Investments Resulting in a Higher Annual Standard Deviation of Returns
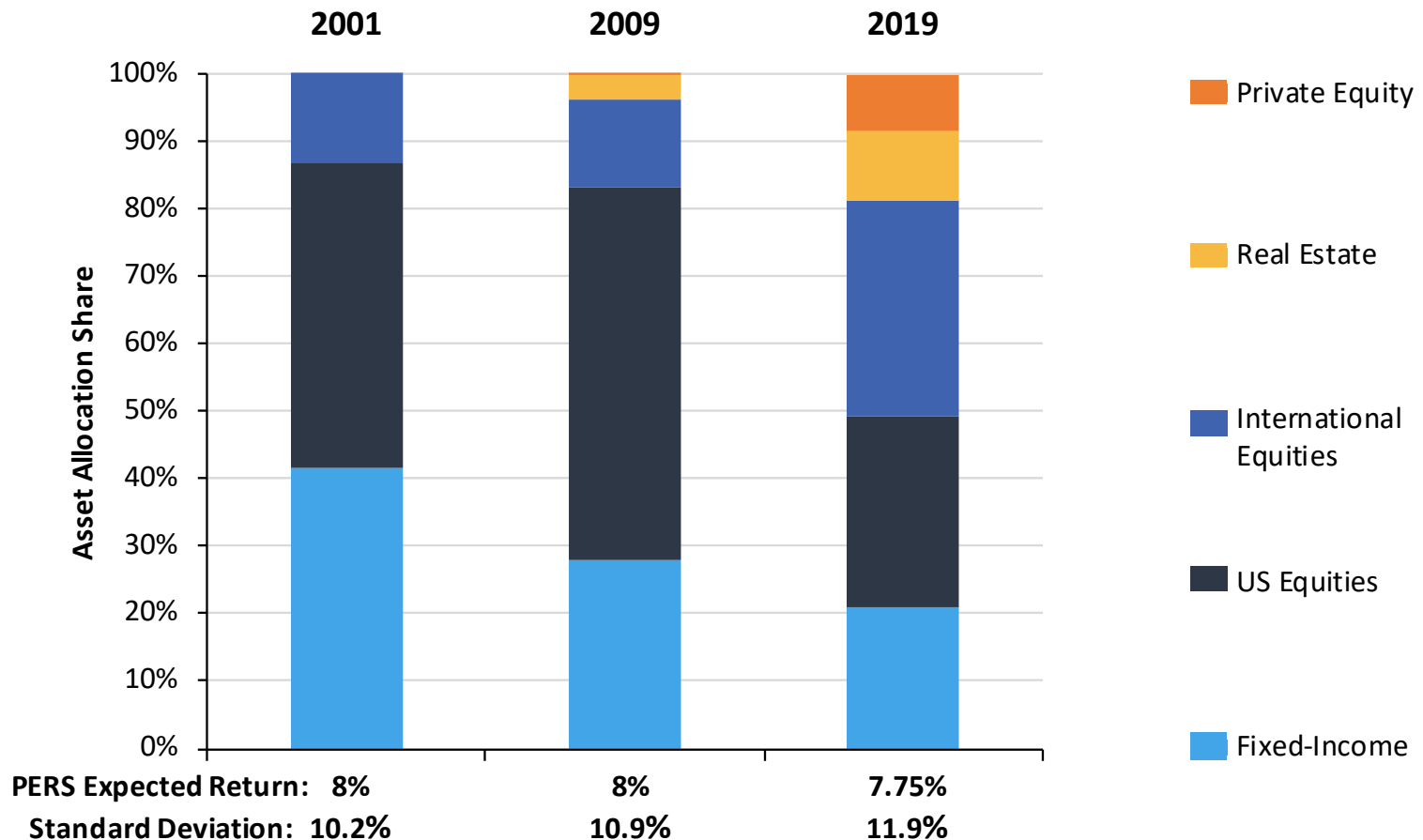
Source: Pension Integrity Project Monte Carlo model based on MPERS asset allocation and reported expected of returns by asset class.

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

Probability of MPERS Achieving A Given Return Based On:							
	PERS Forecast		Short-Term Market Forecast				Long-Term Market Forecast	
Possible Rates of Return	PERS Forecast	PERS 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
8.50%	38.0%	16.4%	19.1%	19.1%	9.3%	26.0%	33.7%	37.8%
8.00%	43.8%	21.9%	24.6%	24.6%	12.4%	31.6%	40.9%	44.7%
7.75%	46.8%	25.5%	27.5%	27.6%	14.4%	34.7%	44.1%	48.4%
7.00%	55.7%	35.8%	37.9%	38.1%	22.0%	45.0%	54.7%	58.6%
6.50%	61.3%	43.5%	45.6%	45.3%	28.0%	51.5%	61.2%	65.1%
6.00%	67.0%	52.0%	53.3%	52.9%	34.4%	58.0%	67.5%	71.1%
5.50%	72.2%	59.9%	61.0%	60.4%	41.6%	64.5%	73.5%	76.4%

Source: Pension Integrity Project Monte Carlo model based on MPERS 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 MPERS. Probability estimates are approximate as they are based on the aggregated return by asset class. For complete methodology contact Reason Foundation. MPERS Forecast is based on 2018 Experience Study.

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

PERS Forecast

- A probability analysis of MPERS historical returns over the past 20 years (2000-2019) indicates only a modest chance (26%) of hitting the plan's 7.75% assumed return.

- MPERS forecast project a 47% chance of achieving their investment return target.

Short-Term Market Forecast

- Returns over the short to medium term can have significant negative effects on funding outcomes for mature pension plans with large negative cash flows like MPERS.

- 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, MPERS returns are likely to fall short of their assumption.

Long-Term Market Forecast

- Longer-term projections typically assume MPERS 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 a variety of other market conditions that increase uncertainty over longer projection periods, relative to shorter ones.

- Forecasts showing long-term returns near 7.75% 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, while the probability of achieving an average return of 7.75% or higher is about 44%, the probability of earning a rate of return below 5.5% is about 26%.

RISK ASSESSMENT

- How resilient is Mississippi PERS to volatile market factors?

Important Funding Concepts

Employer Contribution Rates

- *Statutory Contributions*: MPERS employers make annual payments based on a rate set in Mississippi state statute, meaning contributions are different from ADEC.
- *Actuarially Determined Employer Contribution (ADEC)*: Unlike statutory contributions, ADEC is the annual required amount MPERS' consulting actuary has determined is needed to be contributed each year to avoid growth in pension debt and keep MPERS solvent

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 MPERS current 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 contribution will be at 9%

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 MPERS 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 are unable to appropriate their full actuarially determined employer contributions amid budget stress, additional scenarios show the impact of a five-year employer contribution freeze.

Stress Testing Scenarios:

1. 2020-23 Crisis + Average 6.0% Long-Term
2. 2020-23 Crisis + 2035-38 Crisis + Average 6.0% Long-Term
3. Scenario 1 + 5-Year Employer Contribution Freeze
4. Scenario 2 + 5-Year Employer Contribution Freeze

MPERS Stress Testing: All-in Employer Cost Projections
How a Crisis Increases MPERS Costs
Discount Rate: 7.75%, Assumed Return: 7.75%, Actual Return: Varying, Amo. Period: 30-Year, Closed
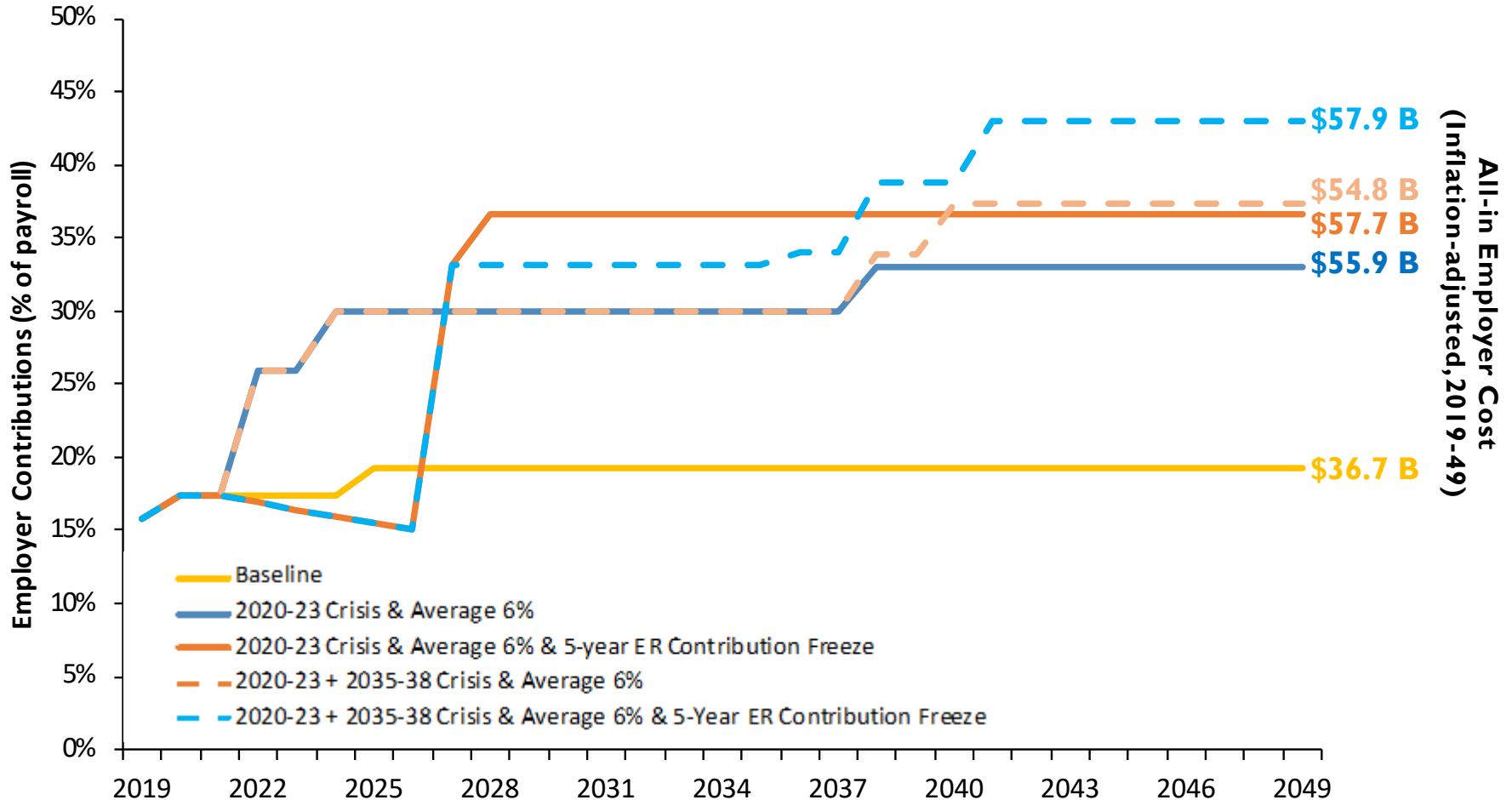
Source: Pension Integrity Project actuarial forecast of MPERS. Values are rounded and adjusted for inflation. State is assumed to make 100% statutory contributions. The "All-in Cost" includes all employer contributions over the 30-year timeframe, and the ending unfunded liability accrued by the end of the forecast period.

Scenario Comparison of Employer Costs

Scenarios	30-Year Employer Contributions	2050 Unfunded Liability (Market Value)	Total All-in Employer Costs
Pre-Crisis Baseline	$36.3 B	$0.4 B	$36.7 B
2020-23 Crisis + Average 6%	$57.7 B	-$1.8 B	$55.9 B
Two Crises + Average 6%	$61.0 B	$3.3 B	$57.7 B
2020-23 Crisis + Average 6% + 5-Year Cont. Freeze	$60.7 B	$5.9 B	$54.8 B
Two Crises + Average 6% + 5-Year Cont. Freeze	$63.1 B	$5.2 B	$57.9 B

Source: Pension Integrity Project actuarial forecast of MPERS 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.

MPERS Stress Testing: Unfunded Liability Projections

Crisis Scenarios Drive Unfunded Liabilities Higher

Discount Rate: 7.75%, Assumed Return: 7.75%, Actual Return: Varying, Amo. Period: 30-Year, Closed
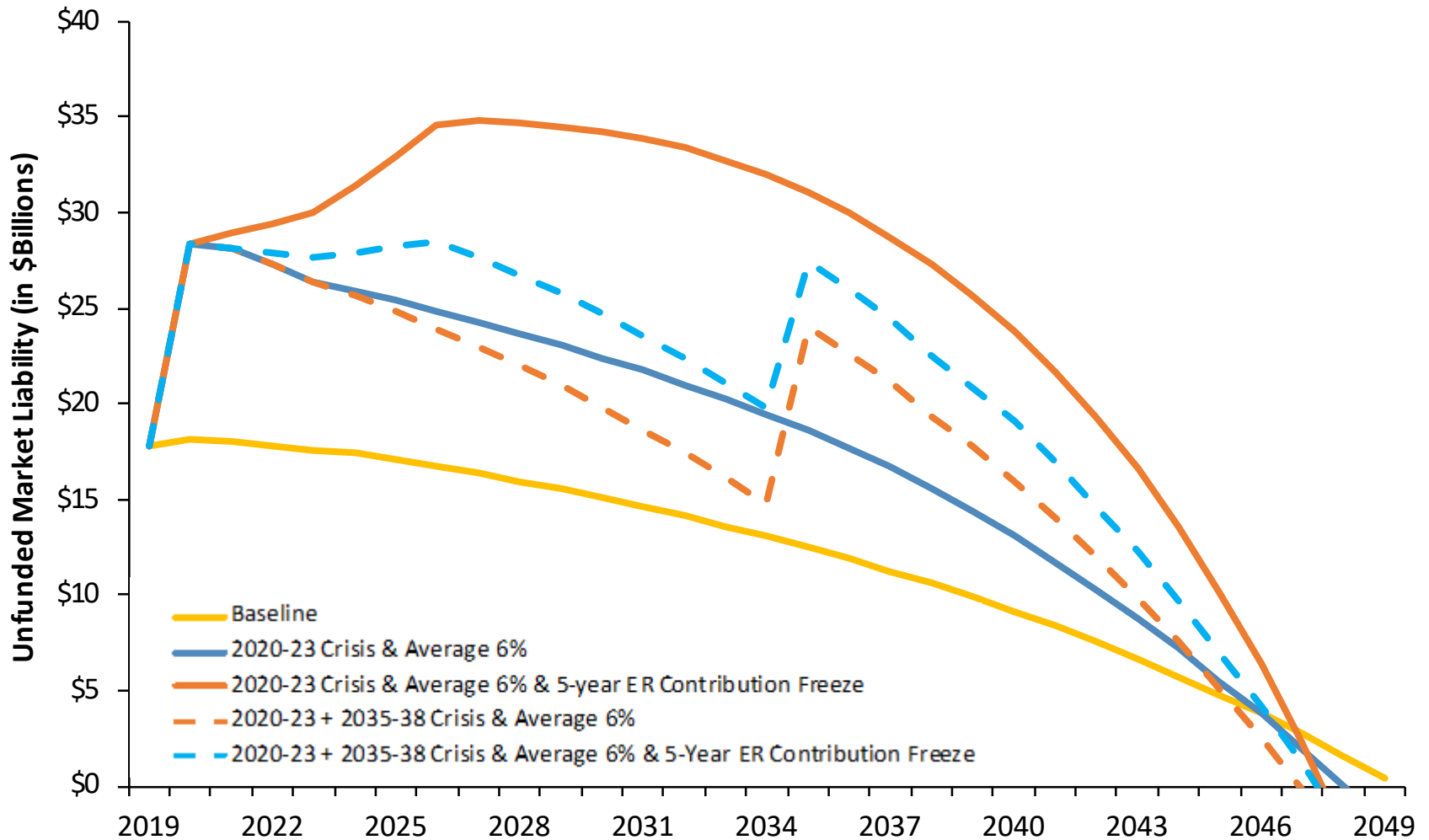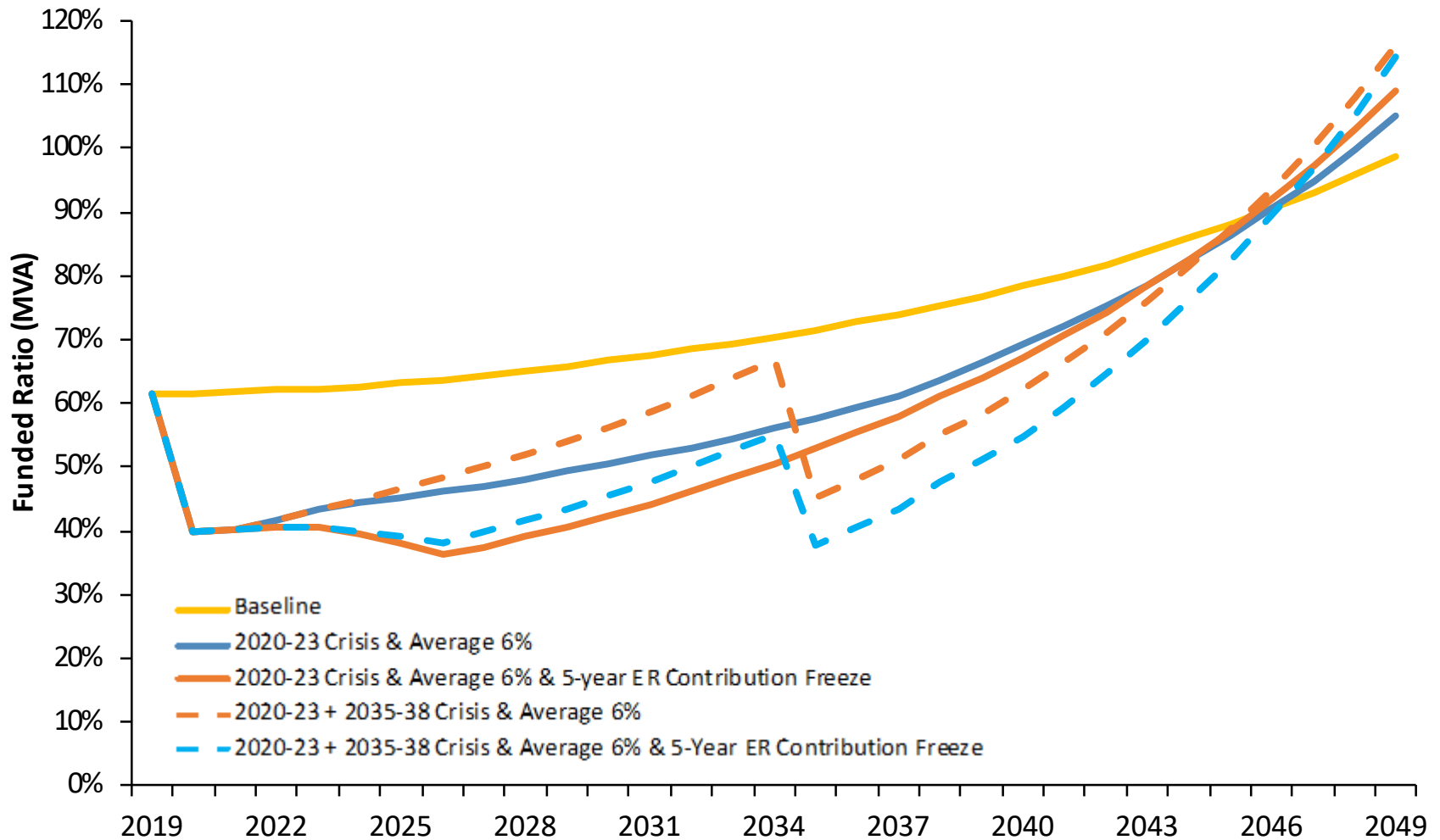

Source: Pension Integrity Project actuarial forecast of MPERS funding. Values are rounded and adjusted for inflation. State is assumed to make statutory contributions. The "All-in Cost" includes all employer contributions over the 30-year timeframe, and the ending unfunded liability accrued by the end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

MPERS Stress Testing: Funded Status Projections
PERS Solvency Varies Under Crisis Scenarios
Discount Rate: 7.75%, Assumed Return: 7.75%, Actual Return: Varying, Amo. Period: 30-Year, Closed

Source: Pension Integrity Project actuarial forecast of MPERS funding. 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.

30-year Employer Contribution Forecast

Timing of Returns Affects What Mississippi Pays
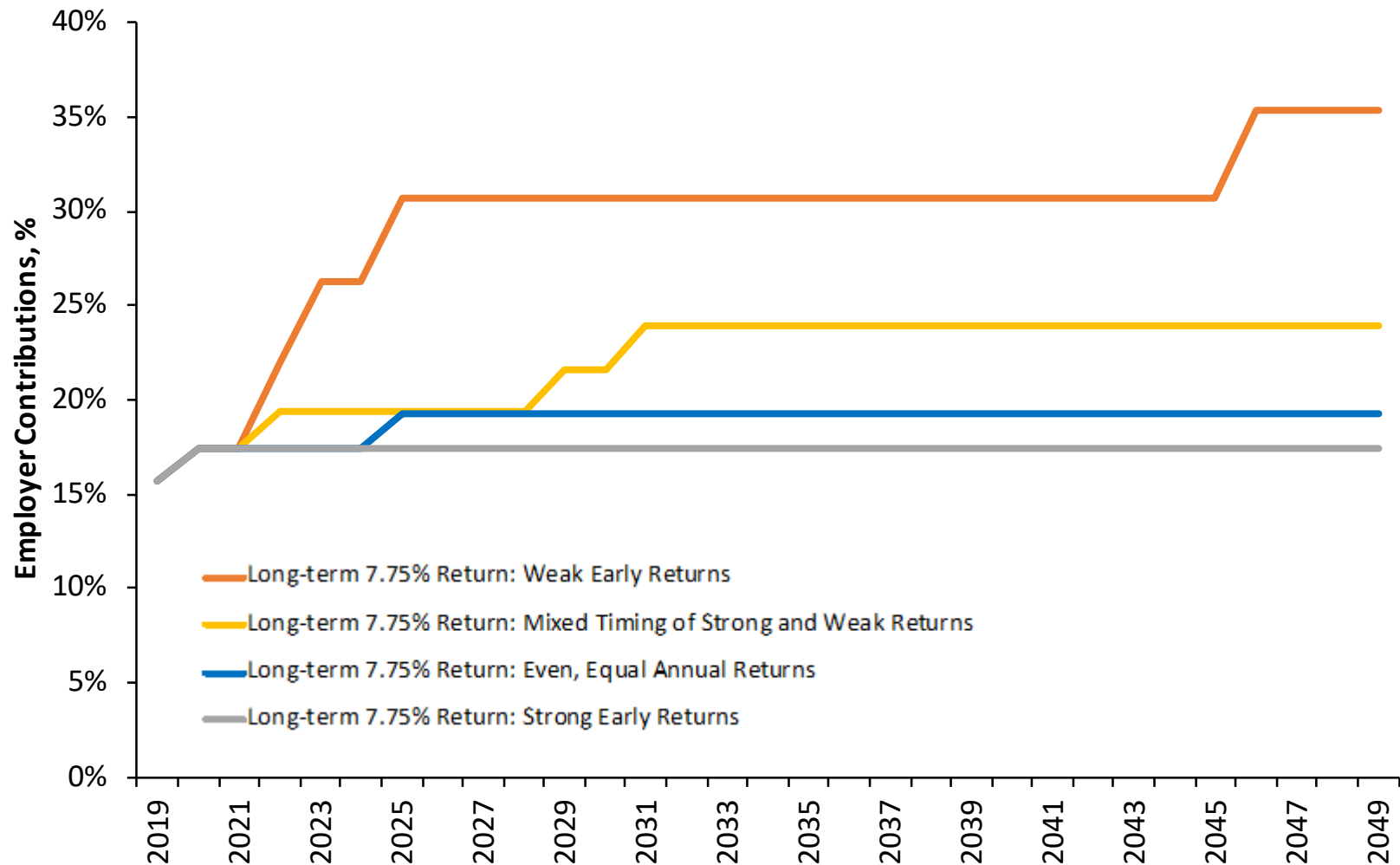
Long-Term Average Returns of 7.75%
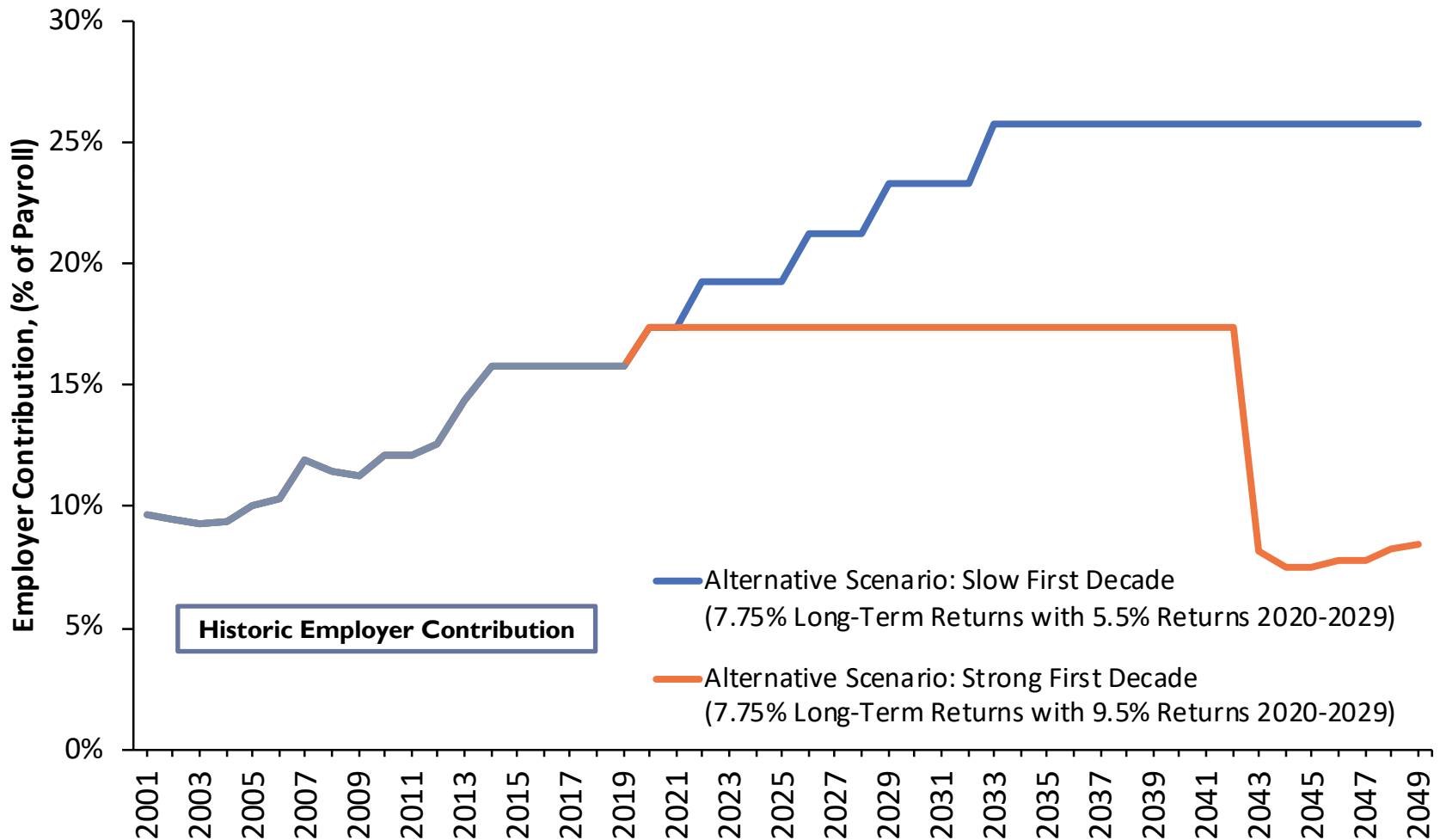
Source: Pension Integrity Project actuarial forecast of MPERS. Figures are adjusted for inflation.

30-year Employer contribution Forecast

All Paths to a 7.75% Average Return Are Not Equal

Long-Term Average Returns of 7.75%

— Long-term 7.75% Return: Weak Early Returns

— Long-term 7.75% Return: Mixed Timing of Strong and Weak Returns

— Long-term 7.75% Return: Even, Equal Annual Returns

— Long-term 7.75% Return: Strong Early Returns

Source: Pension Integrity Project actuarial forecast of MPERS plan. Strong early returns (TWRR=7.73%, MWRR=8.55%), Even, equal annual returns (Constant Return = 7.75%), Mixed timing of strong and weak returns (TWRR=7.74%, MWRR=7.75%), Weak early returns (TWRR=7.72%, MWRR=6.97%) Scenario assumes that MPERS pays the fixed statutory rate each year. Years are plan's fiscal years.

Forecasting the Impact of Market Volatility

<u>Random Investment Return Analysis</u>

What is it?

Why use it?

- Model generates 10,000 different random investment return scenarios, creating ranges in required contributions and funding outcomes
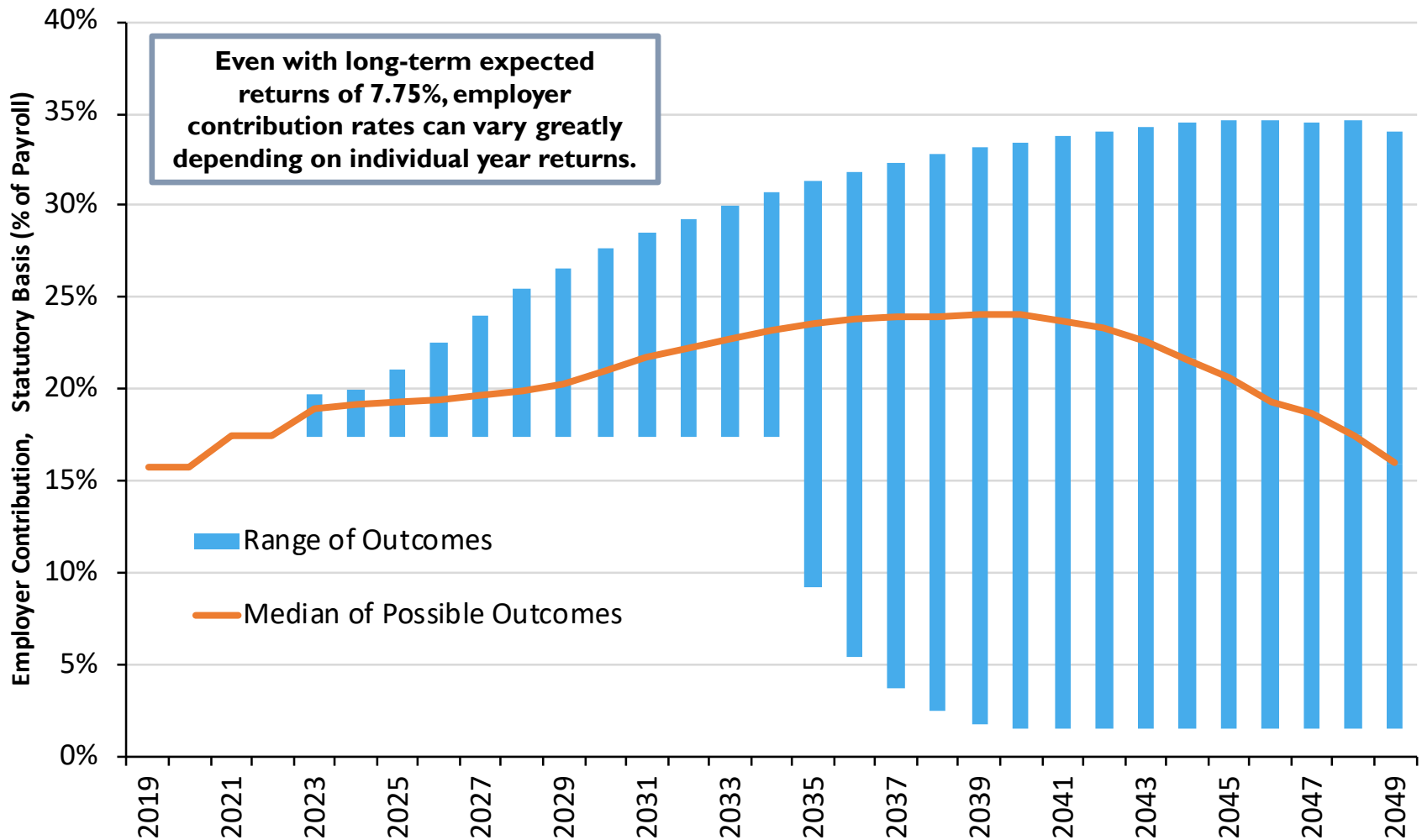- The analysis displays 50 percent of all outcomes that are closest to the median outcome

- 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 MPERS Performs as Expected, Rates Can Still Vary

Long-term Average Expected Returns of 7.75%

> **Even with long-term expected returns of 7.75%, employer contribution rates can vary greatly depending on individual year returns.**

Legend:
- Range of Outcomes
- Median of Possible Outcomes

Y-axis: Employer Contribution, Statutory Basis (% of Payroll), ranging 0% to 40%

X-axis years: 2019, 2021, 2023, 2025, 2027, 2029, 2031, 2033, 2035, 2037, 2039, 2041, 2043, 2045, 2047, 2049

Source: Pension Integrity Project actuarial forecast of MPERS. 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 MPERS 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**
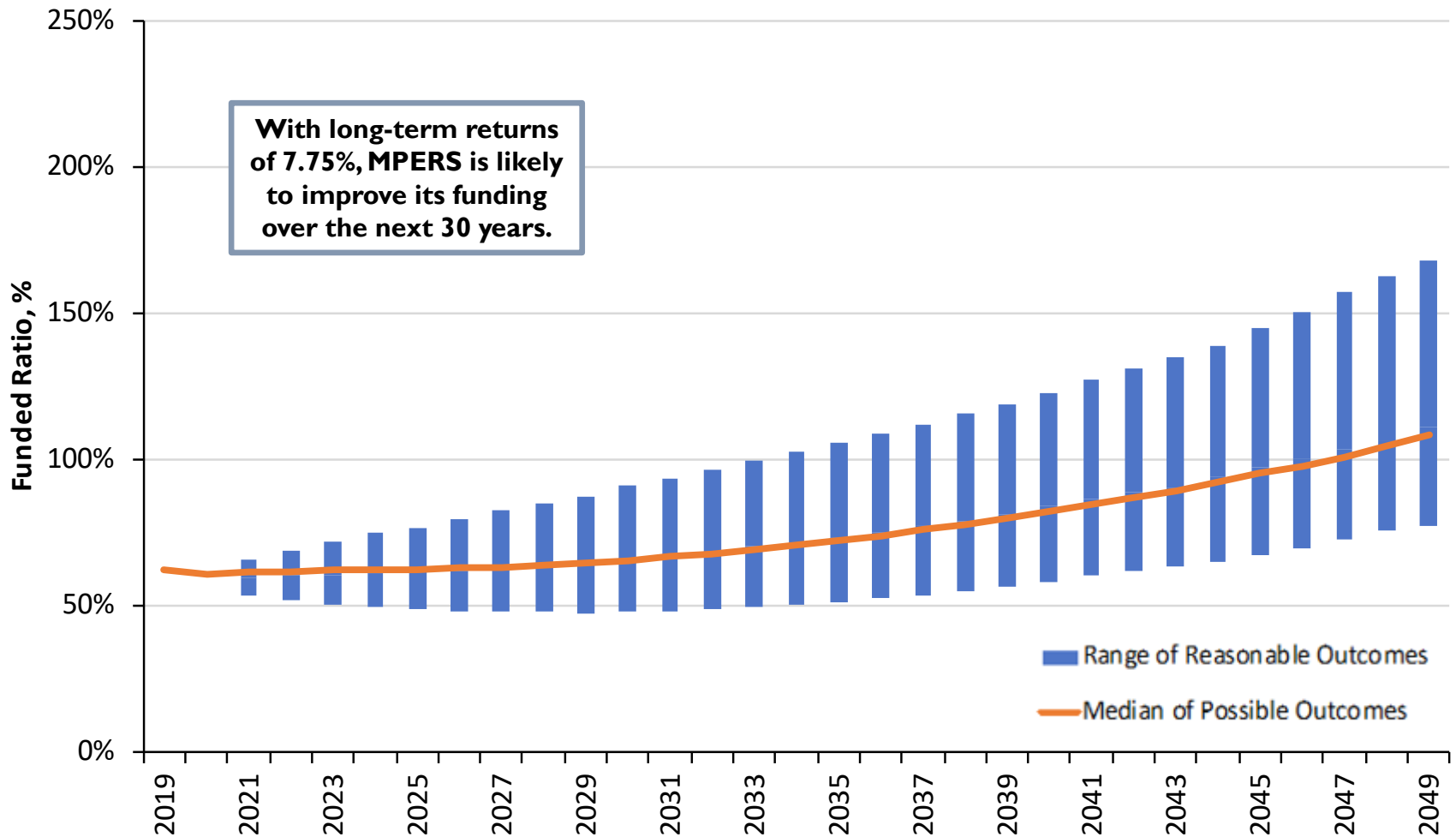- **Median of Possible Outcomes**
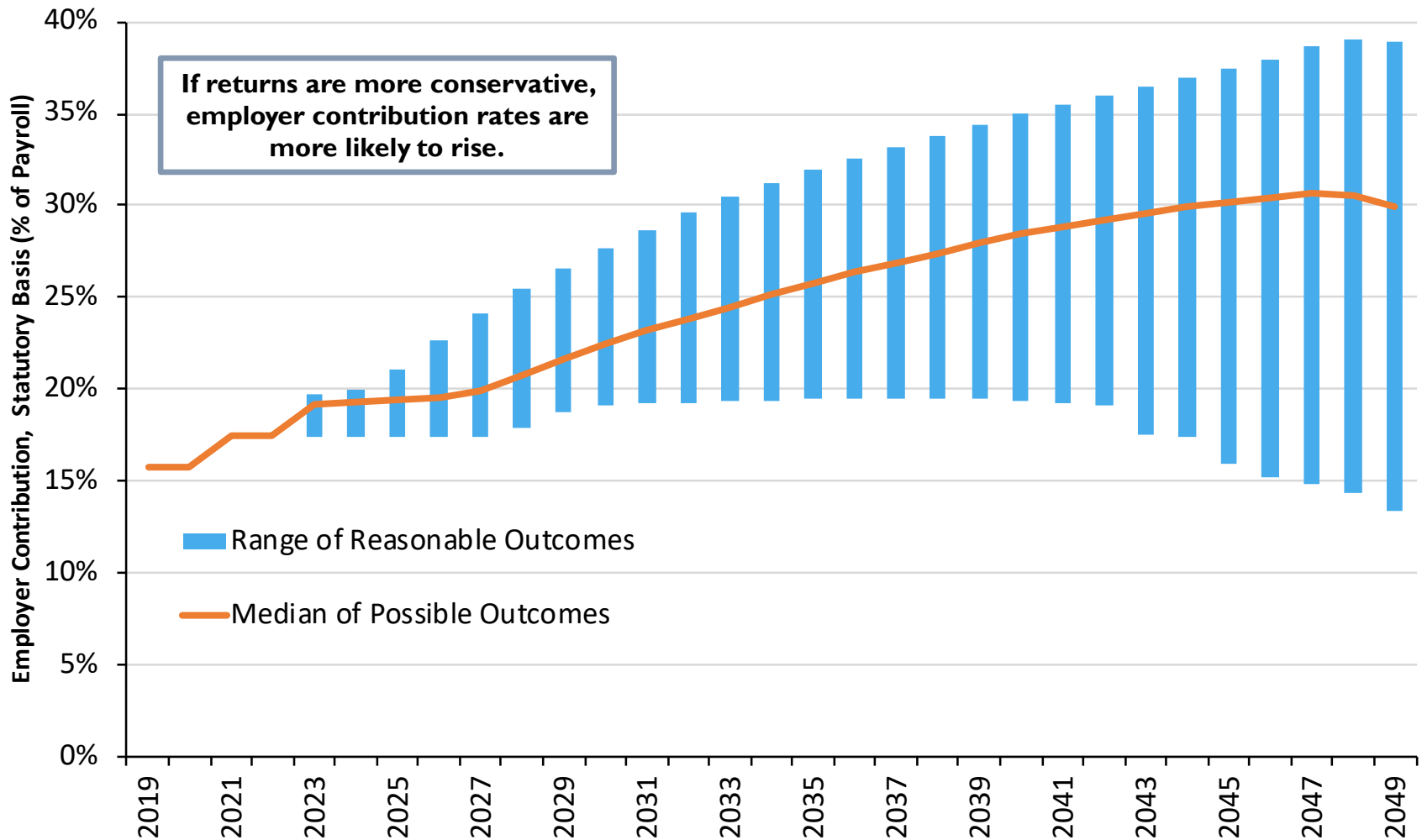
Source: Pension Integrity Project actuarial forecast of MPERS plan using the return and risk assumptions of the Monte Carlo analysis. Conservative returns are 6.83%, which are the result of combining the long-term capital market assumptions from four prominent financial firms

30-year Funded Ratio Forecast
Funded Ratios Can Vary But Are Expected to Improve
Long-term Average Returns of 7.75%

> **With long-term returns of 7.75%, MPERS is likely to improve its funding over the next 30 years.**

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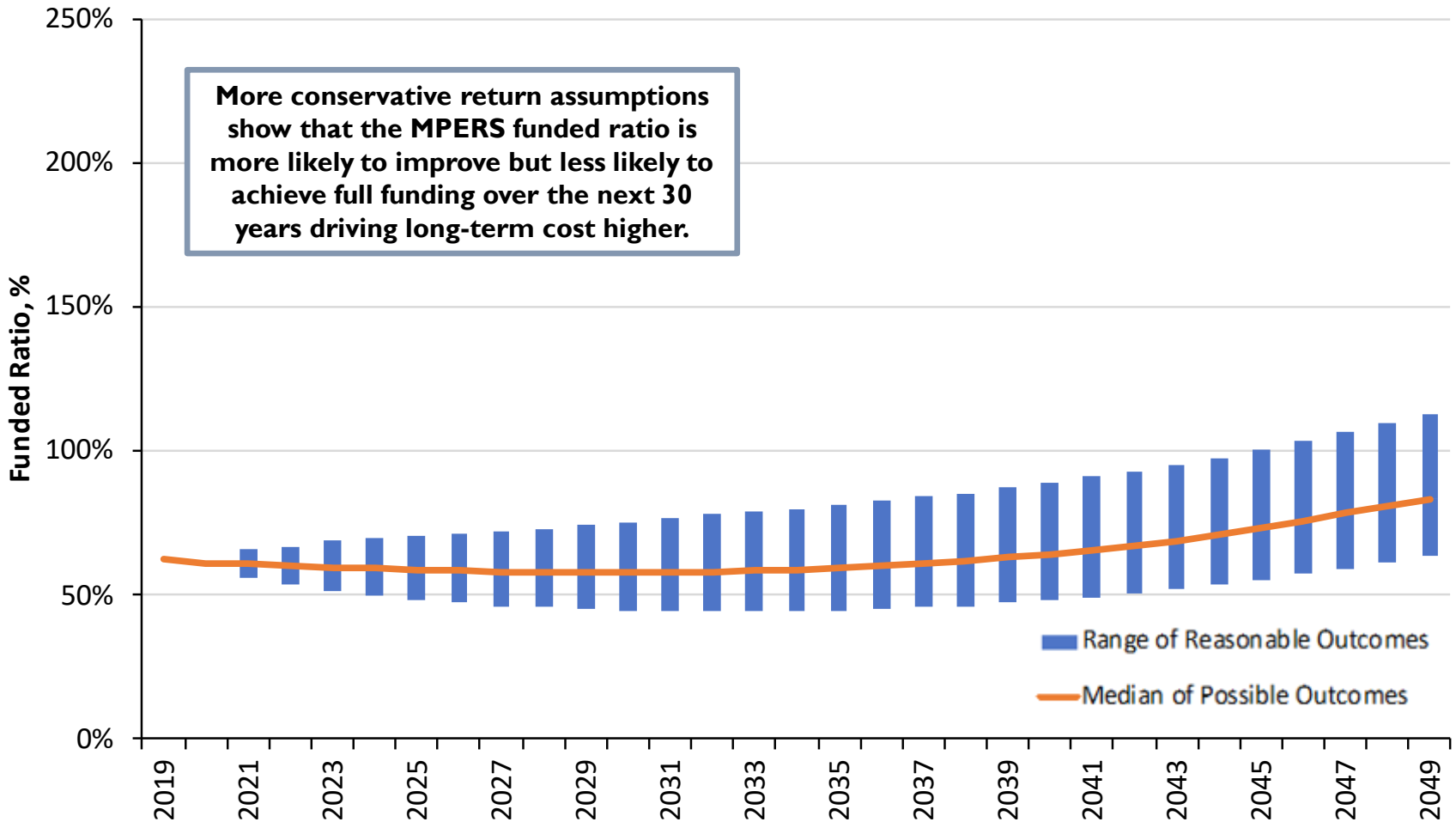- Median of Possible Outcomes

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

30-year Funded Ratio Forecast

MPERS Funding in a "New Normal" Future

More Conservative Long-term Average Returns

Source: Pension Integrity Project actuarial forecast of Mississippi MPERS plan using the return and risk assumptions of the Monte Carlo analysis. Conservative returns are 6.15%, which are the result of combining the long-term capital market assumptions from four prominent financial firms

Sensitivity of Normal Cost
Alternative Assumed Rates of Return
(Amounts to be Paid in 2020-21 Contribution Fiscal Year; % of projected payroll)

	Gross Normal Cost	Employer Normal Cost	Employee Normal Cost (Average)
7.75% Assumed Return (FYE 2019 Baseline)	10.47%	1.47%	9.0%
6.75% Assumed Return	10.82%	1.82%	9.0%
5.75% Assumed Return	11.27%	2.27%	9.0%
4.75% Assumed Return	11.86%	2.86%	9.0%

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 MPERS CAFR.

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

CHALLENGE 2: INSUFFICIENT CONTRIBUTIONS

- MPERS has fallen below their actuarially determined contribution rate 10 of the past 15 years, resulting in the need for much higher contributions today.

- Cash flow challenges compound funding shortfalls in mature plans like MPERS.

- The current COLA structure deprives MPERS of the extra cash flow needed to pre-fund primary pension benefits and pay down the debt faster.

Understanding MPERS Funding Policy

Employer contributions are increased if any of the following is true:

Funded Ratio

If MPERS actuaries calculate a 30-year projected funded ratio below 65% funded using current contribution rates, employer contribution rates are automatically increased to reach above 80% in 2047.

or

Net Cash Flow

If MPERS experiences a negative cash flow greater than 7.75%, employer contribution rates are automatically increased. In 2019, MPERS cash flow rate was negative 5%.

or

ADEC Ratio

If there is more than a 10% difference between the board-determined contribution rate (currently 17.40% of payroll), and the required contribution rate determined by MPERS actuaries (ADEC) to pay off all unfunded liabilities over 30 years, employer contribution rates are automatically increased.

Understanding MPERS Funding Policy

- Automatically triggering contribution increases when MPERS falls below 65% funded sets a funding floor but fails to account for the added costs and risks associated with holding an unfunded pension liability and a funded ratio less than 100%.

  - Any pension plan less than 100% funded holds pension debt that requires *unfunded liability amortization payments* to catch up over a period of decades, like installment payments on a loan.

  - At the end of the last fiscal year, and prior to the market upheaval in 2020 related to COVID-19, MPERS held at least $18 billion in pension debt. Over $6.7 billion in state appropriations have gone to MPERS pension debt payments since 2011.

  - Carrying pension debt means future taxpayers ultimately cover the costs of today's unfunded public employee retirement benefits.

- As of 2018, future actuarial gains and losses, assumption changes or benefit enhancements or reductions are amortized over 25 years.

  - The Society of Actuaries recommends funding periods of 15 to 20 years. Longer periods result in higher long-term costs.

- MPERS' lengthy amortization policy, combined with the "level percent of payroll" amortization method, lowers near-term amortization payments while pushing more expensive payments to later years.

MPERS Negative Amortization Growth, 2001-2019
Interest on the Debt v. Amortization Payments
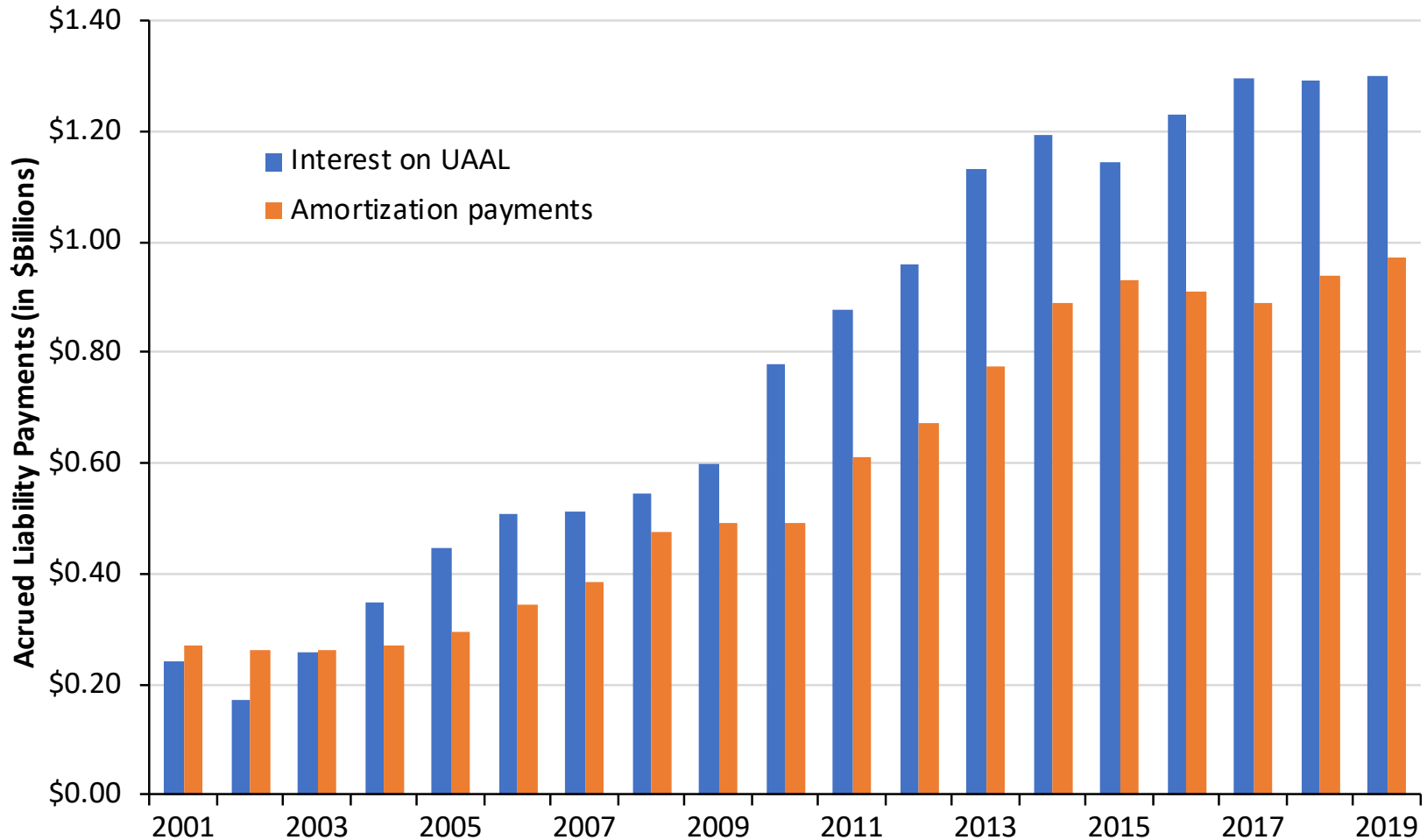
Source: Pension Integrity Project actuarial analysis of MPERS plan valuation reports and CAFRs

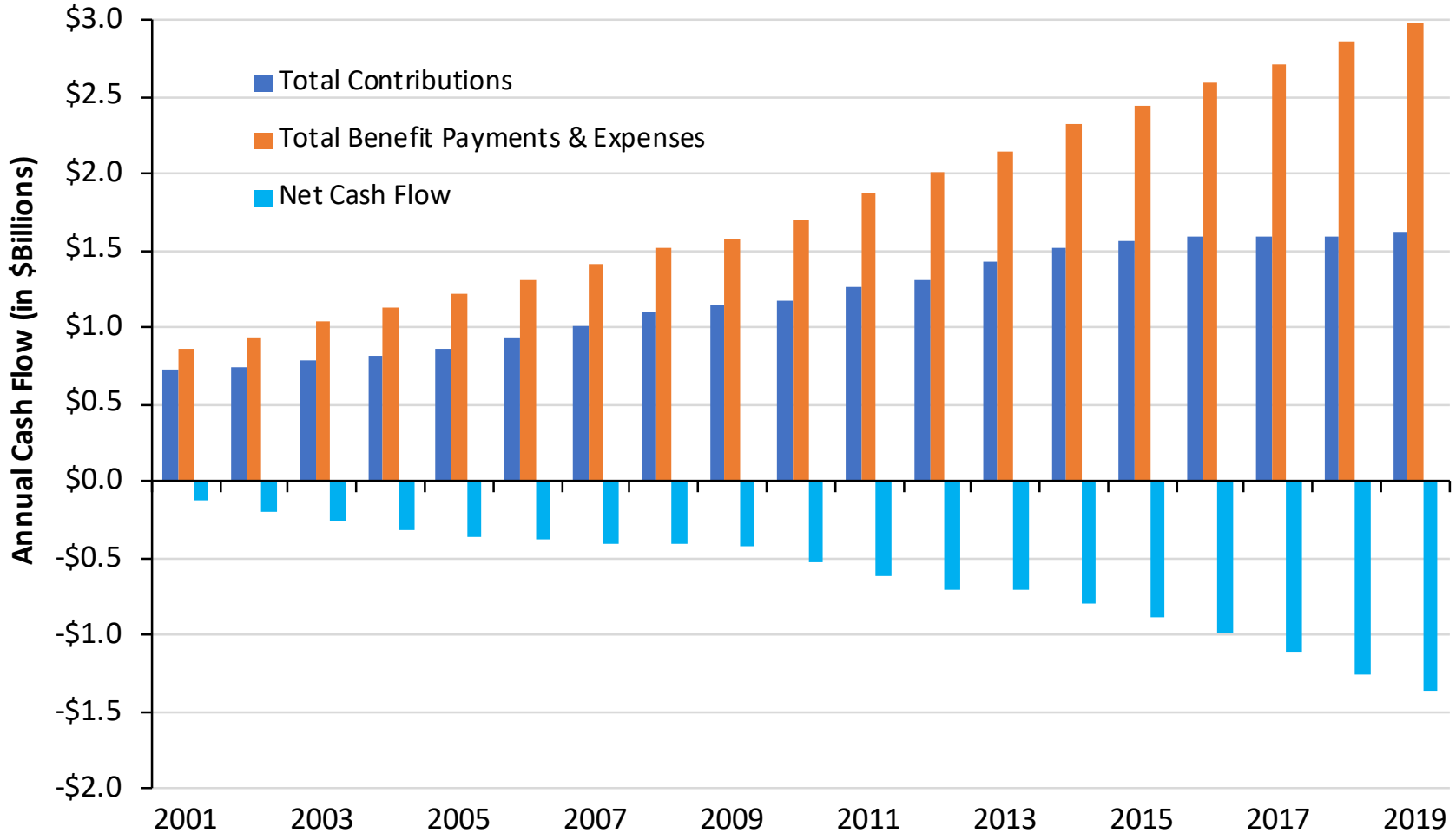# Cash Flow Demands in a Low-Yield Environment Undermine Asset Growth

- Mature pension systems like MPERS often pay out more in benefits than they take in from employees, employers, and investments - negative cash flow is expected.

- In the "New Normal" low-yield environment, as expenses strain MPERS assets, timing is important.

- Unlike newly established plans, MPERS will need to pay out a significant amount of pension benefits over the next 15 years, meaning a large portion of its current assets will not be around (in years 16-30) to make up for the lower earnings anticipated.

- As of 2019, the duration of MPERS actuarial liabilities was 38 years.

Quick Fact:
- MPERS paid out $2.7 billion in benefits and refunds in 2019, while taking in only $1.6 billion in contributions.

Source: Pension Integrity Project analysis of MPERS valuation reports and CAFRs.

Net Cash Flow, 2001-2019
Expenses Outgrowing Contributions

Source: Pension Integrity Project analysis of MPERS actuarial reports and CAFRs. Net Cash Flow indicates the difference between total contributions and total expenses.

Cash Flow Demands in a Low-Yield Environment Undermine Asset Growth

Two important factors are rapidly driving up MPERS cash outflow demands:

- Benefit enhancements before the 2000s offered to MPERS members resulted in higher benefit payouts than would otherwise be required without these increases.

- Changing demographics strain MPERS asset levels because as MPERS matures the number of retired employees outgrow active members. This is exacerbated by the aging population phenomenon.

Large negative cash flows, although expected, may indicate:

- A need to adjust return assumption from long-term horizon to mid-term projection, to better align with the average timing of pension payouts.

- A need for additional pension contributions.

- Severely high actuarial risks caused by unrealistic actuarial assumptions.

- Impractical reliance on investment returns to grow assets, meaning MPERS is more exposed to downside risks.

Source: Pension Integrity Project analysis of MPERS actuarial valuations.

Prefunding Benefits vs. Debt Payments:
MPERS Payments to Amortize the Unfunded Liability are Growing
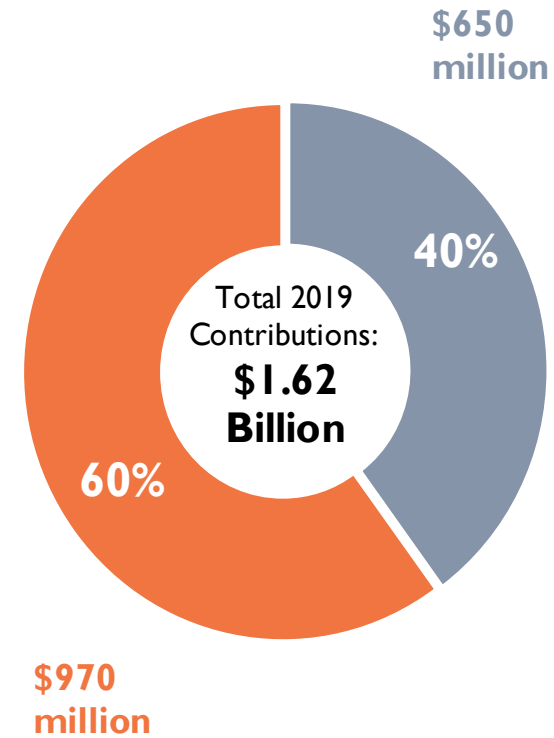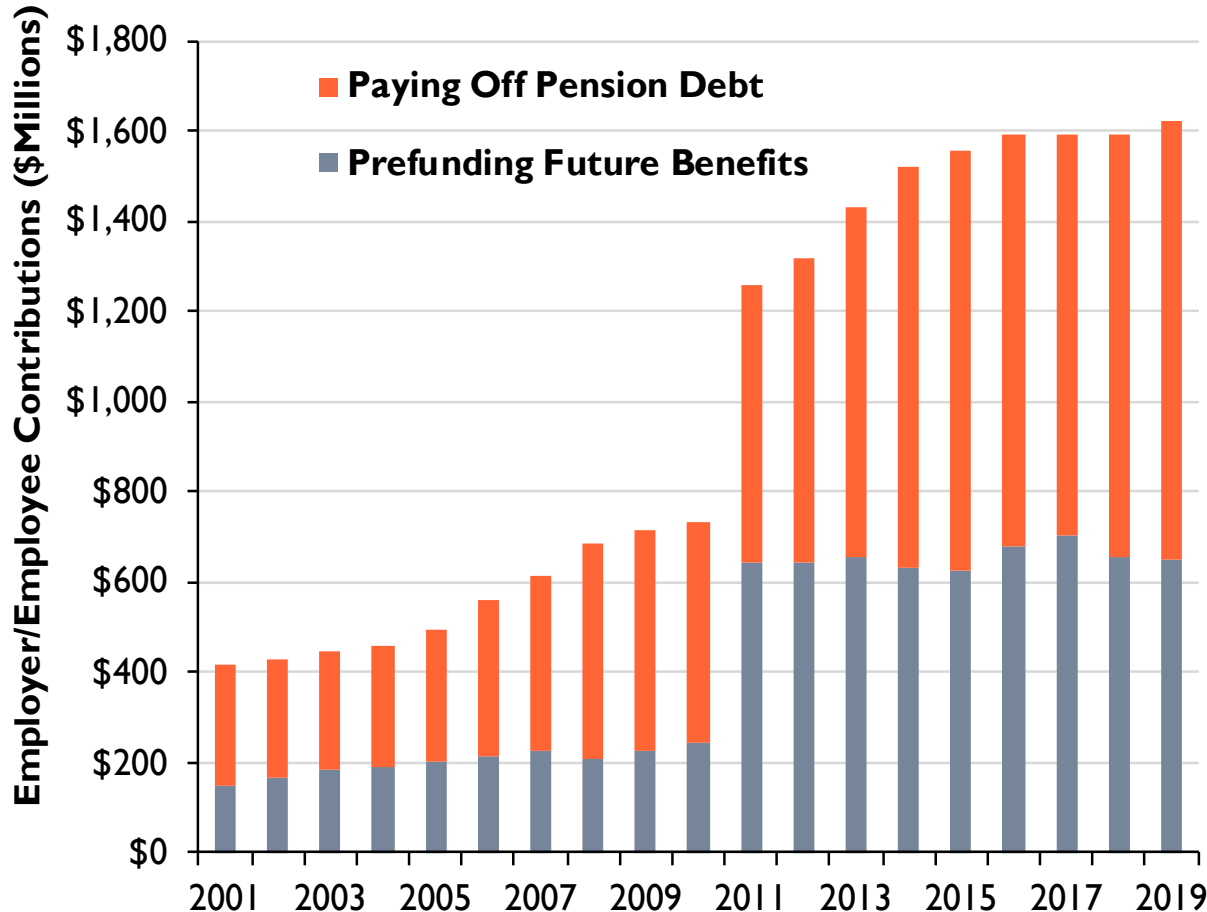
Source: Pension Integrity Project actuarial analysis of of Mississippi MPERS plan valuation reports and CAFRs

Guaranteed Compound Cost-of-Living Adjustments

- The current COLA equals 3% compounded for each fiscal year after the year in which the retired member reaches age 60 (55 for those who became members of MPERS before July 1, 2011).

- Total cost-of-living adjustment (COLA) payments in 2019 were $700 million, about a quarter of all benefit payouts made that year.

- Over the course of a typical retirement period, the current MPERS COLA equates to nearly 26% off the benefit value.

- While factoring the COLA into MPERS' normal cost is good practice, the 3% rate historically outpaced the actual change in inflation.

  - COLAs is meant to guard retirees against the diminishment of their benefit's purchasing power of due to inflation.

COLA as part of Benefit Payments:
MPERS COLA growth relative to non-COLA portion of benefit payments
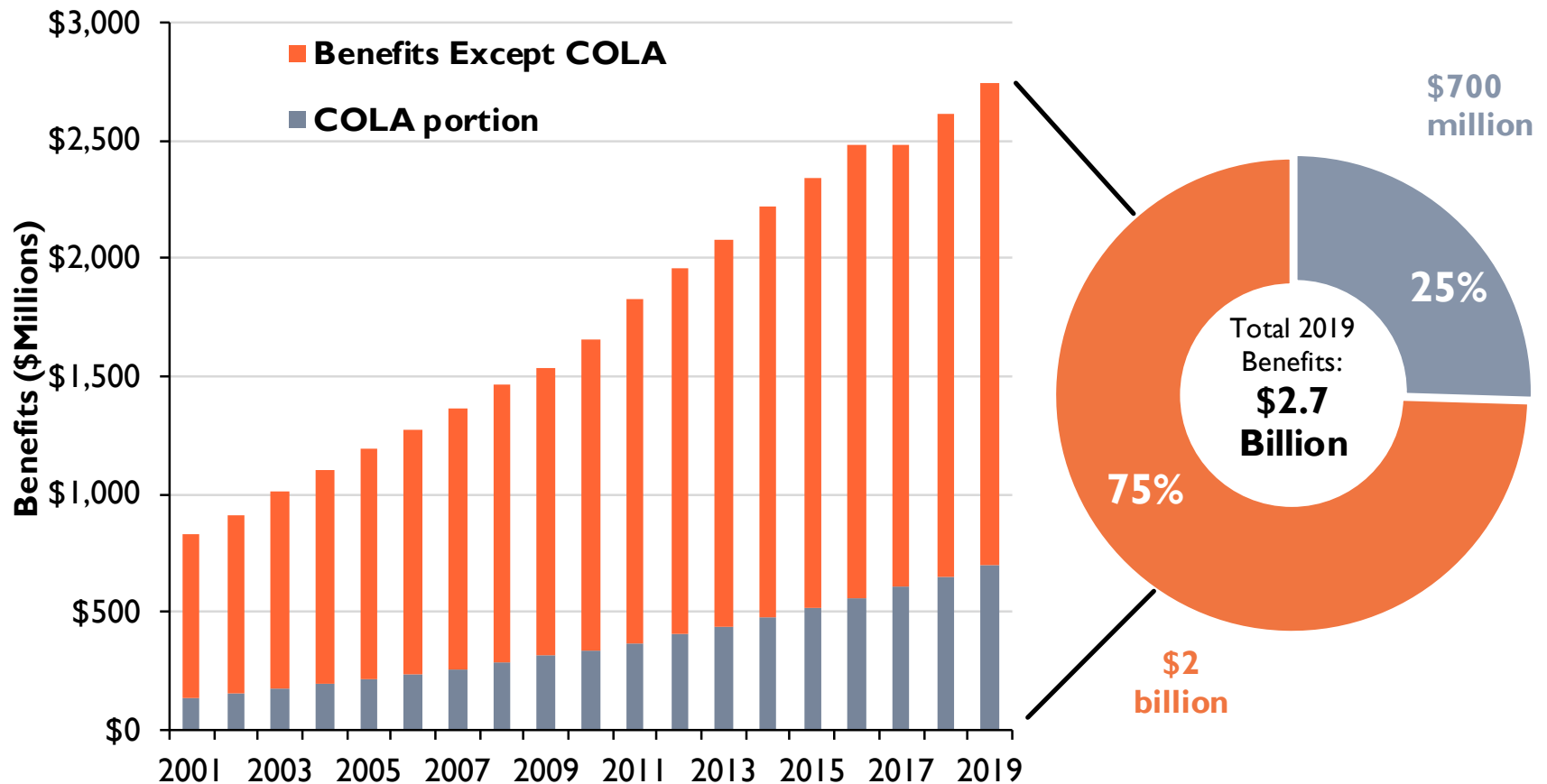
Source: Pension Integrity Project actuarial analysis of of Mississippi MPERS plan valuation reports and CAFRs

CHALLENGE 3: ACTUARIAL ASSUMPTIONS AND METHODS

- Failure to meet actuarial assumptions and delay in updating those assumptions has led to an underestimation of the total pension liability.

- 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 from Aggressive Actuarial Assumptions
Actual Experience Different from Actuarial Assumptions

(+) Overestimated Payroll Growth

- PERS employers have not raised salaries as fast as expected, resulting in lower payrolls and thus lower earned pension benefits. This has meant a reduction in unfunded liabilities of $3.7 billion from 2001 to 2019.

(-) Overestimated Payroll Growth

- However, overestimating payroll growth is creating a long-term problem for MPERS 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 vs. Assumption
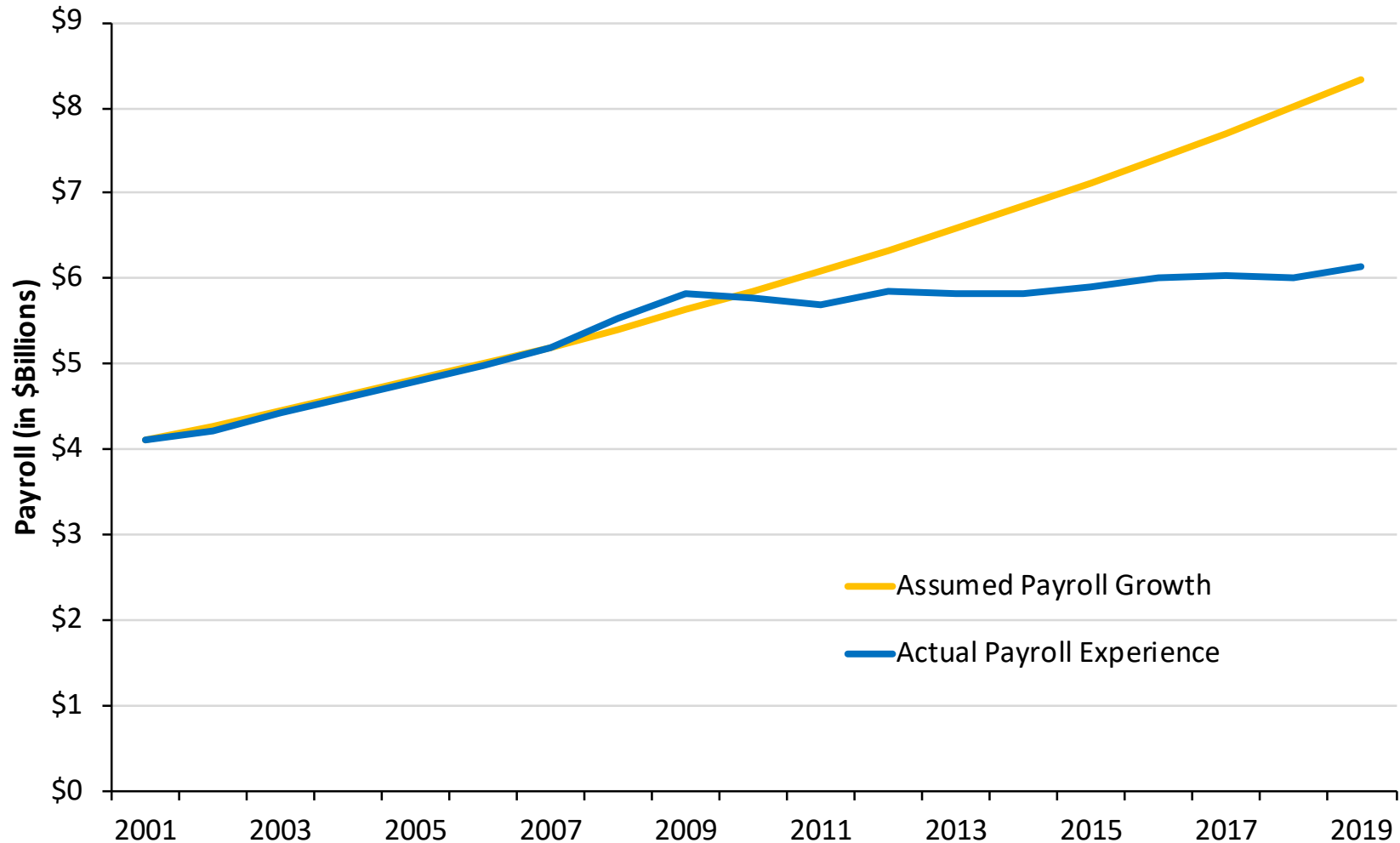
Source: Pension Integrity Project actuarial analysis of of Mississippi MPERS plan valuation reports and CAFRs

Challenges from Aggressive Actuarial Assumptions
Actual Experience Different from Actuarial Assumptions

(-) Withdrawal Rate, Service Retirement, and Post-Retirement Mortality Assumptions

- MPERS's unfunded liability has increased by $3.4 billion between 2001-2019 due to misaligned demographic assumptions.

- This stems from a combination of one or more of the following factors:

  o Actual withdrawal rates before members have reached either a reduced or normal retirement threshold have been higher than anticipated.

  o MPERS members have been retiring at older ages than expected, receiving less pension checks.

  o Retired members have been living longer than expected, thereby receiving more pension checks than anticipated.

Challenges from Aggressive Actuarial Assumptions
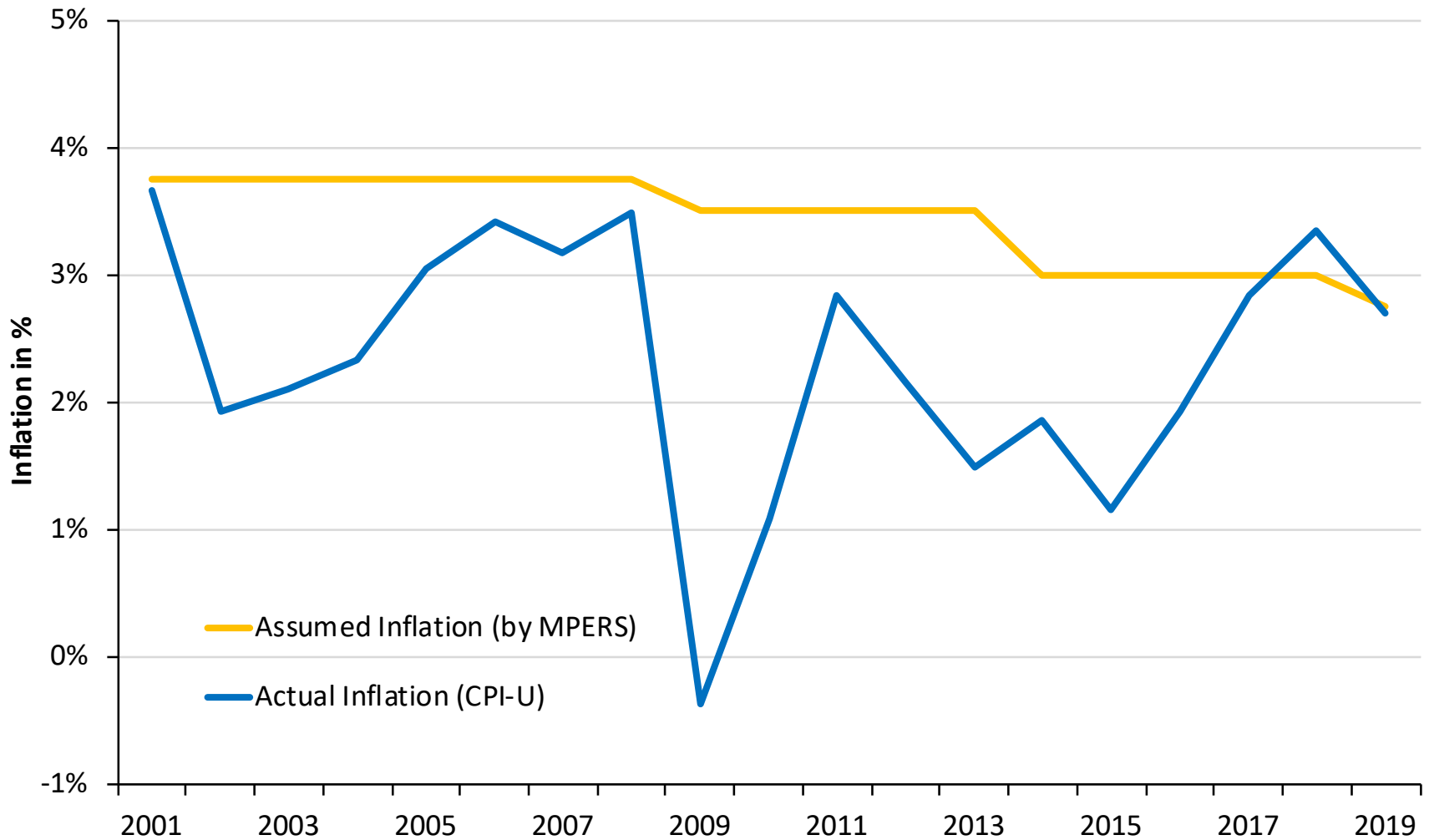# Actual Experience Different from Actuarial Assumptions

(-) Overestimating Post-Retirement Mortality Rates

- Over the last two decades, deviations from mortality assumptions alone accounted for $234 million in unfunded liabilities.

- Overestimating mortality rates for retired members may increase long-term costs for MPERS by increasing the benefits government is required to pay out over the prolonged life of retired public employees.

- According to a recent study by the Society of Actuaries focused specifically on public pension plans, many public workers—including male and female teachers, as well as female general government employees who reached age 65—are expected, on average, to live longer than previously assumed.

- Currently, MPERS uses RP-2014 Mortality Table with BB improvement scale, that updates mortality rates only by age, thereby, missing out on longevity improvements that accrue over the coming calendar years.

Challenges from Aggressive Actuarial Assumptions
Actual Inflation vs. Assumption

Source: Pension Integrity Project analysis MPERS actuarial valuation reports and CPI-U data for the South region from the Bureau of Labor Statistics.

Challenges from Aggressive Actuarial Assumptions
Assumption Changes Expose Hidden Unfunded Liabilities
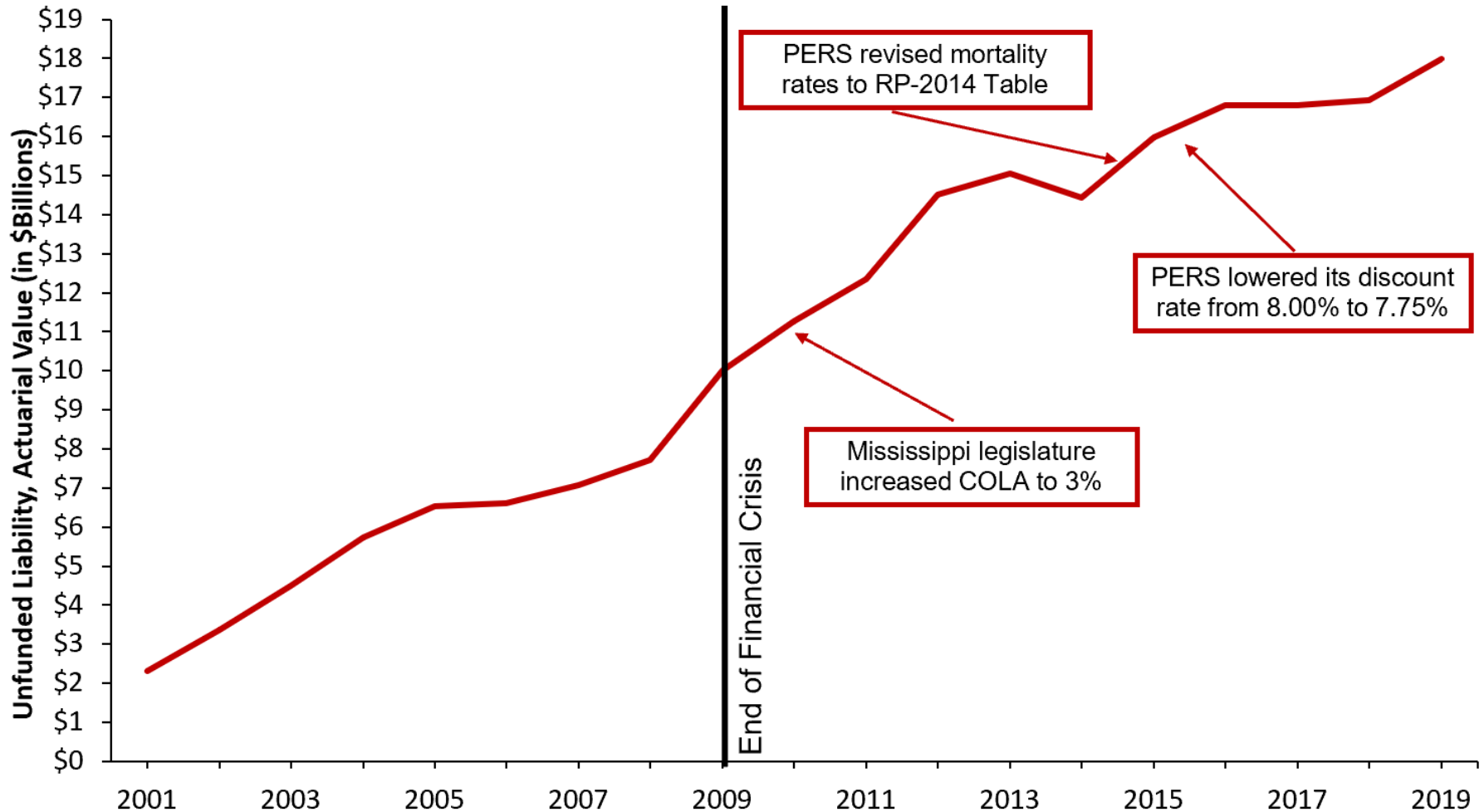
Source: Pension Integrity Project analysis of MPERS actuarial valuation reports.

CHALLENGE 4: DISCOUNT RATE AND UNDERVALUING DEBT

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

MPERS 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 MPERS — 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 MPERS 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.

MPERS 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 Mississippi would pay out less than 100% of promised retirement income benefits to members and retirees.**
   - Promised benefits for vested members represent a legal contract.

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.

MPERS Pension Debt Sensitivity
FYE 2019 Unfunded Liability Under Varying Discount Rates

	Funded Ratio	Unfunded Liability	Actuarial Accrued Liability
7.75% Discount Rate	61.6%	$17.6 billion	$45.8 billion
6.75% Discount Rate	55.0%	$23.1 billion	$51.3 billion
5.75% Discount Rate	49.6%	$29.6 billion	$57.8 billion
4.75% Discount Rate	43.2%	$37.1 billion	$65.3 billion

Source: Pension Integrity Project analysis of MPERS GASB Statements. Current MPERS discount rate is set at 7.75%.
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 MPERS Discount Rate (2001-2019)
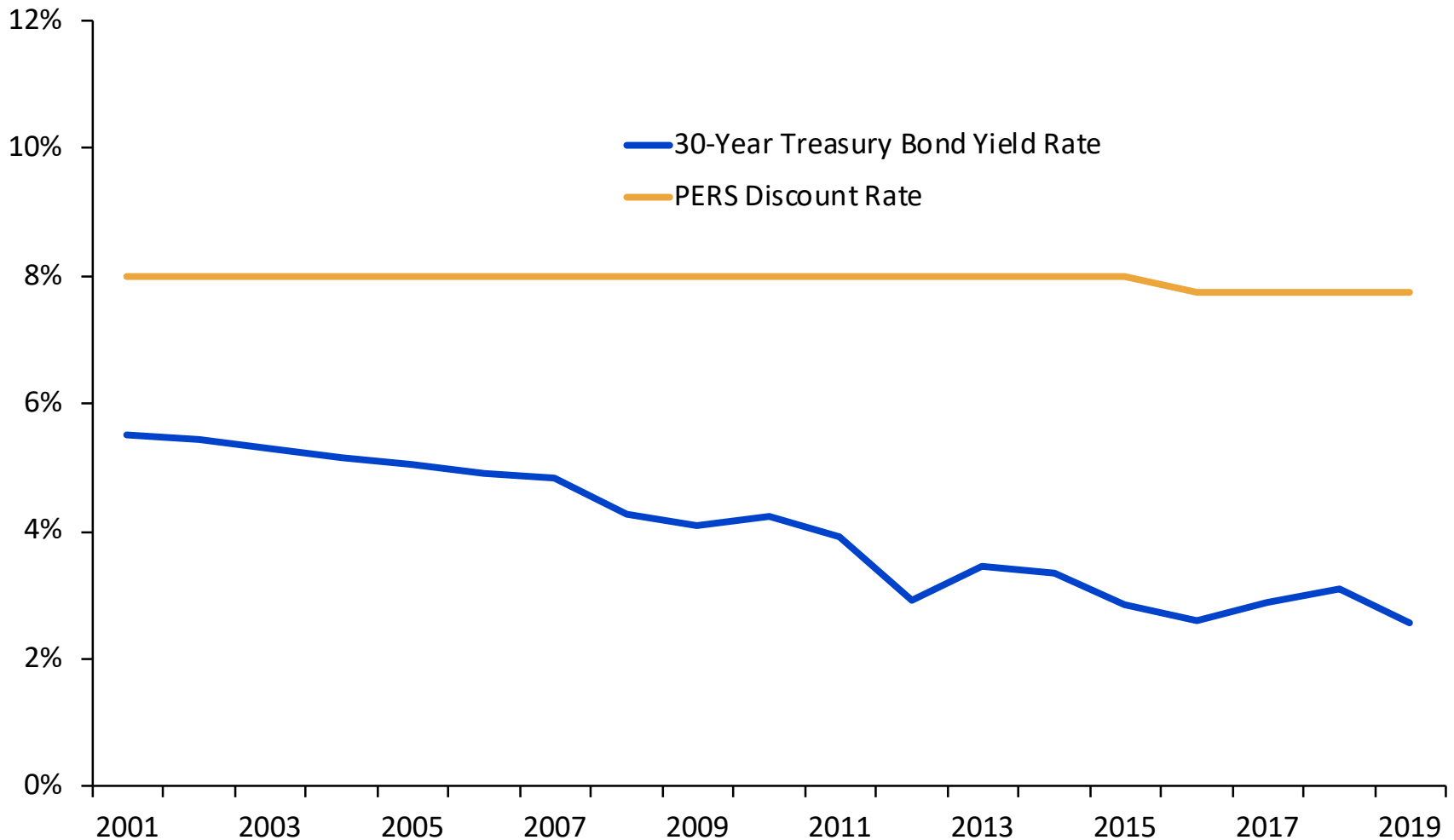
Source: Federal Reserve average annual 30-year treasury constant maturity rate
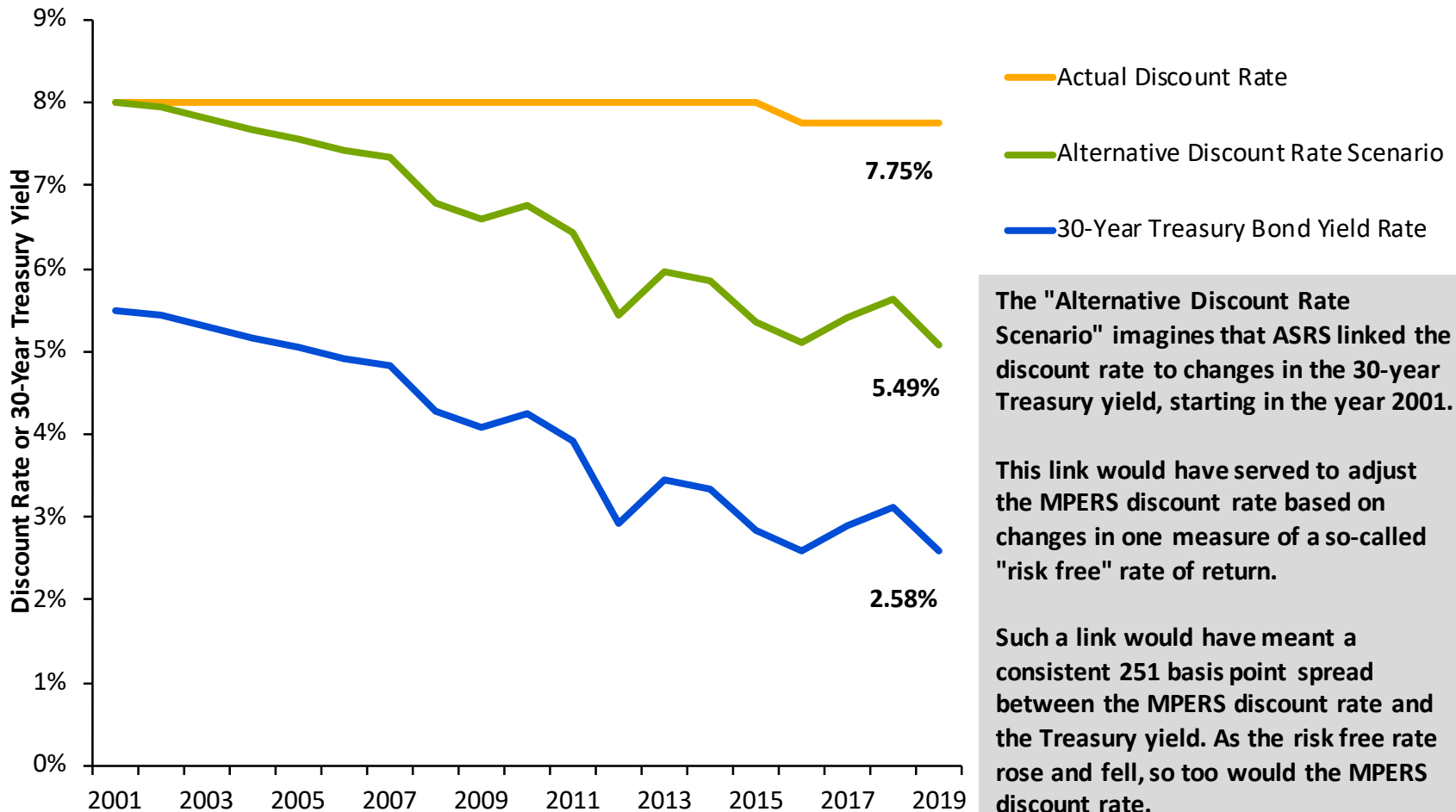
Comparing Change in Discount Rate to the Change in the Risk-Free Rate, 2000-2019

Legend:
- Actual Discount Rate
- Alternative Discount Rate Scenario
- 30-Year Treasury Bond Yield Rate

Labeled values on chart: **7.75%**, **5.49%**, **2.58%**

The "Alternative Discount Rate Scenario" imagines that ASRS linked the discount rate to changes in the 30-year Treasury yield, starting in the year 2001.

This link would have served to adjust the MPERS discount rate based on changes in one measure of a so-called "risk free" rate of return.

Such a link would have meant a consistent 251 basis point spread between the MPERS discount rate and the Treasury yield. As the risk free rate rose and fell, so too would the MPERS discount rate.

Source: Federal Reserve average annual 30-year treasury constant maturity rate
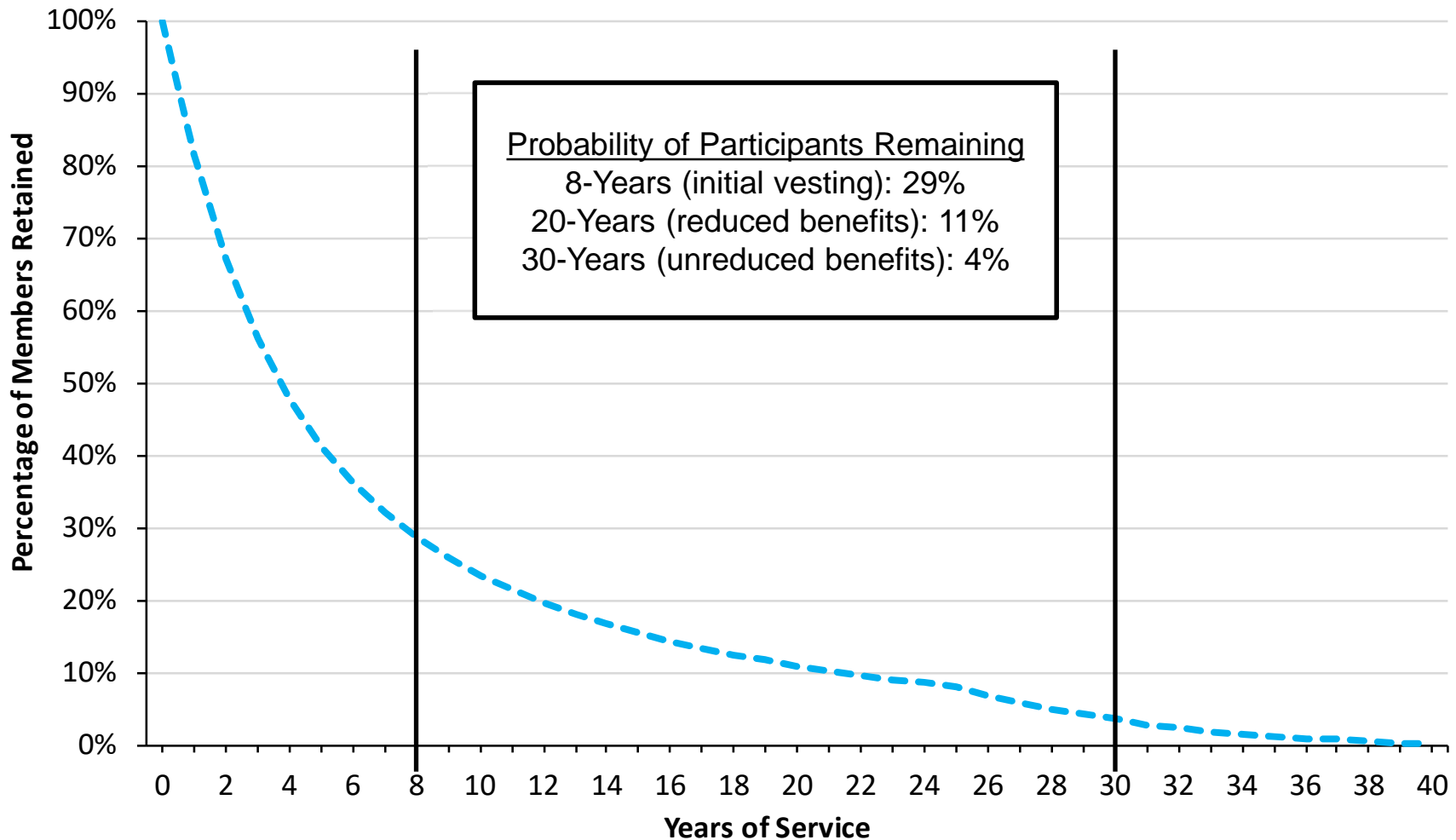
CHALLENGE 5:
THE EXISTING BENEFIT DESIGN DOES NOT WORK FOR EVERYONE

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

Probability of Members Remaining in MPERS

Probability of Participants Remaining
8-Years (initial vesting): 29%
20-Years (reduced benefits): 11%
30-Years (unreduced benefits): 4%

Source: Pension Integrity Project analysis of MPERS actuarial reports, CAFRs, and experience study. Illustration is based on plan's 2018 assumptions and a hypothetical analysis of an average employee hired at the age of 25

Does the MPERS Retirement Plan Work for All Employees?

- **71%** of new workers **leave** before vesting with 8 years of service
  - Employees need to work for 8 years (4 years if hired on or before June 30, 2007) before their benefits become vested.
  - Employees who leave the plan before then must forfeit contributions their school or state made on their behalf.

- **89%** of new workers **leave** before 20 years of service.

- Just **11%** of MPERS workers remain in the system from start to finish to receive **partial** benefits

- Only **4%** of MPERS workers remain in the system from start to finish to receive **full** benefits after 30 years of service
  - Mississippi ensures that all employees have access to Social Security benefits.

Recruiting and Retaining Public Employees

- **Recruiting a 21st Century Workforce:**
  - There is little evidence that retirement plans — DB, DC, or other design — are a major factor in whether an individual wants to become a teacher or otherwise enter public service.
  - The most likely incentive to increase recruiting to the public sector work force is increased salary.

- **Retaining Employees:**
  - If worker retention is a goal of the MPERS system, it is clearly not working. About 60% of employees leave within 5 years.
  - After 8 years of service (initial vesting) there is some retention effect, but 96% of all workers do not end up receiving full benefits because they do not accumulate enough years of service.

MPERS Benefit Overview

DB Plan Design for New Hires

- **Multiplier:** 2% (25 or 30 years) / 2.5% (additional years)
- **Final Average Salary:** Four highest years
- **Vesting:** 4 or 8 Years depending on Tier
- **Normal Retirement Eligibility:** Age 60 and vested
- **Early Retirement Provision:** Any Age & 25 years of service
- **Average Employee Contribution:** 9.0%
- **Participation in Social Security:** Yes
- **Annual Benefit Summary** *(Retirees as of 7/1/19)*:
  - Average Annual Benefit: $24,433
  - Number of Retirees and Beneficiaries: 107,844

Source: Pension Integrity Project analysis of MPERS actuarial reports and CAFRs. Noncontributory members don't make pension contributions.

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.

Questions?

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