

MONTANA TEACHERS' RETIREMENT SYSTEM (TRS) PENSION SOLVENCY ANALYSIS

Prepared by:

Pension Integrity Project at Reason Foundation

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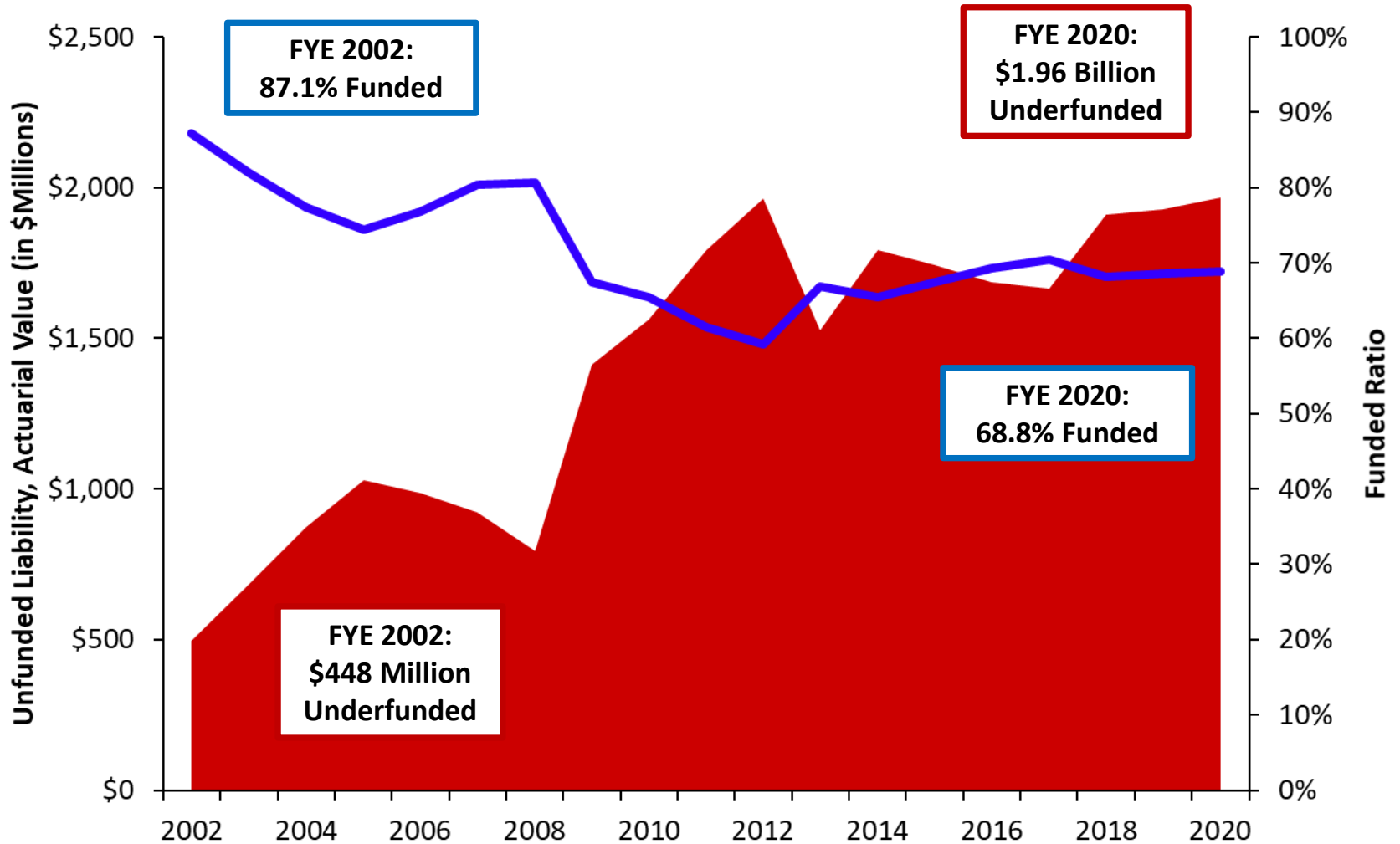


About the Pension Integrity Project

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:

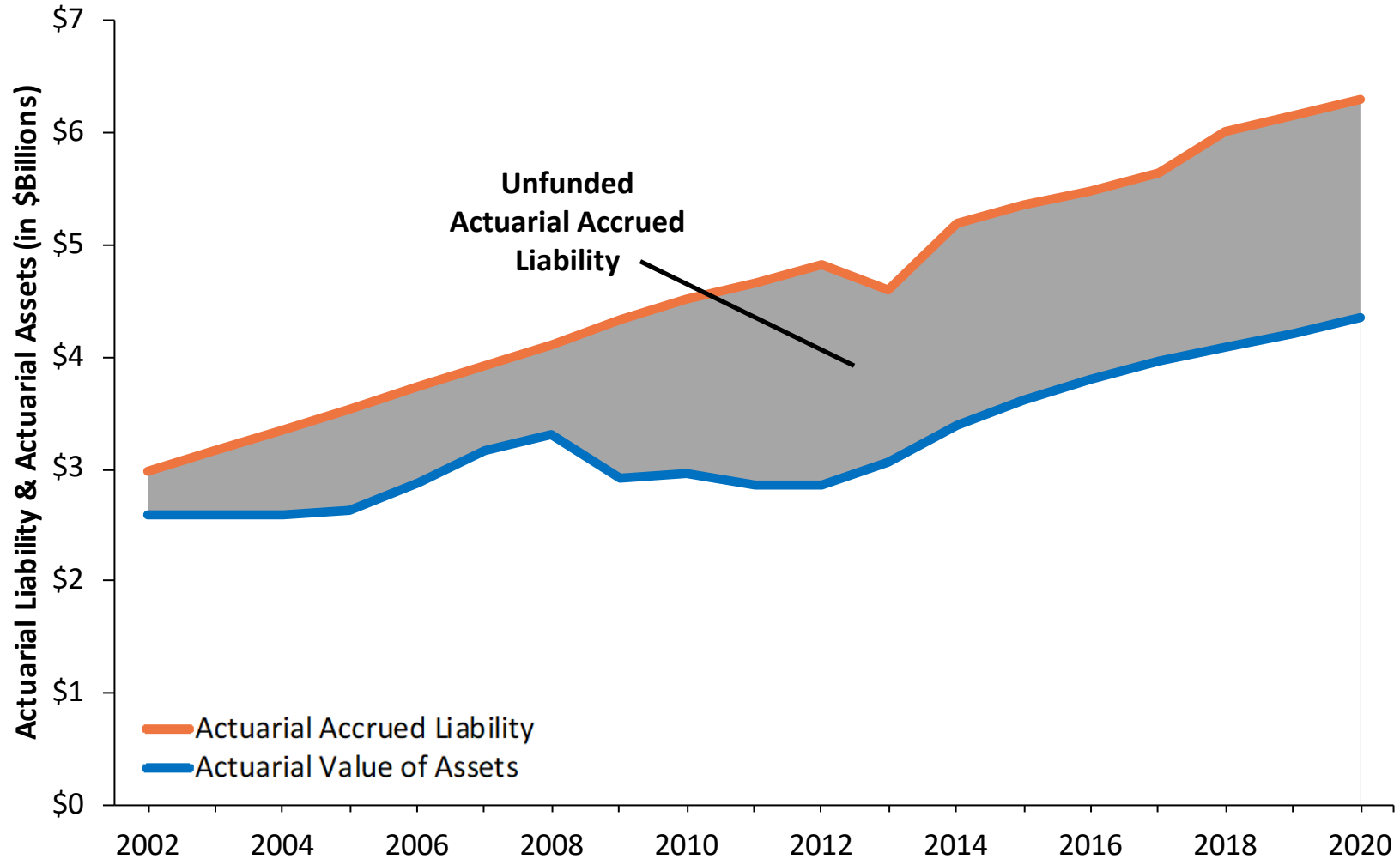
- *Customized analysis* of pension system design, trends
- *Independent actuarial modeling* of reform scenarios
- Consultation and modeling around *custom policy designs*
- Latest pension reform *research and case studies*
- *Peer-to-peer mentoring* from state and local officials who have successfully enacted pension reforms
- Assistance with *stakeholder outreach*, engagement and relationship management
- Design and execution of *public education programs* and media campaigns

A History of Weakening Solvency (2002-2020)



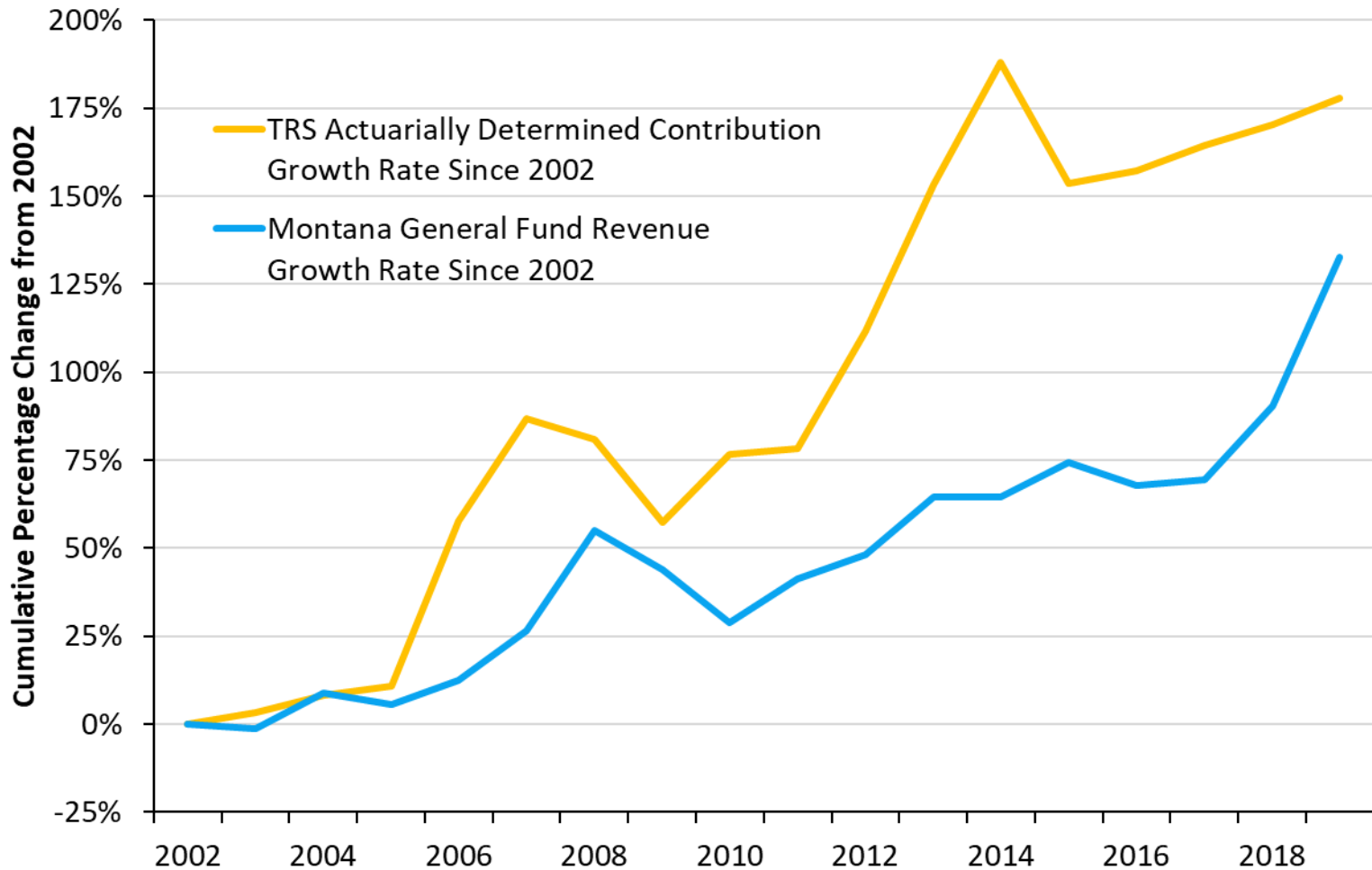
Source: Pension Integrity Project analysis of Montana TRS actuarial valuation reports and CAFRs.

TRS Liabilities are Growing Faster than Assets



Source: Pension Integrity Project analysis of TRS actuarial valuation reports through FY2020.

Actuarially Determined Contribution Rates Growing Faster than Montana Revenue



Source: Pension Integrity Project analysis of TRS actuarial valuation reports and data from NASBO Fiscal Survey of States. GASB recently changed the definition of Actuarially Required Contribution (ARC) to Actuarially Determined Employer Contribution (ADEC).



Makeup of TRS Contributions

	FY2020 Contributions	
	% of Payroll	\$ Value
Total Employee	8.15%	\$71,774,428
Total Employer	14.40%	\$126,805,201
<i>State (Normal Cost)</i>	1.63%	\$14,354,886
<i>State (Debt Amortization)</i>	9.57%	\$84,279,911
<i>State (Supplemental Statutory Contributions)</i>	2.84%	\$25,000,000
<i>Agency (Required Agency Contribution)</i>	0.36%	\$3,170,404
Total TRS Contributions	22.55%	\$198,579,629

Montana law (MCA 19-20-608 & 609) dictates that if the TRS funded ratio is below 90%, Employer contributions should contribute an additional 1% of compensation, increasing by 0.1% each year up to 2% or the TRS funding ratio is above 90%.

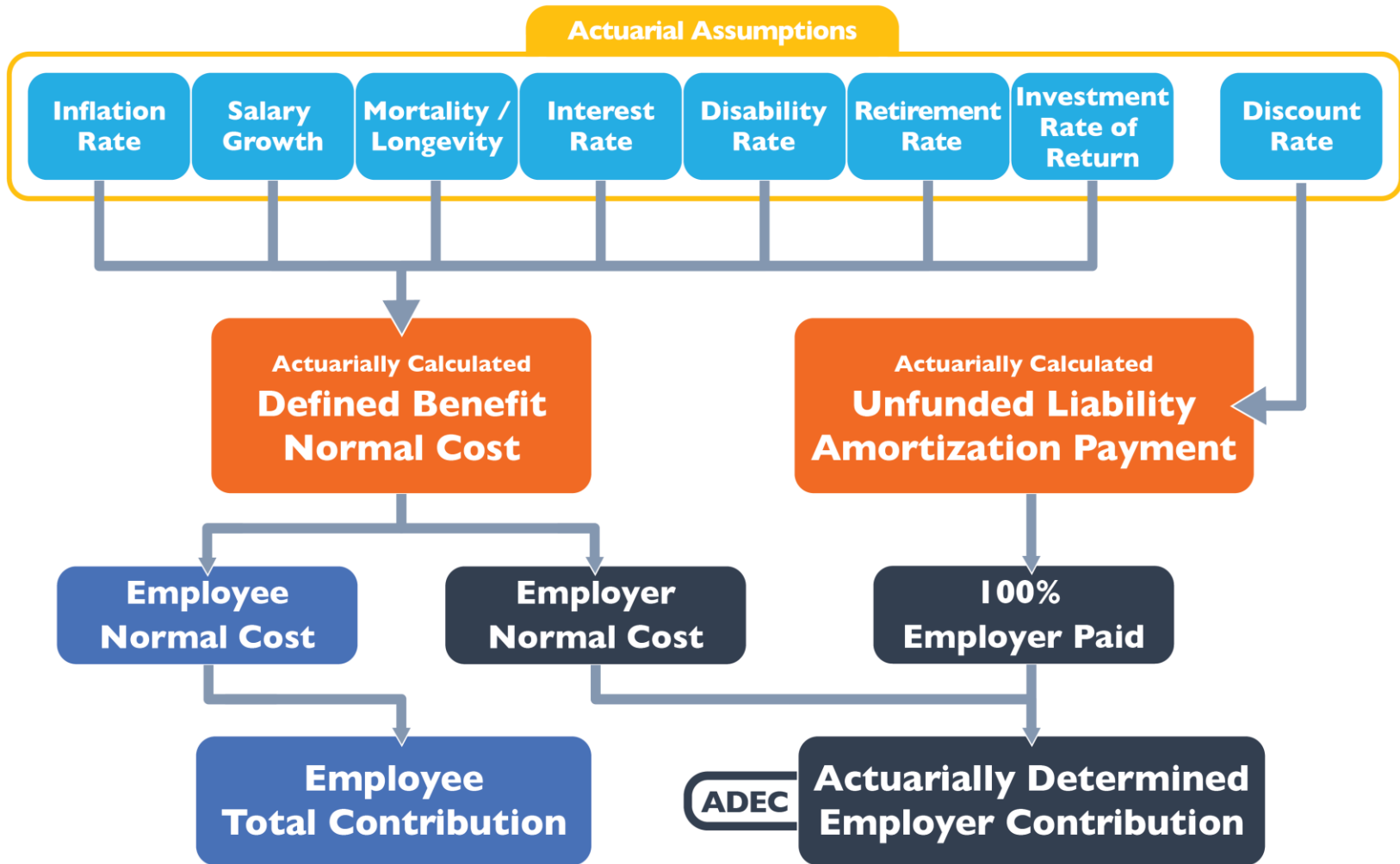
The supplemental rate applicable to the university system (MUS-RP), is currently set at 4.72%.



CHALLENGES CURRENTLY FACING MONTANA TRS



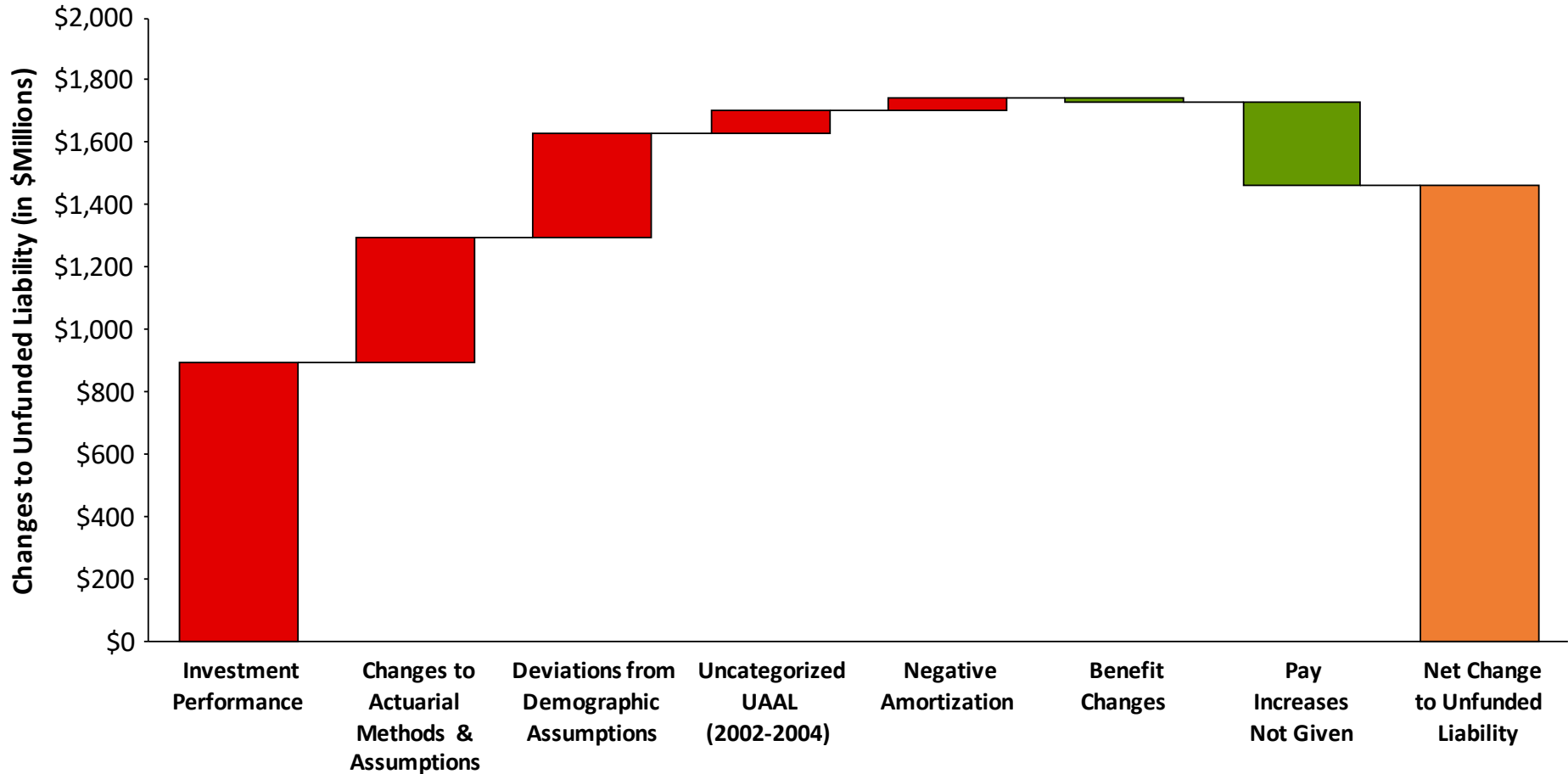
How a Pension Plan is Funded





Composition of MTRS Pension Debt

Actuarial Experience of Montana TRS, 2002-2020



Source: Pension Integrity Project analysis of Montana TRS CAFRs. Data represents cumulative unfunded actuarial liability by gain/loss category. Uncategorized unfunded actuarial accrued liability (UAAL) accumulated between 2002-2004 and not allocated to any MTRS CAFR or valuation category.

The Drivers Behind TRS Pension Debt



1. **Deviations from Investment Return Assumptions** have been the largest contributor to the TRS unfunded liability, adding \$897 million since 2002.
2. **Changes to Actuarial Methods & Assumptions** to better reflect current market and demographic trends have exposed over \$400 million in previously unrecognized unfunded liability.
3. **Deviations from Demographic Assumptions** – including deviations from withdrawal, retirement, disability, and mortality assumptions — added \$332 million to the unfunded liability over the last 15 years.
4. **Extended Amortization Timetables** have resulted in interest on TRS debt exceeding the actual debt payments (negative amortization) since 2002, adding a net \$39 million in the unfunded liabilities.



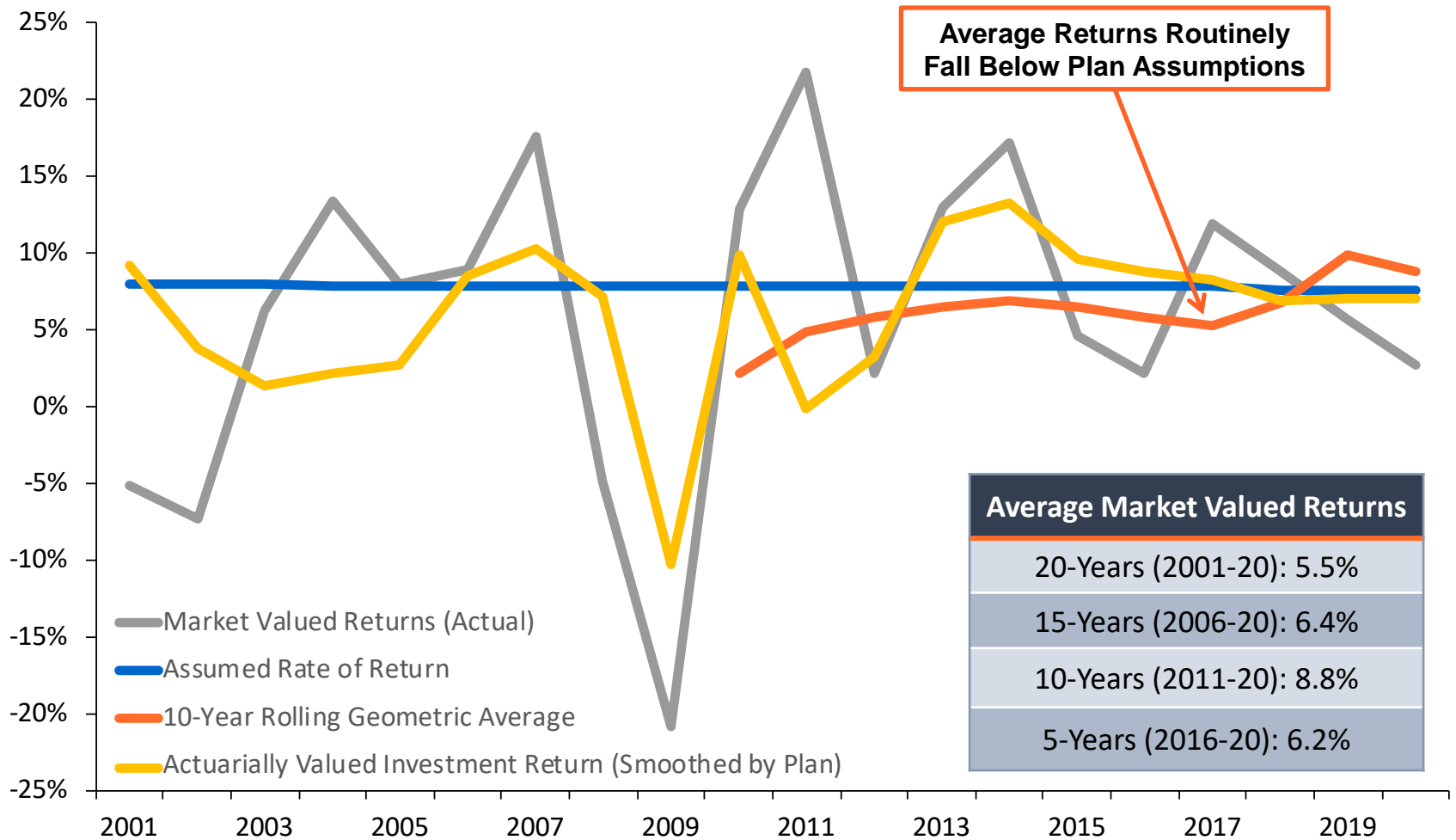
CHALLENGE I: ASSUMED RATE OF RETURN

- **Unrealistic Expectations:** Current Montana TRS investment return assumptions expose 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.



TRS Challenge I: Investment Returns

Investment Return History, 2001- 2020



Source: Pension Integrity Project analysis of Montana TRS actuarial valuation reports and CAFRs. The current assumed rate of return for TRS is 7.50%



TRS Challenge I: Investment Returns

Investment Returns Have Underperformed

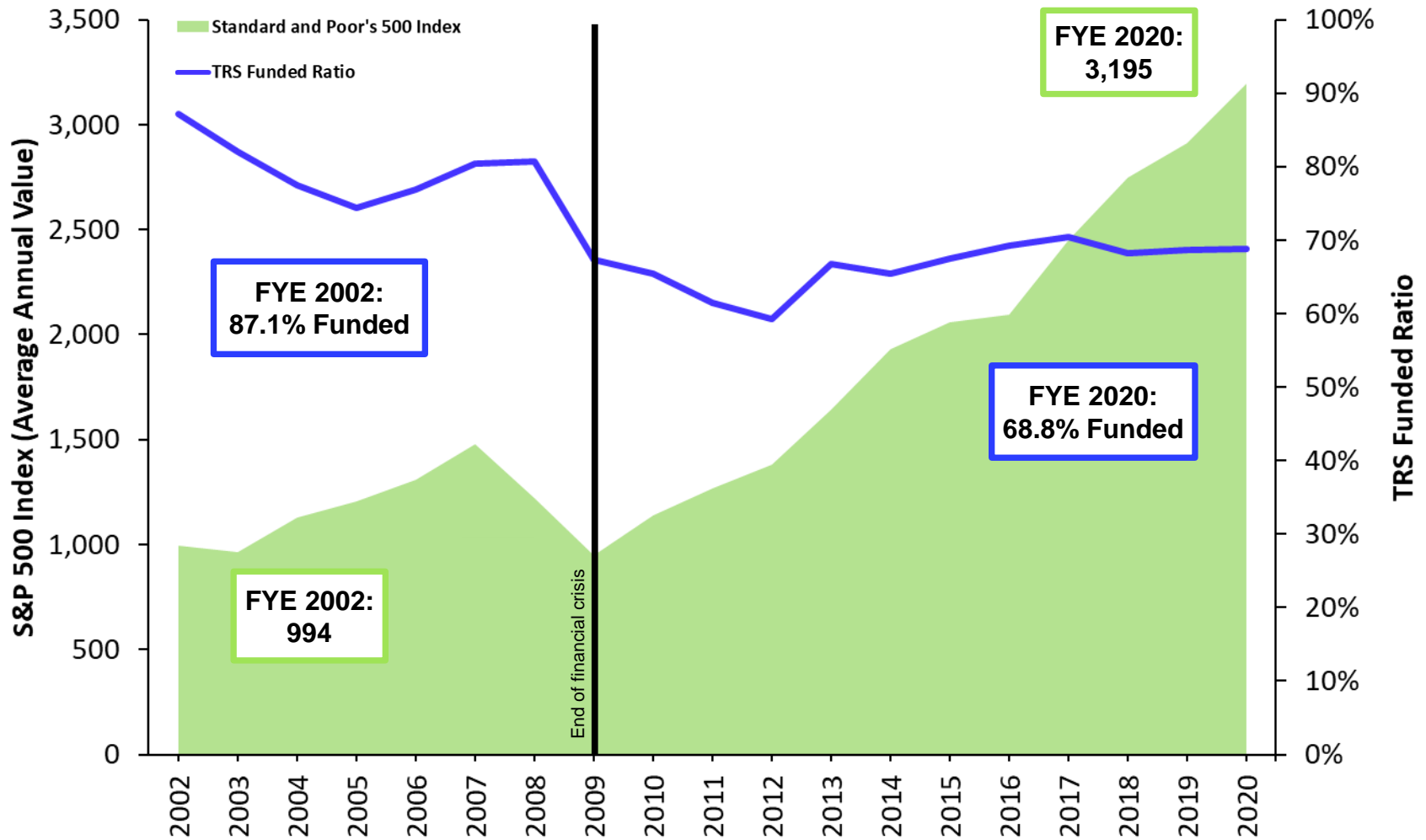
- TRS actuaries have historically used an 8% assumed rate of return to calculate member and employer contributions, slowly lowering the rate to 7.5% over the past two decades in response to significant market changes.
- Average long-term portfolio returns have not matched long-term assumptions over different periods of time:

Average Market Valued Returns	Average Actuarially Valued Returns
20-Years (2001-2020): 5.5%	20-Years (2001-2020): 5.9%
15-Years (2006-2020): 6.4%	15-Years (2006-2020): 6.6%
10-Years (2011-2020): 8.8%	10-Years (2011-2020): 7.5%
5-Years (2016-2020): 6.2%	5-Years (2016-2020): 7.6%

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



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



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



New Normal: The Market Has Changed

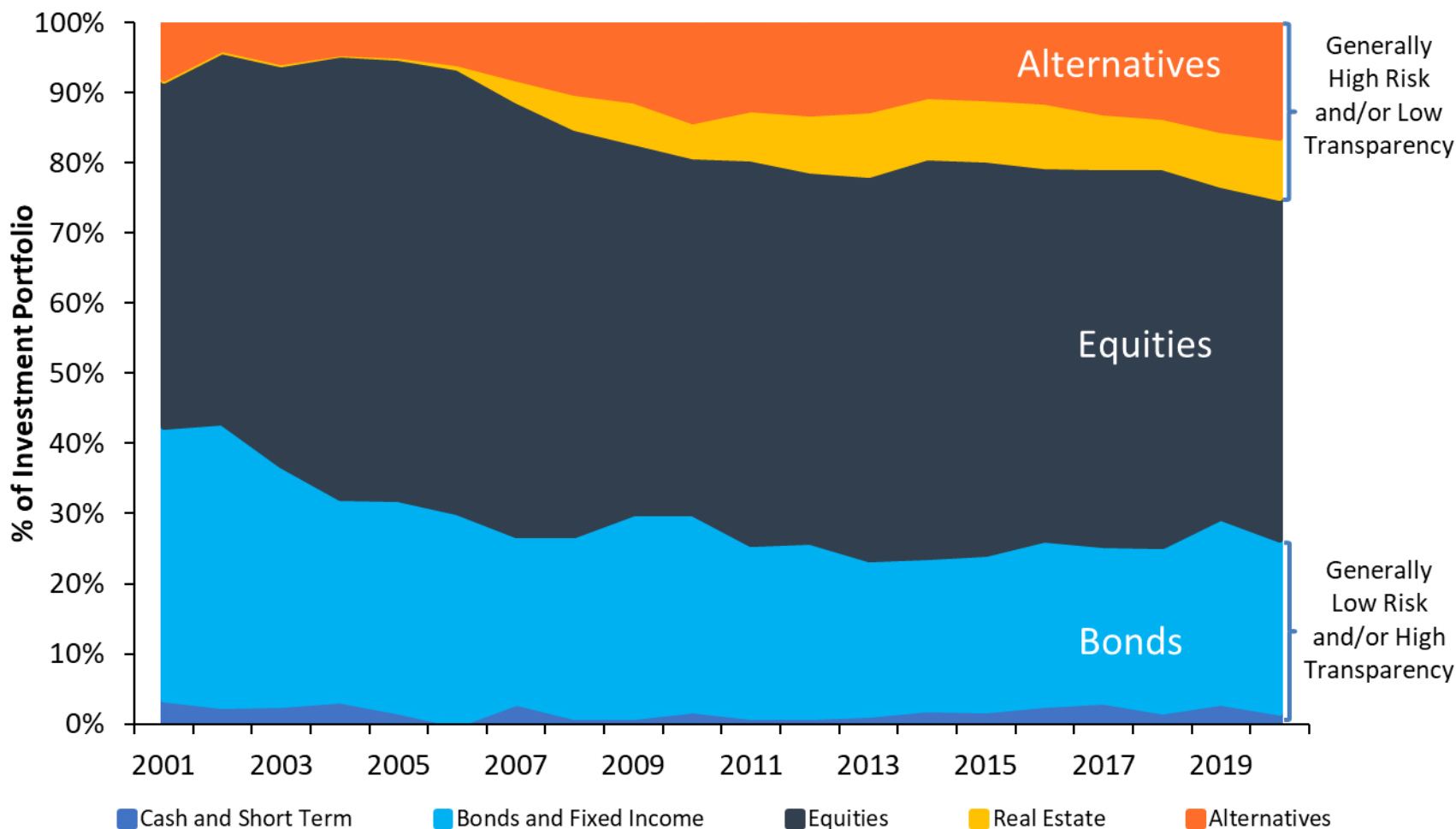
The “new normal” for institutional investing suggests that achieving even a 6% average rate of return in the future is optimistic.

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 near 8% in the 1990s to consistently less than 3%.
 - New phenomenon: negative interest rates, designates a collapse in global bond yields.
 - The U.S. just experienced the longest economic recovery in history, yet average growth rates in GDP and inflation are below expectations.
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. The Montana TRS 5-year average return is around 6.6%, well below the assumed 7.5% return assumption.



Montana TRS Asset Allocation (2001-2020)

Expanding Risk in Search for Yield



Source: Pension Integrity Project analysis of Montana TRS actuarial valuation reports and CAFRS.

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



Probability of TRS Achieving A Given Return Based On:

Possible Rates of Return	TRS Assumptions & Experience		Short-to Mid-Term Market Forecast				Long-Term Market Forecast	
	TRS Historical Returns	Based on TRS Assumptions	Research Affiliates 10-Year Forecast	BNY Mellon 10-Year Forecast	Horizon 10-Year Market Forecast	JP Morgan 10-15 Year Forecast	BlackRock 20-Year Forecast	Horizon 20-Year Market Forecast
9.00%	6%	29%	6%	11%	17%	26%	30%	26%
8.00%	14%	43%	12%	21%	27%	40%	42%	39%
7.50%	19%	51%	16%	27%	34%	48%	49%	47%
7.00%	26%	58%	21%	34%	41%	56%	56%	54%
6.50%	34%	65%	27%	42%	48%	64%	62%	62%
6.00%	43%	72%	34%	50%	56%	71%	68%	68%
5.00%	61%	83%	50%	66%	69%	83%	79%	80%

Source: Pension Integrity Project Monte Carlo model based on TRS 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 TRS. Probability estimates are approximate as they are based on the aggregated return by asset class. For complete methodology contact Reason Foundation. TRS Forecast based on 2020 Horizon 20-year forecast. Probabilities projected in Horizon 20-Year Market Forecast column reflect 2020 reported expected returns. Horizon is an external consulting firm that surveyed capital assumptions made by other firms.

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



TRS Assumptions & Experience

- A probability analysis of TRS historical returns over the past 20 years (2000-2020) indicates only a modest chance (26%) of hitting the plan's 7.5% assumed return.
- Horizon's long-term capital assumptions adopted by TRS project a 47% chance of achieving their current 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 TRS.
- Analysis of capital market assumptions publicly reported by the leading financial firms (BlackRock, JP Morgan, BNY Mellon, and Research Affiliates) suggests that over a 10-15 year period, TRS returns are likely to fall short of their assumption.

Long-Term Market Forecast

- Longer-term projections typically assume TRS 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 7.5% being likely also show a significant chance that the actual long-term average return will fall far shorter than expected.
 - ✓ For example, according to the BlackRock's 20-year forecast, while the probability of achieving an average return of 7.5% or higher is about 49%, the probability of earning a rate of return below 5% is about 21%.



RISK ASSESSMENT

- **How resilient is TRS to volatile market factors?**



Important Funding Concepts

Employer Contribution Rates

- **Statutory Contributions:** TRS employers make annual payments based on a rate set in Montana state statute, meaning contributions remain static until changed by legislation.
- **Actuarially Determined Employer Contribution (ADEC):** Unlike statutory contributions, ADEC is the annual required amount TRS's consulting actuary has determined is needed to be contributed each year to avoid growth in pension UAL and keep TRS solvent.
- **Variable Contribution Rate:** Not as rigid as statutory contributions but not as responsive as actuarially determined contributions, Montana's current tradition of legislating contribution increases only after years of poor performance requires political action in times of volatility, with rate increases requested only when forecasts show that the period to fully amortize the current legacy unfunded liability exceeds 30 years.

Statutory rates are more susceptible to the political risk inherent to the legislative process and often result in systemic underfunding, especially when legislatively established rates fall short of what plan actuaries calculate as necessary to ensure funding progress.

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 variable contribution rate used as the baseline funding policy in the following analysis responds to changes in market conditions in lieu of the slower-paced statutory rate increases anticipated under current state law.
- The variable baseline rate factors in statutorily required appropriation from the state of a fixed amount of \$25 million for the fiscal year beginning July 1, 2013 which is used to calculate the amortization period and subsequent variable rate. The variable baseline rate does not include conditional decreases tied to the TRS funding period.

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 TRS 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 experts expect continued market volatility, and the Federal Reserve is expected to keep interest rates near 0% for years and only increase rates in response to longer-term inflation trends.

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 -24.0% returns in 2020, followed by three years of 11% average returns.
- Recognizing expert consensus regarding a diminishing capital market outlook, scenarios assume a 6% fixed annual return between crisis scenarios.
- 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.

Stress Testing Scenarios:

1. Assumed Rate of Return
2. 6% Fixed Annual Return
3. 2020-23 Crisis + 6% Fixed Annual Return
4. 2020-23 Crisis + 2035-38 Crisis + 6% Fixed Annual Return



Scenario Comparison of Employer Costs

Scenarios	Variable Statutory Contributions			Actuarial Contributions		
	30-Year Employer Contributions	2050 Unfunded Liability (Market Value)	Total All-in Employer Costs	30-Year Employer Contributions	2050 Unfunded Liability (Market Value)	Total All-in Employer Costs
Pre-Crisis Baseline	\$4.62 B	\$0.00 B	\$4.62 B	\$4.63 B	\$0.02 B	\$4.65 B
6% Fixed Annual Return	\$4.83 B	\$2.89 B	\$7.72 B	\$6.00 B	\$1.26 B	\$7.25 B
2020-23 Crisis + 6% Fixed Annual Return	\$7.01 B	\$1.32 B	\$8.33 B	\$7.48 B	\$0.67 B	\$8.15 B
Two Crises + 6% Fixed Annual Return	\$7.01 B	\$2.26 B	\$9.27 B	\$7.94 B	\$1.03 B	\$8.98 B

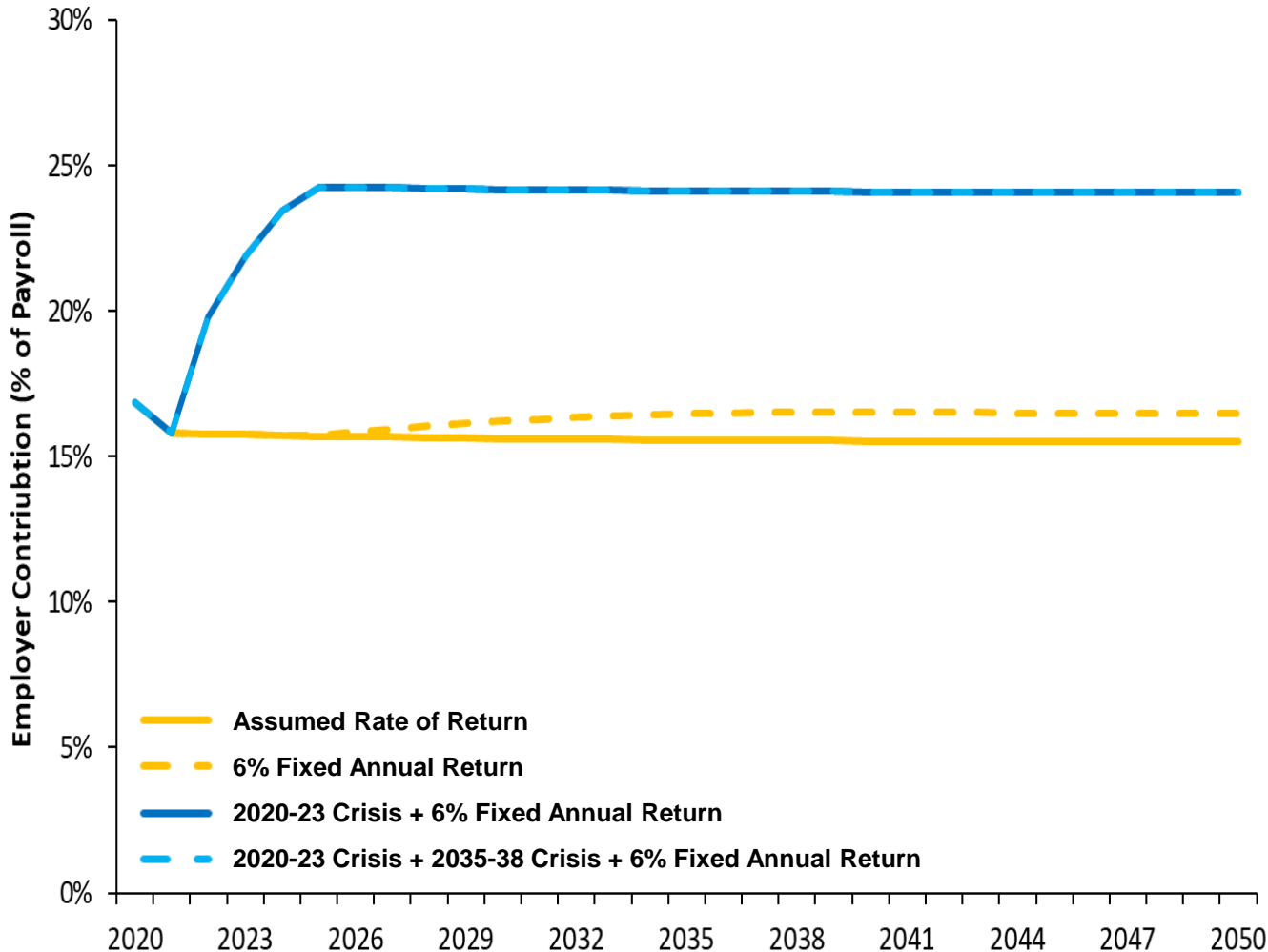
Source: Pension Integrity Project actuarial forecast of TRS. All values are rounded and adjusted for inflation. The "All-in Cost" includes all employer contributions over the 30-year timeframe, and the ending unfunded liability accrued by the end of the forecast period.



TRS Stress Testing: All-in Employer Cost Projections

How a Crisis Increases TRS Cost

Discount Rate: 7.5%, Assumed Return: 7.5%, Actual Return: Varying, Amo. Period: Current



Scenarios	Total All-in Employer Costs
Pre-Crisis Baseline	\$4.62 B
6% Fixed Annual Return	\$7.72 B
2020-23 Crisis + 6% Fixed Annual Return	\$8.33 B
Two Crises + 6% Fixed Annual Return	\$9.27 B

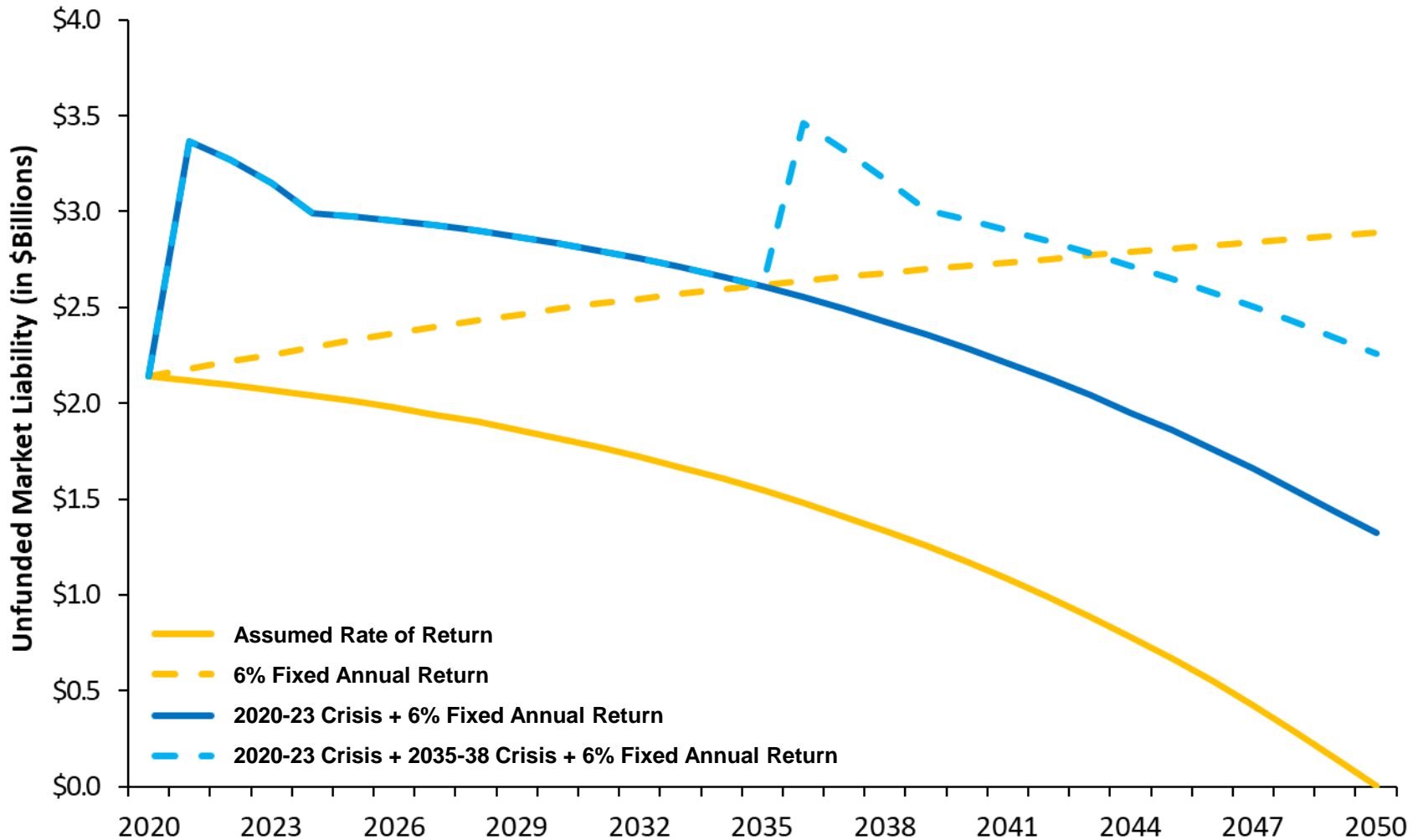
Source: Pension Integrity Project actuarial forecast of TRS. Values are rounded and adjusted for inflation. Baseline and crisis scenarios assume the State adheres to the current funding policy. All amortization schedules include both new and legacy unfunded liabilities. The "All-in Cost" includes all employer contributions over the 30-year timeframe, and the ending unfunded liability accrued by the end of the forecast period.

TRS Stress Testing: Unfunded Liability Projections

Unfunded Liabilities Under Crisis Scenarios



Discount Rate: 7.5%, Assumed Return: 7.5%, Actual Return: Varying, Amo. Period: Current



Source: Pension Integrity Project actuarial forecast of TRS. Values are rounded and adjusted for inflation. Baseline and crisis scenarios assume the State adheres to the current funding policy. All amortization schedules include both new and legacy unfunded liabilities. 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.

TRS Stress Testing: Funded Status Projections

TRS Solvency Under Crisis Scenarios



Discount Rate: 7.5%, Assumed Return: 7.5%, Actual Return: Varying, Amo. Period: Current



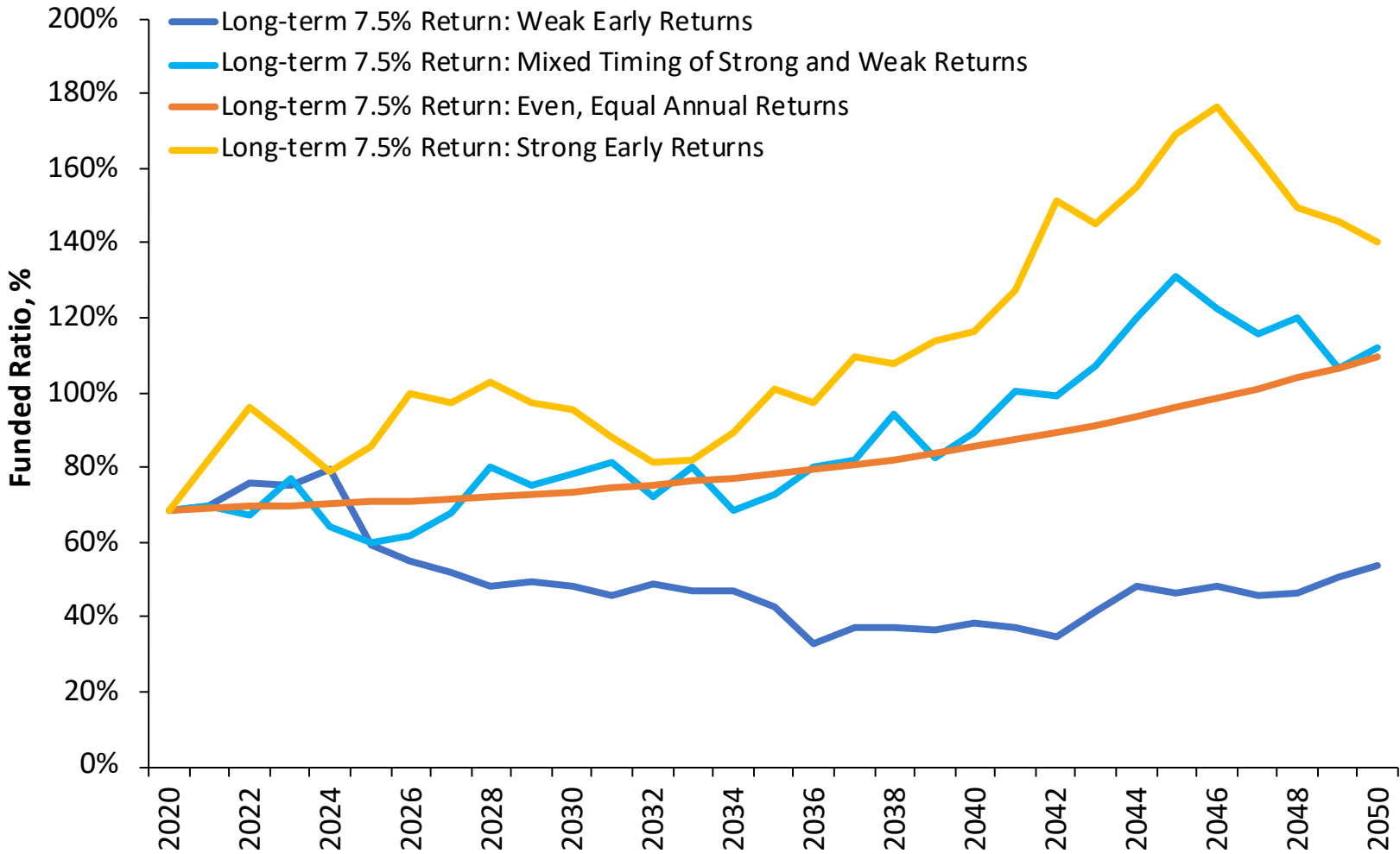
Source: Pension Integrity Project actuarial forecast of TRS. Values are rounded and adjusted for inflation. Baseline and crisis scenarios assume the State adheres to the current funding policy. All amortization schedules include both new and legacy unfunded liabilities. The "All-in Cost" includes all employer contributions over the 30-year timeframe, and the ending unfunded liability accrued by the end of the forecast period.



30-year Funded Ratio 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 TRS plan. Strong early returns (TWRR = 7.0%, MWRR = 8.1%), Even, equal annual returns (Constant Return = 7.0%), Mixed timing of strong and weak returns (TWRR = 7.0%, MWRR = 7.0%), Weak early returns (TWRR = 7.0%, MWRR = 5.8%) Scenario assumes TRS pays statutory contribution rates each year. Years are plan's fiscal years.



Forecasting the Impact of Market Volatility

Random Variable Analysis

What is it?

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

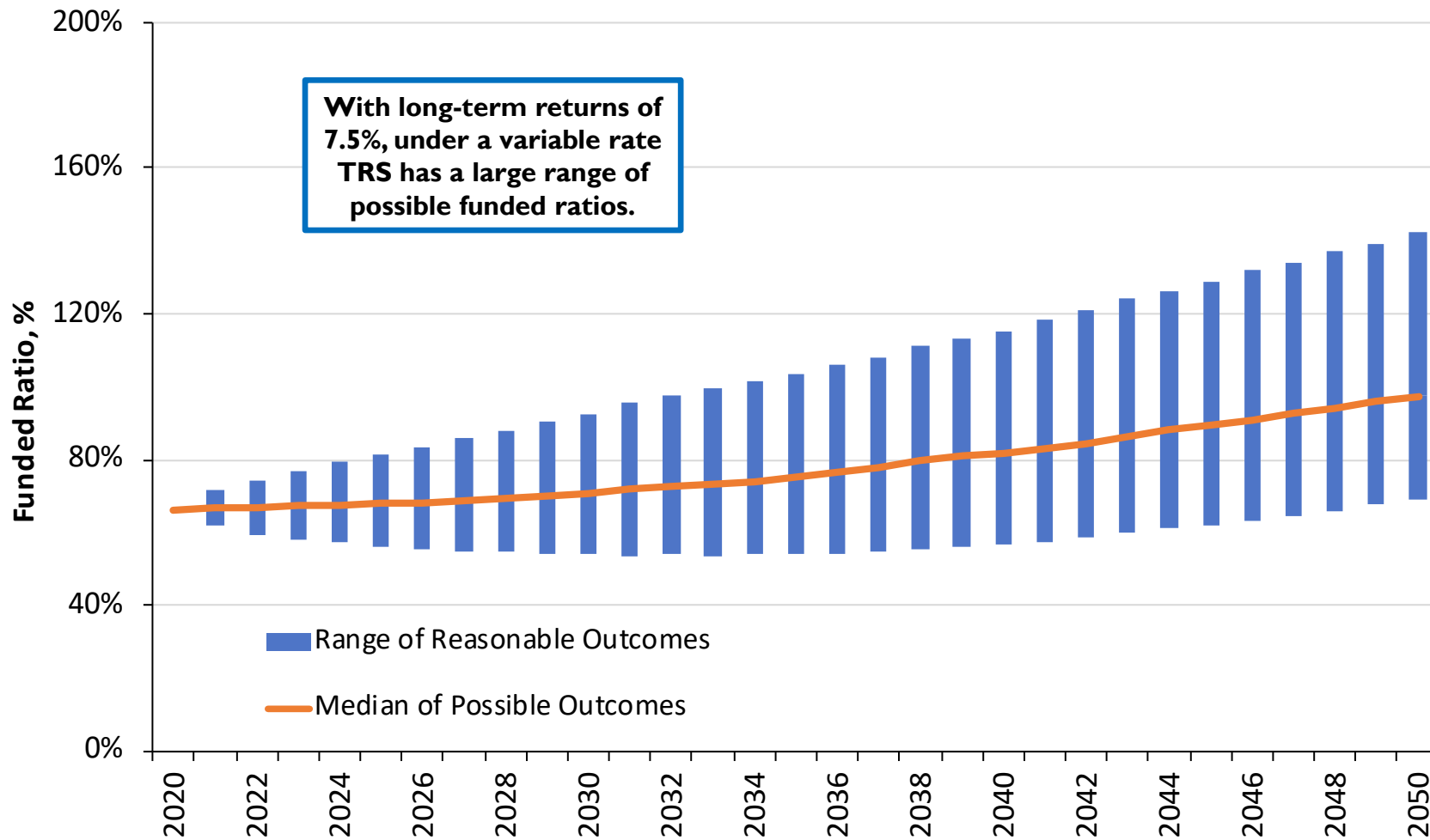
Why use it?

- 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 Funded Ratio Forecast (Variable Contribution Rate)

Funded Ratios are Expected to Improve

Long-term Average Returns of 7.5%



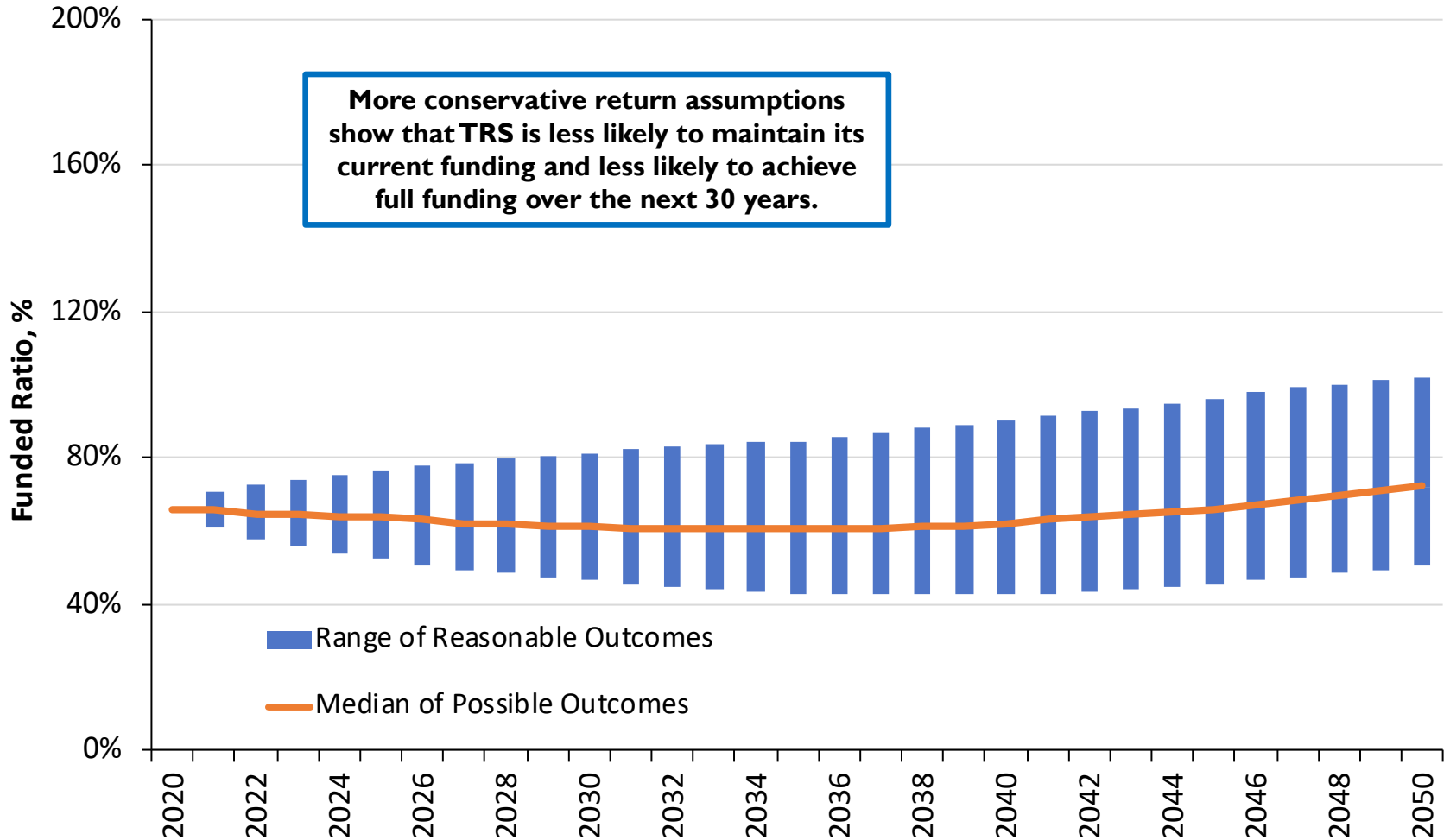
Range of Reasonable Outcomes represents the 50% of possible outcomes closest to the median.



30-year Funded Ratio Forecast (Variable Contribution Rate)

How Do Missed Returns Impact Funded Ratios?

More Conservative Long-term Average Returns



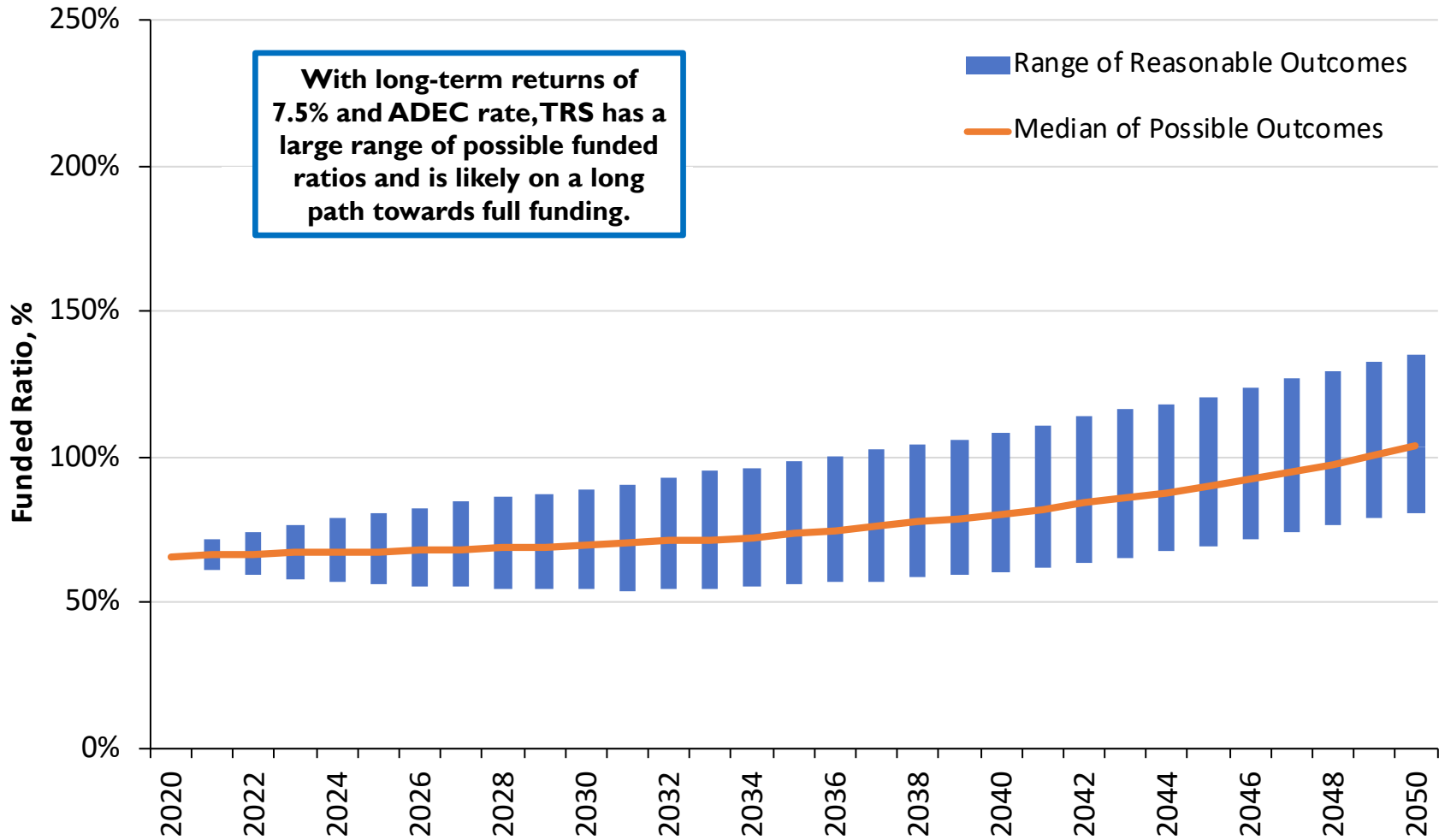
Source: Pension Integrity Project actuarial forecast of TRS plan using the return and risk assumptions of the Monte Carlo analysis. Conservative returns are 5.8%, which are the result of combining the short-term capital market assumptions from four prominent financial firms



30-year Funded Ratio Forecast (Conceptual ADEC Contribution Policy)

How Do Contribution Methods Affect Funding?

Long-term Average Returns of 7.5%



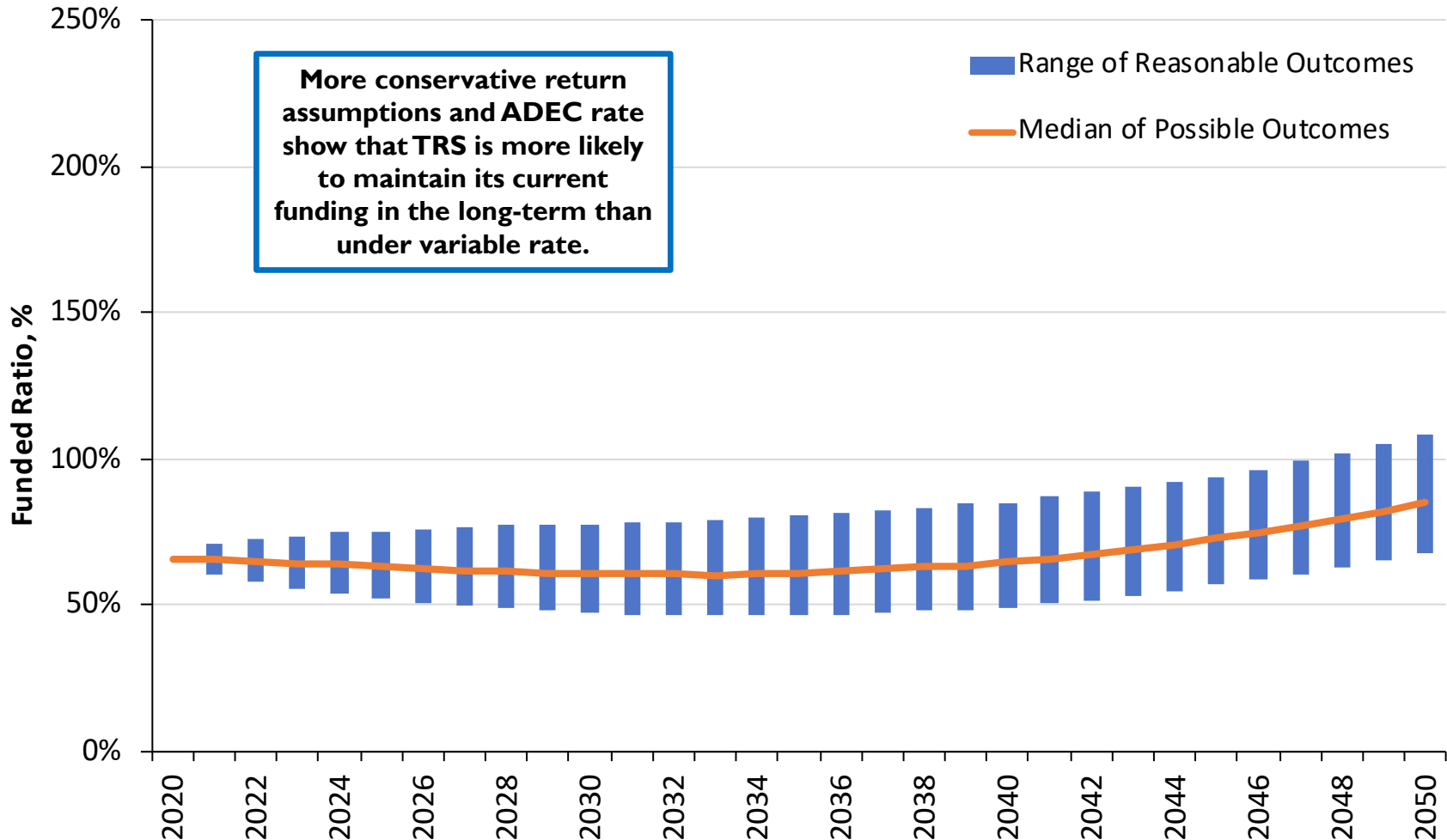
Source: Pension Integrity Project actuarial forecast of TRS plan based on TRS return and risk assumptions.
 Range of Reasonable Outcomes represents the 50% of possible outcomes closest to the median.



30-year Funded Ratio Forecast (Conceptual ADEC Contribution Policy)

How Do Contribution Methods Affect Funding?

More Conservative Long-term Average Returns



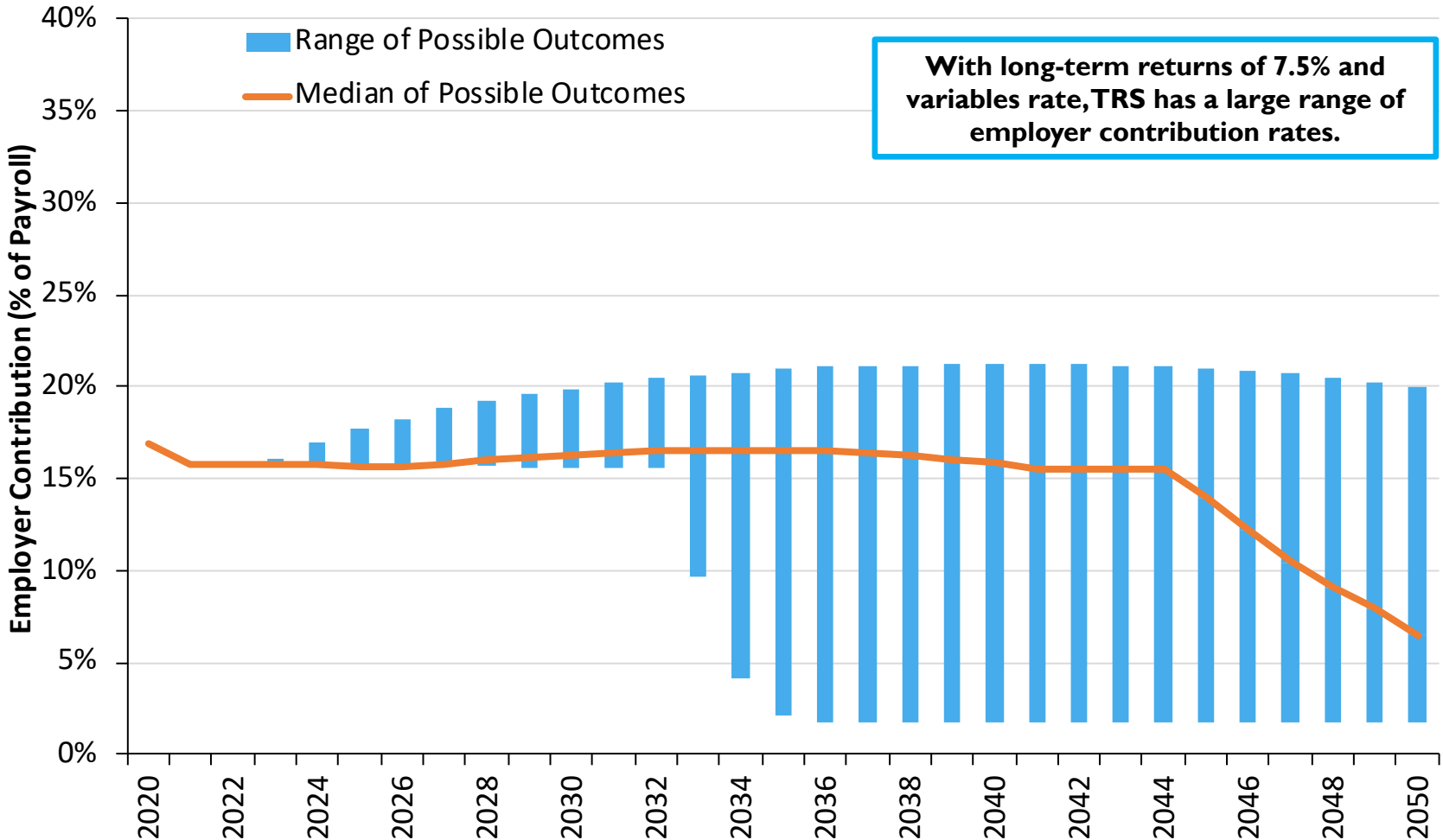
Source: Pension Integrity Project actuarial forecast of TRS plan using the return and risk assumptions of the Monte Carlo analysis. Conservative returns are 5.8%, which are the result of combining the short-term capital market assumptions from four prominent financial firms



30-year Employer Contribution Forecast (Variable Contribution Rate)

If TRS Performs as Expected, Rates Can Still Vary

Long-term Average Returns of 7.5%



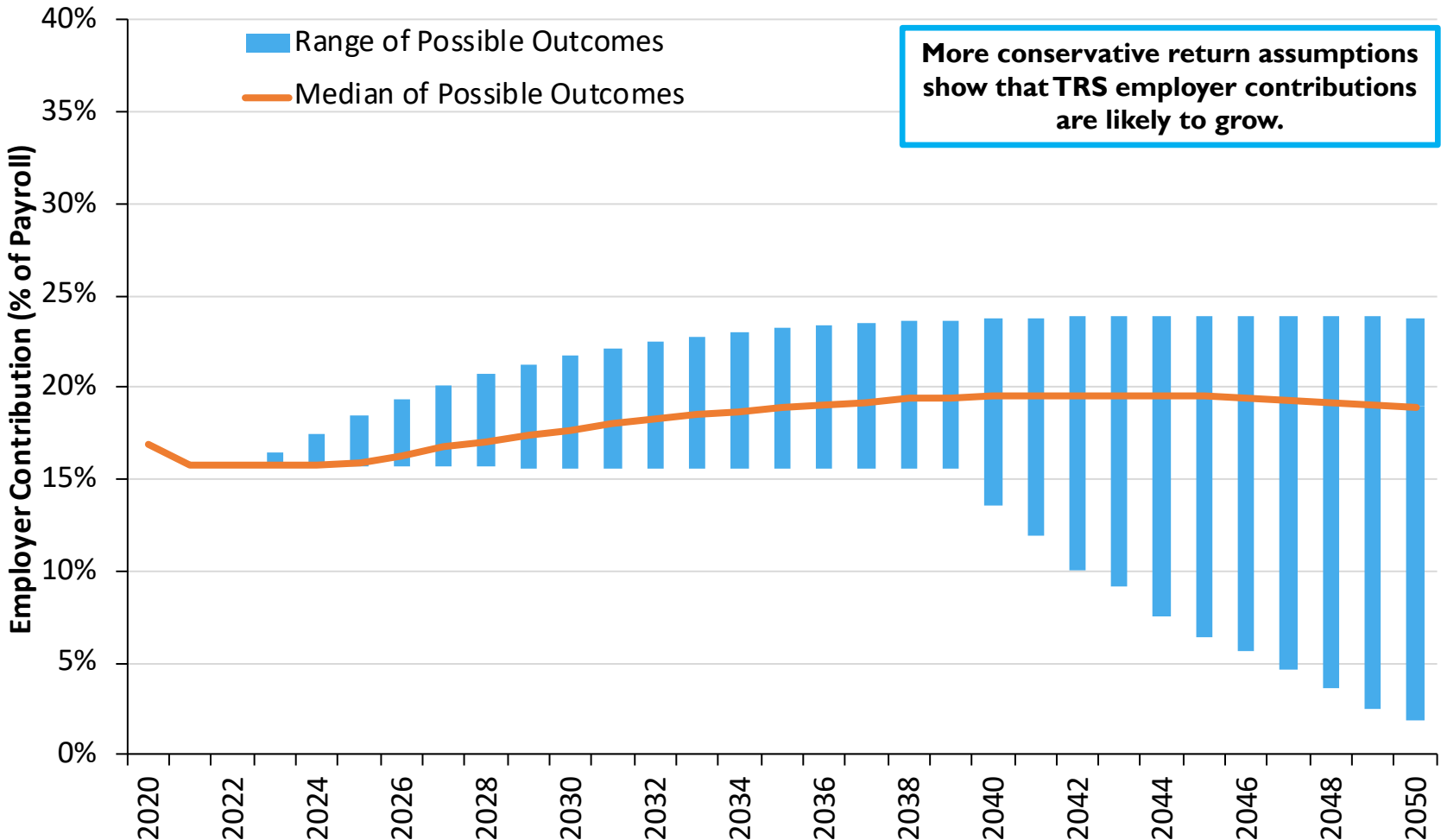
Source: Pension Integrity Project actuarial forecast of TRS. The variable statutory contribution policy assumes the employer contribution will be adjusted to bring the amortization period down to 30 years immediately whenever the period exceeds 30 years. When the amortization period is below 30 years, the contribution is assumed to stay fixed as a percent of payroll. The absolute contribution amount is assumed to grow at the payroll growth rate. Figures are rounded and adjusted for inflation.



30-year Employer Contribution Forecast (Variable Contribution Rate)

If TRS Underperforms, Expect Higher Contribution Rates

More Conservative Long-term Average Expected Returns



More conservative return assumptions show that TRS employer contributions are likely to grow.

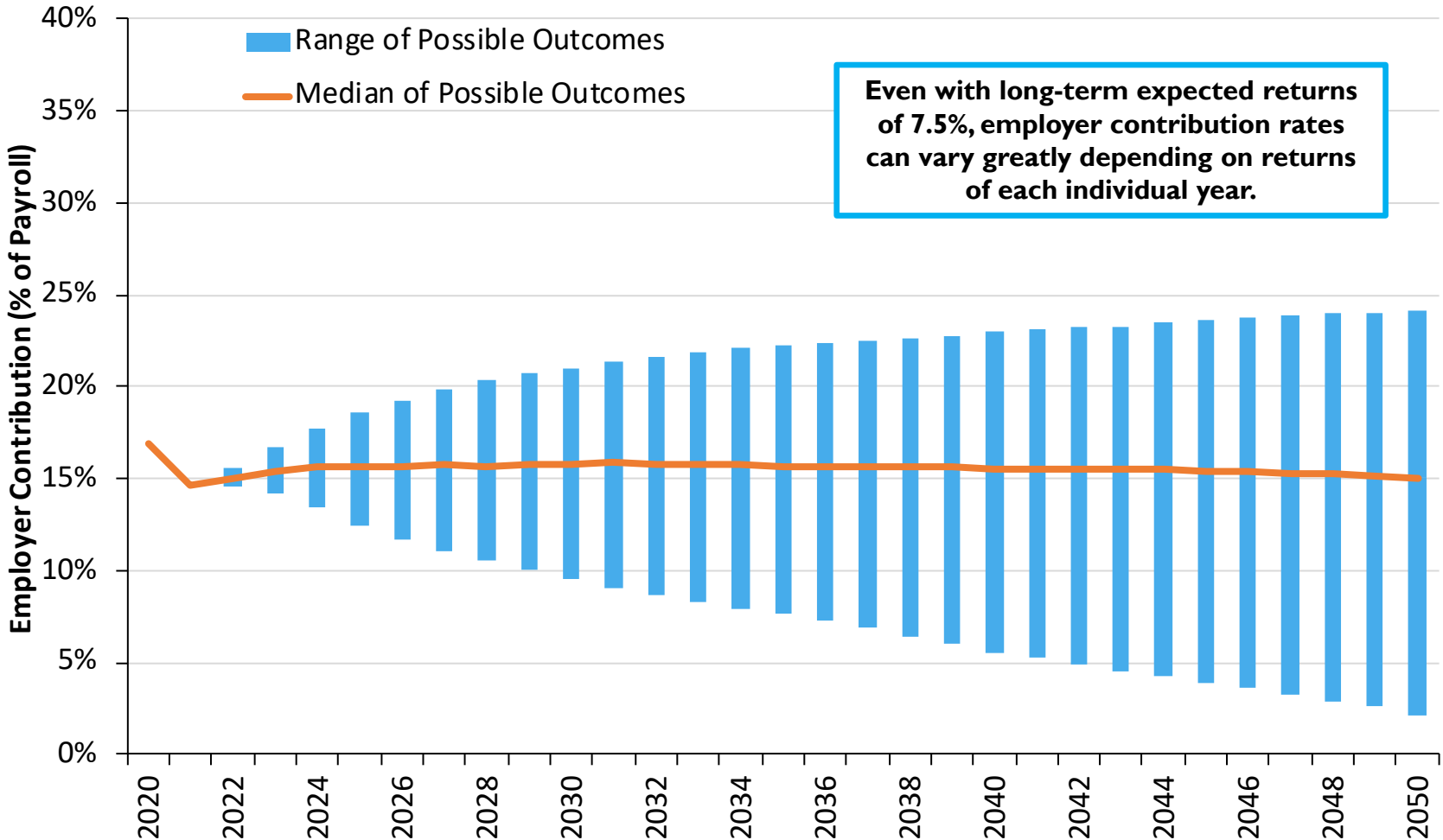
Source: Pension Integrity Project actuarial forecast of TRS plan using the return and risk assumptions of the Monte Carlo analysis. Conservative returns are 5.8%, which are the result of combining the long-term capital market assumptions from four prominent financial firms. The variable statutory contribution policy assumes the employer contribution will be adjusted to bring the amortization period down to 30 years immediately whenever the period exceeds 30 years. When the amortization period is below 30 years, the contribution is assumed to stay fixed as a percent of payroll. The absolute contribution amount is assumed to grow at the payroll growth rate.



30-year Employer Contribution Forecast (Conceptual ADEC Contribution Policy)

If TRS Performs as Expected, Rates Can Still Vary

Long-term Average Returns of 7.5%



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

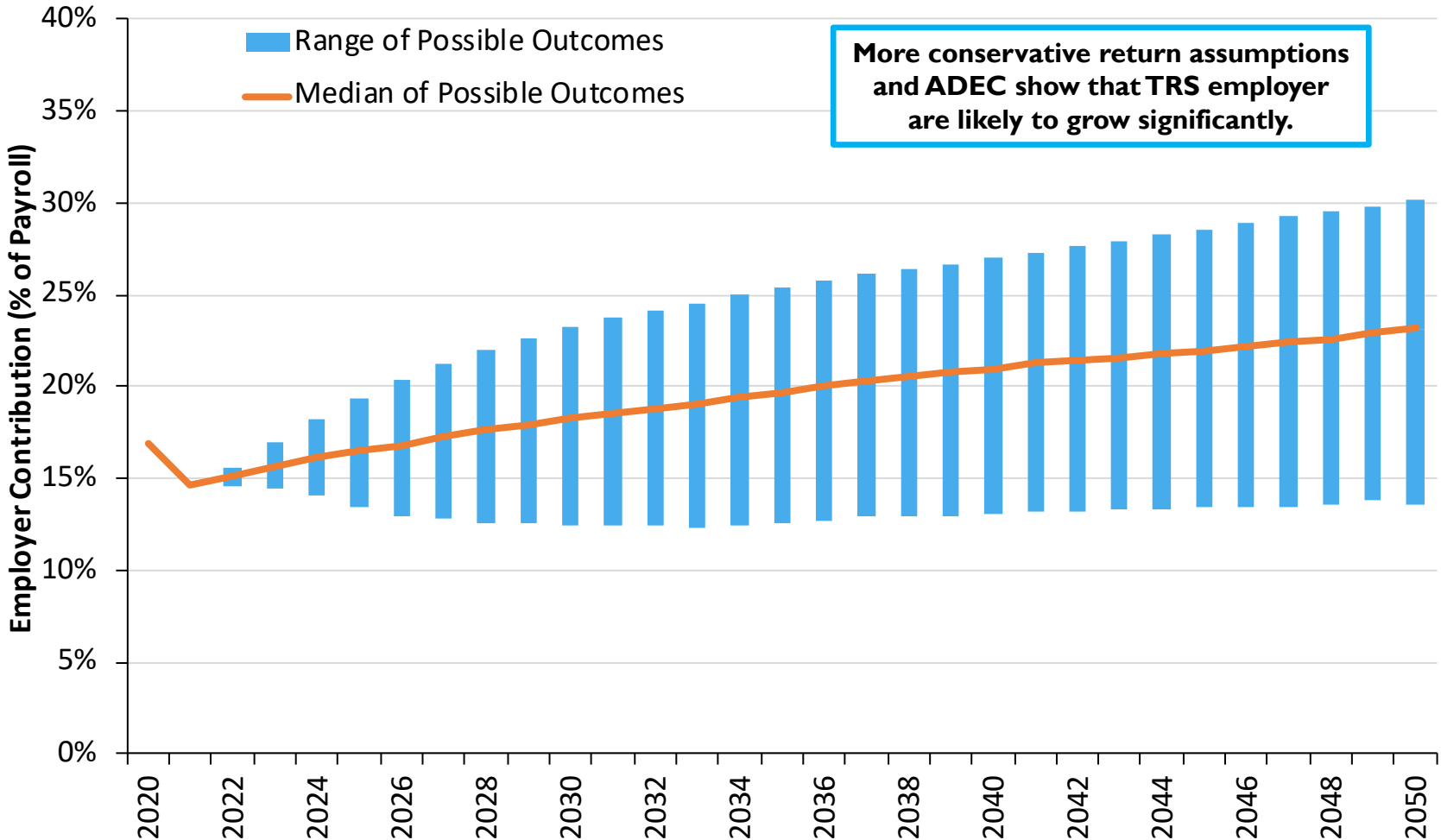
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Sensitivity Analysis: Normal Cost Comparison Under Alternative Assumed Rates of Return



Amounts to be Paid in 2020-21 Contribution Fiscal Year, % of projected payroll

Assumed Return	Gross Normal Cost	Employer Normal Cost	Employee Normal Cost
7.5% (FYE 2020 Baseline)	9.75%	1.60%	8.15%
6.5%	11.92%	3.77%	8.15%
5.5%	14.57%	6.42%	8.15%
4.5%	17.81%	9.66%	8.15%

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.



CHALLENGE 2: DEVIATIONS AND CHANGES TO 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.
- Adopting more prudent actuarial assumptions and methods necessitates the recognition of additional unfunded liabilities.

Acknowledging Outdated Actuarial Assumptions

When Experience Differs from Assumptions



(-) Actuarial Assumption and Methods

- TRS unfunded liabilities have increased by a combined \$400 million between 2002-2020 due to prudent updates to actuarial assumptions and methods such as lowering the assumed rate of return.

(+) Salary Increase Assumptions

- TRS employers have not raised salaries as fast as expected, resulting in lower payrolls and thus lower earned pension benefits - a common case for many state-level pension plans. This reduced unfunded liabilities by \$266 million from 2002-2020.

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

- Due to misaligned demographic assumptions, TRS unfunded liabilities have increased by a combined \$332 million between 2002-2020.
- This likely stems from a combination of one or more of the following factors:
 - ✓ Actual withdrawal rates before members have reached either a reduced or normal retirement threshold have been lower than anticipated.
 - ✓ TRS members have been retiring earlier than expected, receiving more pension checks.



Acknowledging Outdated Actuarial Assumptions

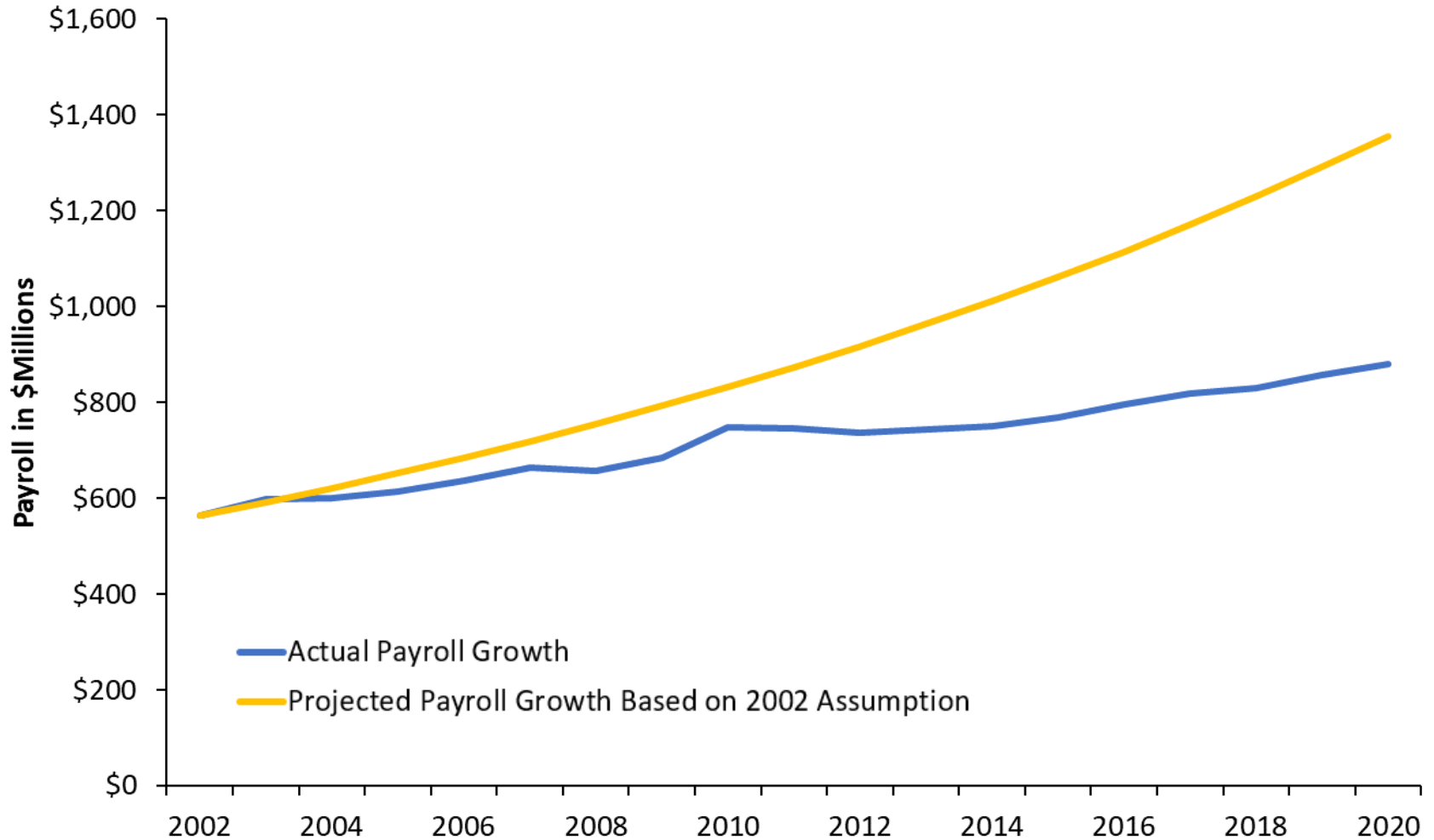
When Experience Differs from Assumptions

(-) Overestimated Payroll Growth

- Overestimating payroll growth may create a long-term problem for TRS in combination with the level-percentage of payroll amortization method used by the plans.
- This method *backloads pension debt payments* by assuming that future payrolls will be larger than today (a reasonable assumption).
- While in and of itself, a growing payroll is a reasonable assumption, if payroll does not grow as fast as assumed, employer contributions must rise as a percentage of payroll.
 - ✓ This means the amortization method combined with the inaccurate assumption is delaying debt payments.

Acknowledging Outdated Actuarial Assumptions

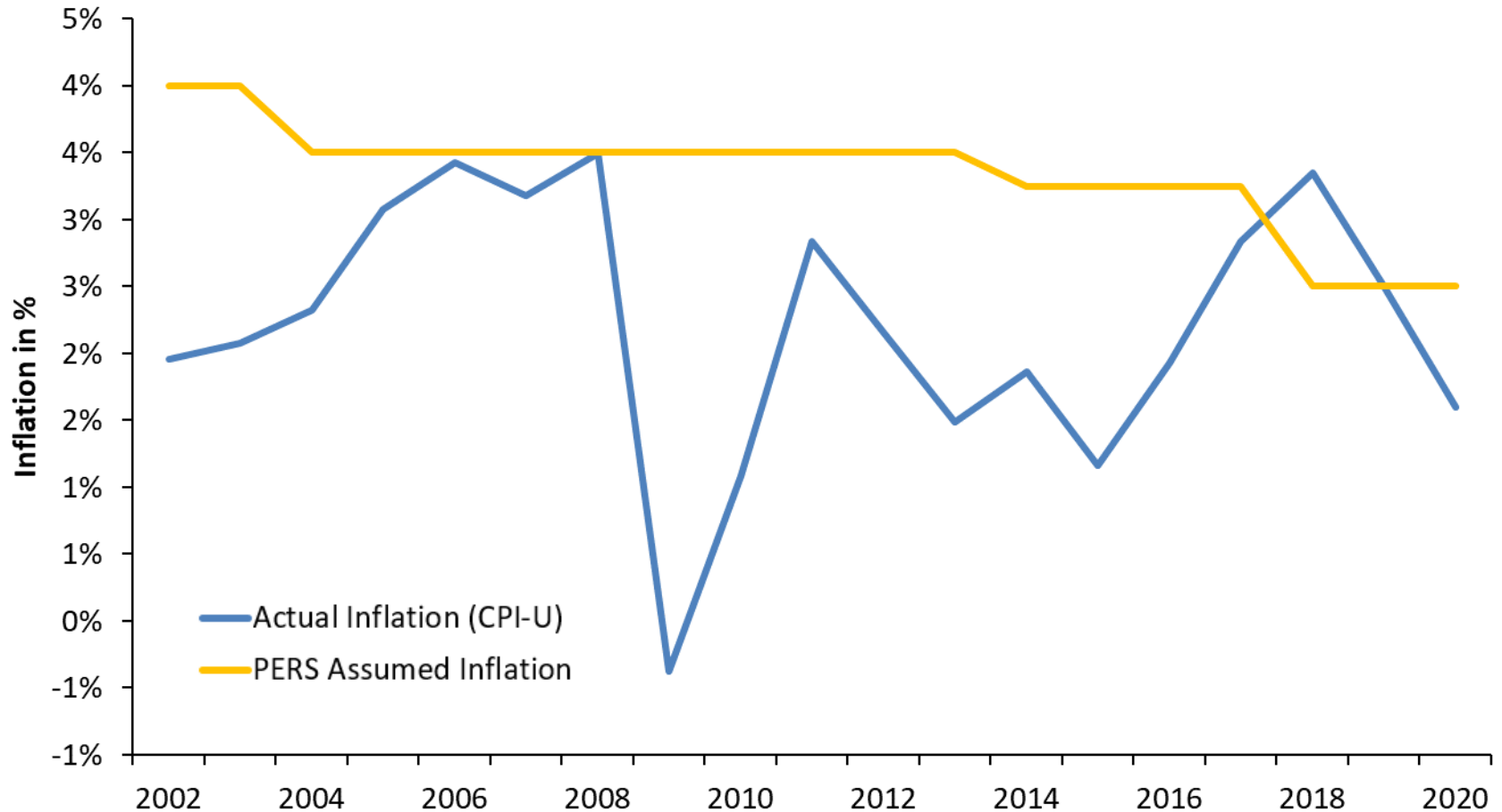
Actual Change in Payroll v. Assumption



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

Acknowledging Outdated Actuarial Assumptions

Actual Inflation v. Assumption

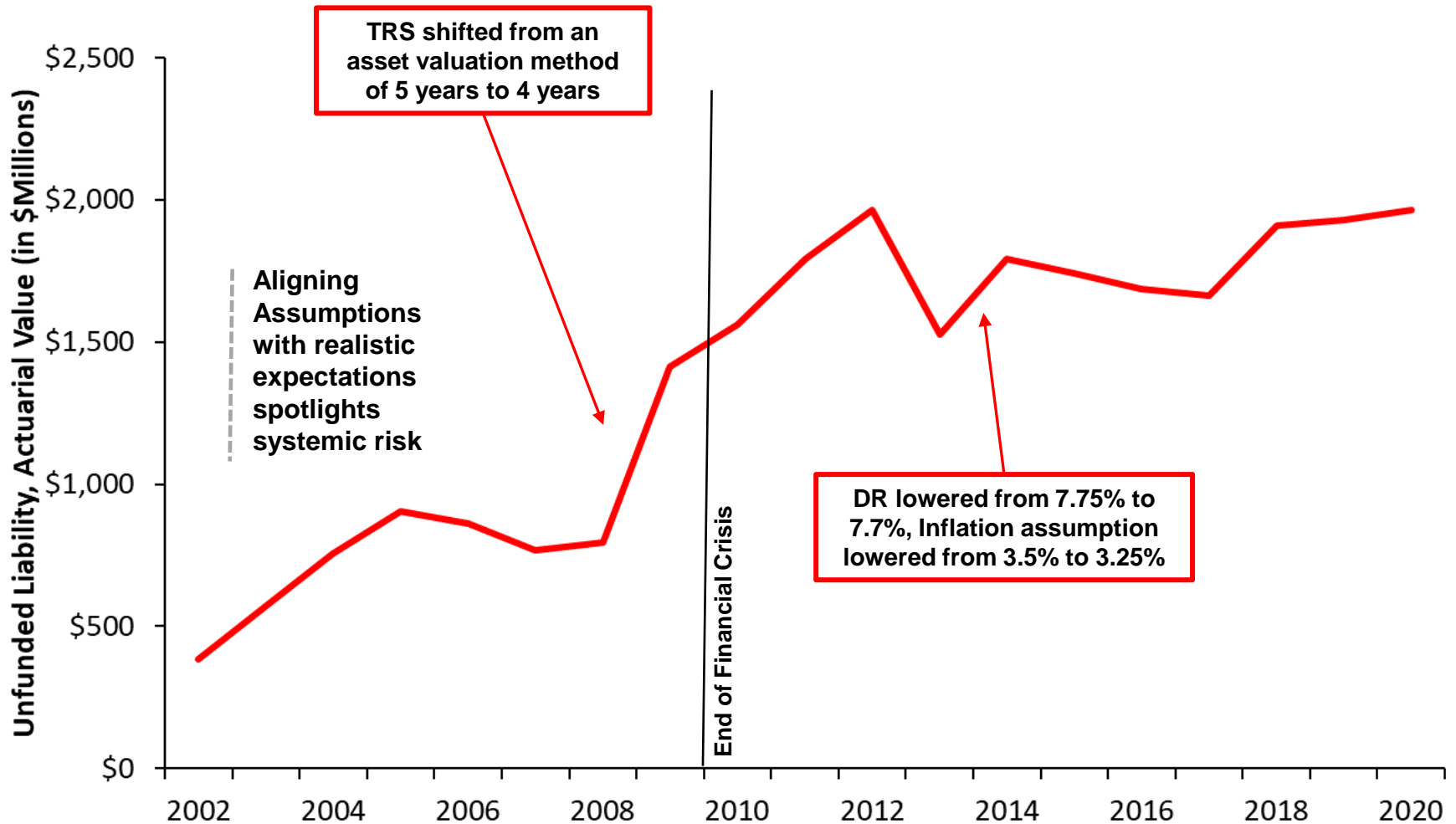


Source: Pension Integrity Project analysis TRS and TRS actuarial valuation reports and CPI-U data from the Bureau of Labor Statistics.



Challenges from Aggressive Actuarial Assumptions

Assumption Changes Expose Hidden Unfunded Liabilities



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



CHALLENGE 3: INSUFFICIENT CONTRIBUTIONS & DEBT MANAGEMENT POLICIES

- Over the past two decades employer contributions to TRS have fallen short of the amount plan actuaries determined would be needed to reach 100% funding in 30 years.
- State contributions towards paying off pension debt are less than the interest accruing on the pension debt.



Paying Down Unfunded Liabilities with a Statutory Contribution Rate

Current Montana TRS Amortization Policy

If the TRS actuary calculates an unfunded liability amortization window...

Greater than 30 years:

The actuary will recommend a contribution rate increase that can expect to fully amortize the UAAL over a closed 30-year period.

Less than 30 years, but greater than 0 and is projected to continue to decline over the remainder of the closed period:

The actuary will not recommend a change in the statutory contribution rates.

Less than 30 years, but has increased over prior valuations and is projected to continue to grow:

The actuary will recommend a contribution rate increase that is expected to reverse the trend and reestablish a closed amortization period equal to that of the last valuation.

Unfunded Liability Amortization Payments

Pension plans are required to make regular payments to reduce any unfunded actuarially accrued liability, or pension debt. Amortization payments are regular contributions to reduce the unfunded liability and are paid on a set schedule, like other forms of debt, to spread out payments over time. If the chosen amortization period is too long, generally over 20 years, negative amortization becomes a serious risk.

Open vs Layered (Closed) Amortization Policy

“Open” amortization policy describes when amortization payments are reset each year, guaranteeing the UAL will never be paid off and often can mean contributions towards unfunded liabilities each year don’t even cover the interest on the debt. “Layered” (closed) amortization creates a separate amortization schedule for all new UAL accruing in a given year, ideally designed to pay it off within a short (<15yr) period.

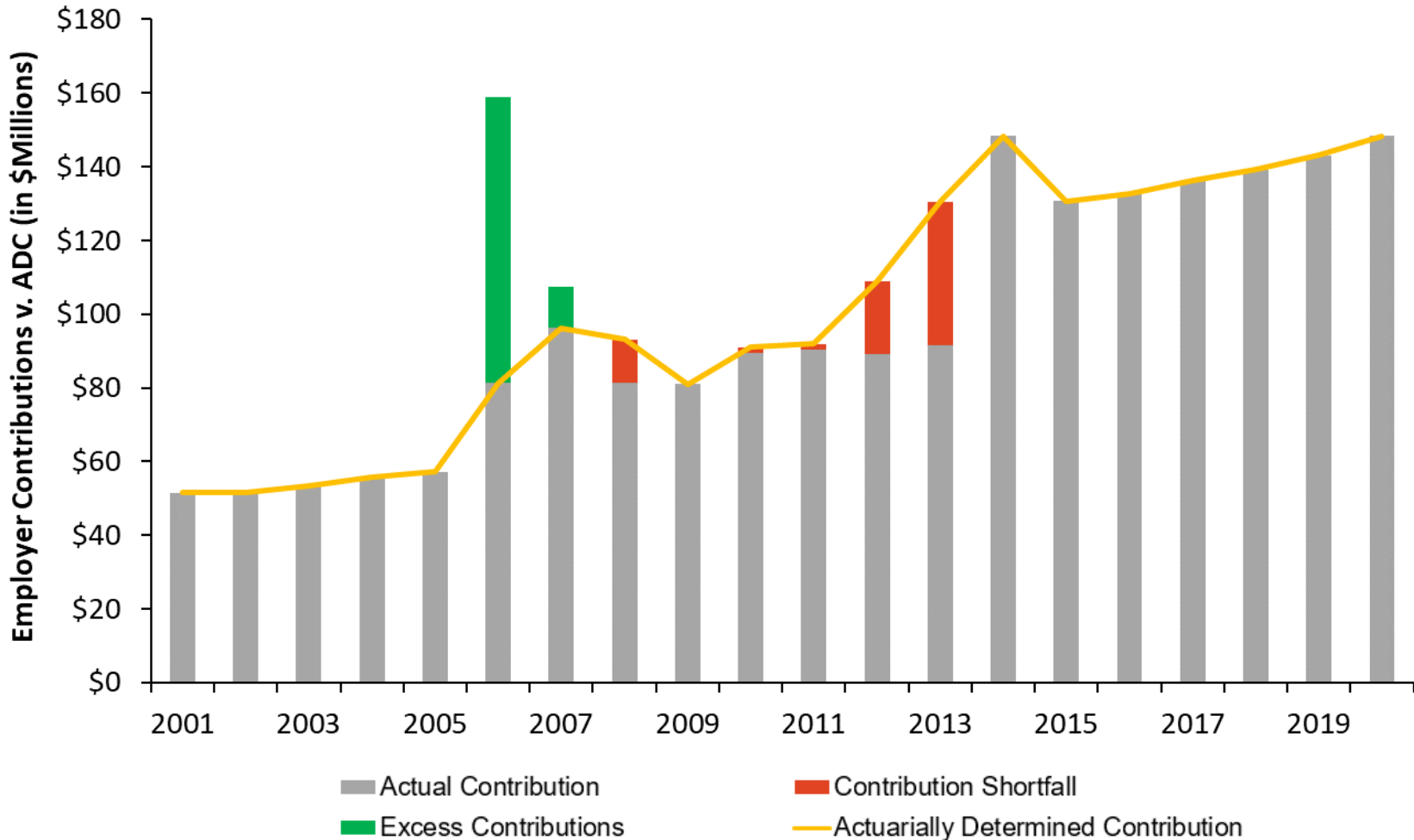
State Statutes and Policy Perpetuate Structural Underfunding Problems for TRS



1. Since 2009 annual employer contributions to TRS have fallen short of the actuarially determined contribution (ADC) rate.
 - ✓ The legislative process makes it difficult to quickly respond to the recommendations of plan actuaries leading to growth in unfunded liabilities.
 - ✓ The ADC rate for TRS is based on an open amortization period that resets annually – a similar policy to refinancing a home mortgage every year.
2. Negative amortization: Plan actuaries report that contributions available to cover the unfunded liability are less than the interest accruing on the pension debt each year.
3. Under current contribution rates and current assumptions it will take 29 years for TRS to amortize the debt.

Actuarially Determined Employer Contribution History, 2001-2020

Actual v. Required Contributions



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

Negative Amortization: Understanding the Current Funding Policy



TRS Amortization Period History:

- 2020: 29-year amortization period
- 2016: 24-year amortization period
- 2012: Infinite amortization period
- 2008: 31-year amortization period

- These long amortization periods are indicators that plan amortization payments are not sufficient to pay down the unfunded liability and subsequent interest it accrues (i.e. *negative amortization*).
 - The Society of Actuaries recommends amortization periods of 15 to 20 years.
 - Longer periods result in larger long-term costs, so the shorter the amortization period, the better.

Debt Management Policies

Shorting TRS Leads to Negative Amortization



1. Due to inadequate and capped statutory rates, TRS valuations routinely show volatile amortization periods, taking TRS well outside industry best practices.
2. TRS officially maintains a 30-year, level percent open amortization target. And as of 2020 TRS's actual amortization period was 29 years.
3. Long amortization periods are indicators that plan amortization payments are insufficient to pay down TRS's unfunded liability and the interest that debt accrues.
4. Since 2009, employer contributions have generally fallen below the interest accrued on TRS's unfunded liability (negative amortization) with few exceptions, leaving TRS to fall further behind its obligations in absolute terms.
5. Limiting TRS's amortization period to no more than 20 years and addressing any new unfunded liabilities in a given year on separate, "layered" schedules is the most direct way to limit the impact of unfunded liabilities long-term.

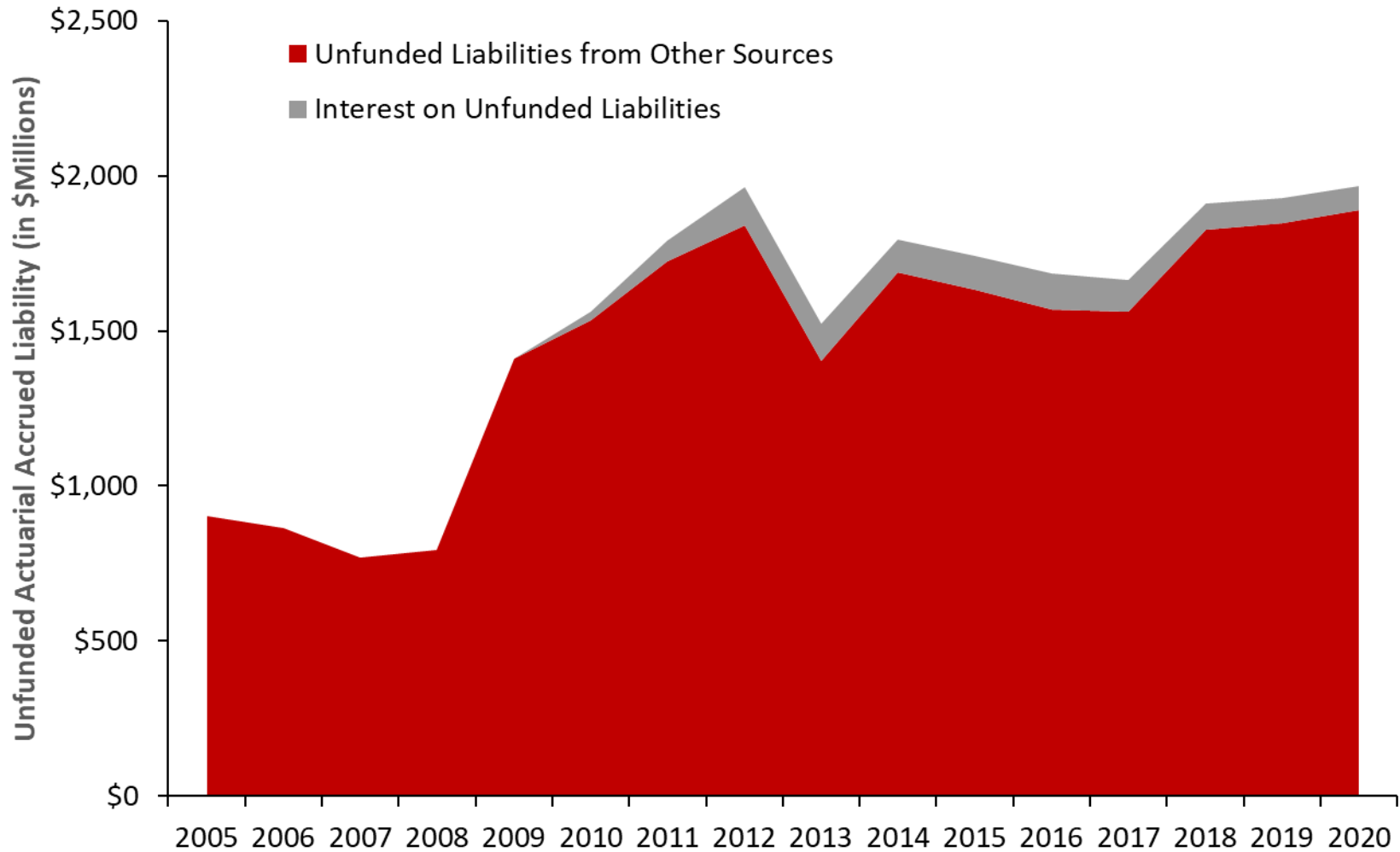
Quick Facts:

- The Society of Actuaries recommends amortizing new unfunded pension liabilities on a layered basis over a 15 to 20-year period.



Negative Amortization Growth (2005-2020)

Interest on the Debt as a Portion of UAAL

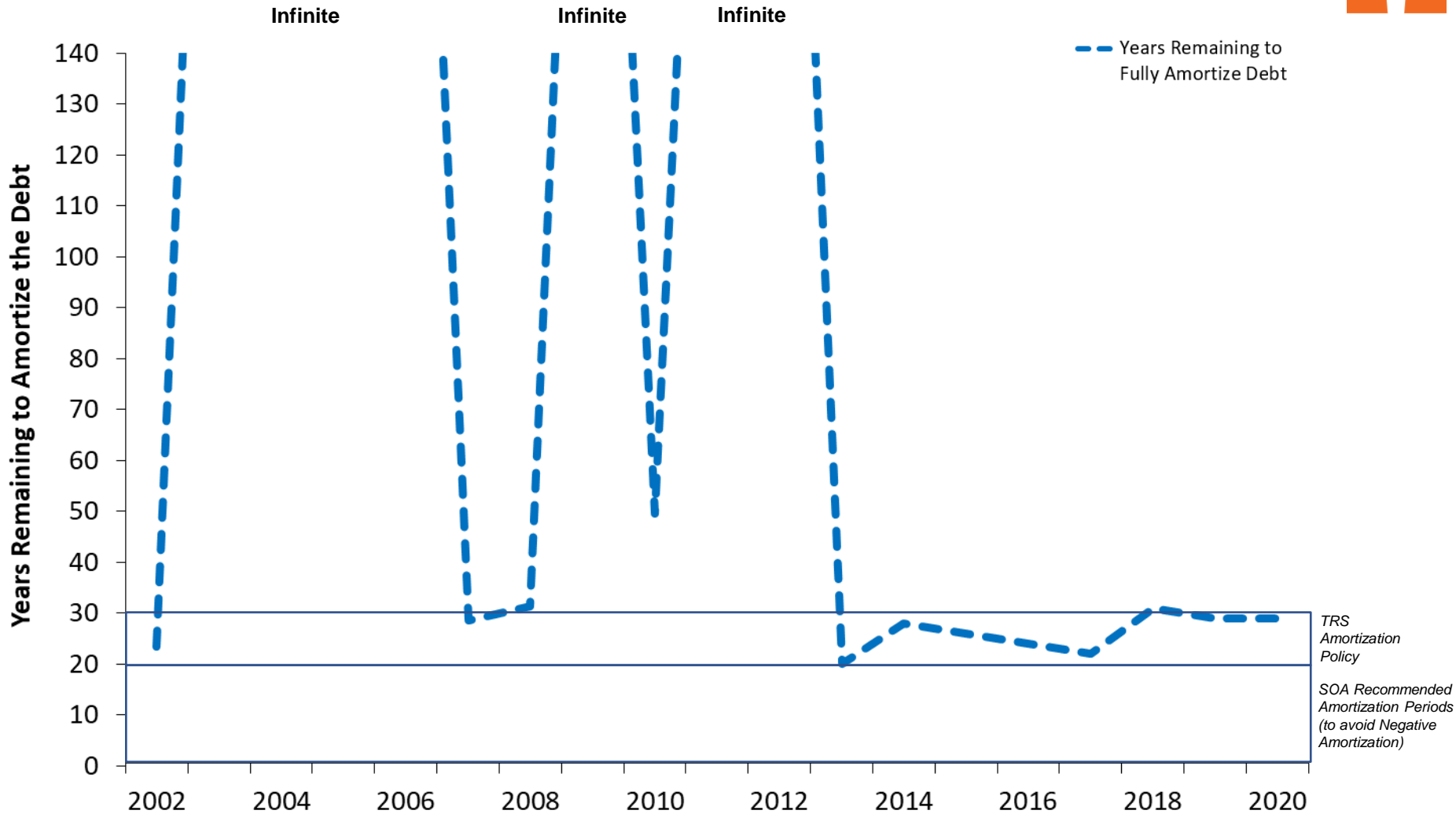


Source: Pension Integrity Project analysis of Montana TRS actuarial reports and CAFRs.



Debt Management Policies

Infinite Amortization Means Perpetual Debt



Source: Pension Integrity Project analysis of TRS actuarial valuation reports and CAFRs.
The Society of Actuaries Blue Ribbon Panel recommends amortization periods not exceed 20 years..



CHALLENGE 4: DISCOUNT RATE AND UNDERVALUING DEBT

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

Montana TRS 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 Montana TRS — 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 Montana TRS 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.

Montana TRS 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 Montana would pay out less than 100% of promised retirement income benefits to members and retirees.**
 - The Contract Clause in the Montana Constitution is similar to the U.S. Constitution's Contract Clause. There is little basis to conclude Montana TRS has the kind of liability risks implied by a high discount rate.
- 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.

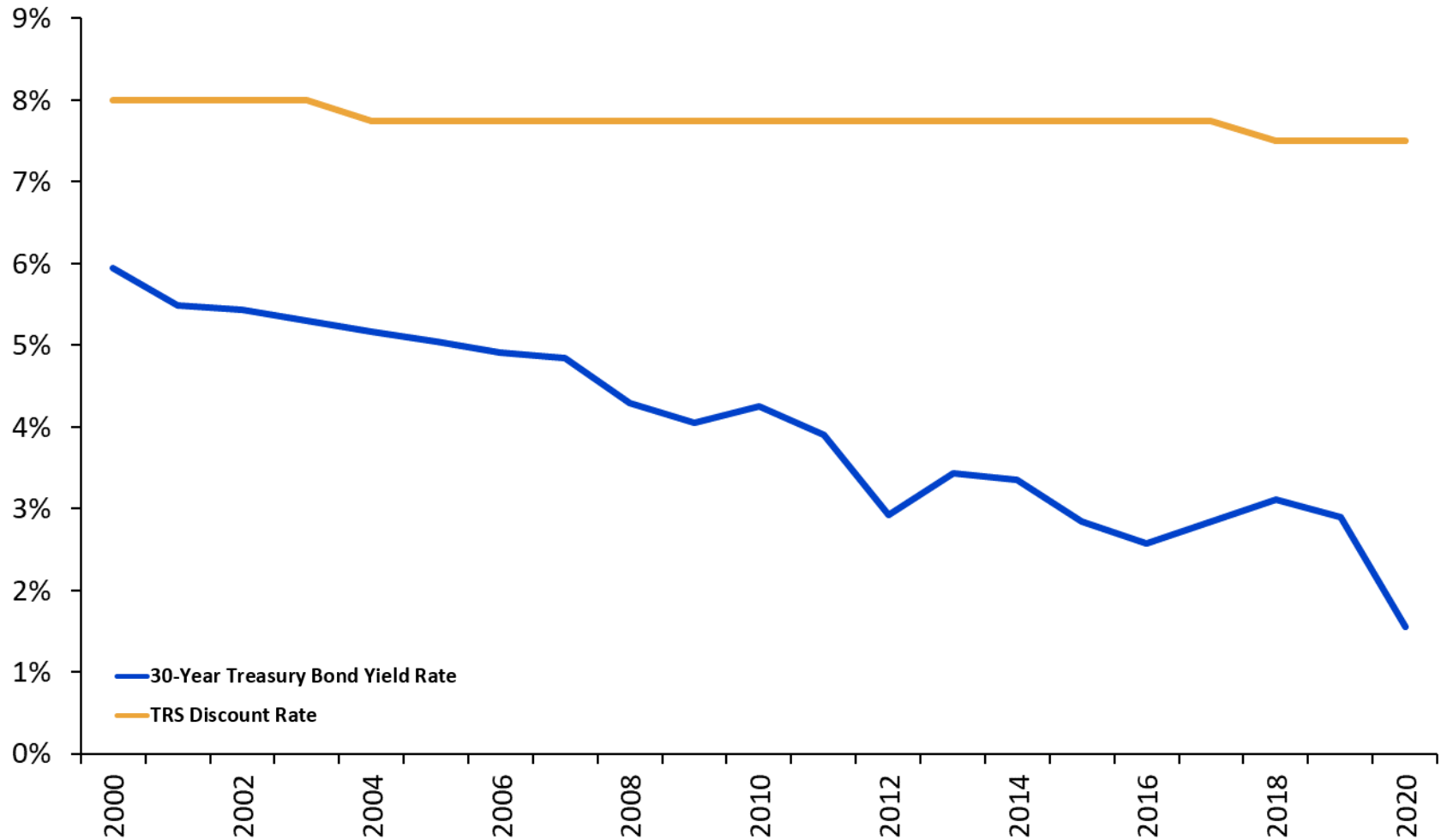


Sensitivity Analysis: Pension Debt Comparison Under Alternative Discount Rates

Discount Rate	Funded Ratio (Market Value)	Unfunded Liability (Market Value)	Actuarial Accrued Liability
7.50% (Baseline)	66.1%	\$2.1 billion	\$6.3 billion
6.50%	59.2%	\$2.7 billion	\$7.0 billion
5.50%	52.7%	\$3.6 billion	\$7.9 billion
4.50%	46.5%	\$4.7 billion	\$9.0 billion

Note: Both baseline and alternative unfunded liability figures should be considered approximate guides to unfunded liability projections under various discount rates. Any policy changes should be based on more precise actuarial liability forecasts using detailed plan data.

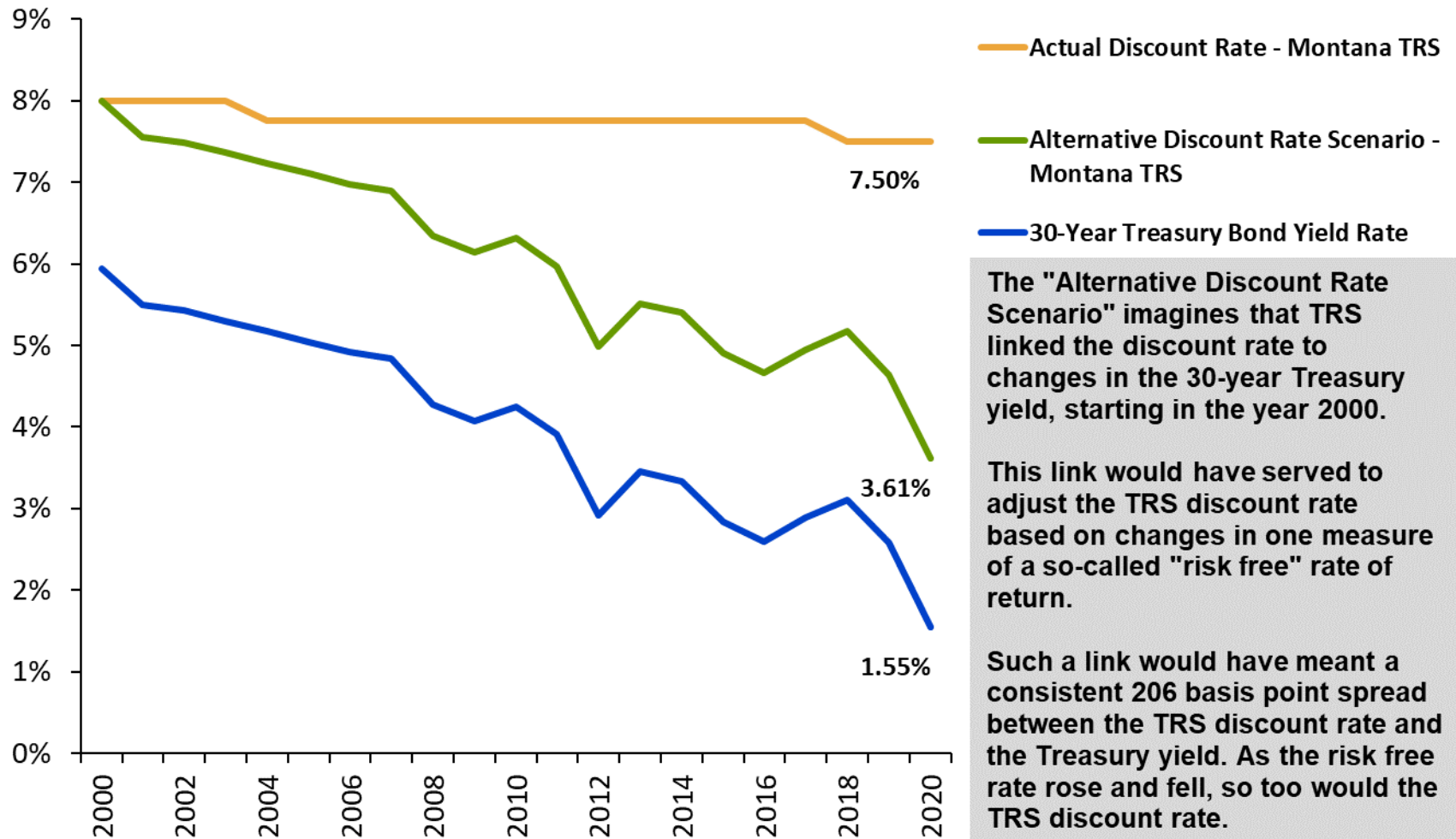
Changes in the Risk Free Rate Compared to TRS Discount Rate (2000-2020)



Source: Pension Integrity Project analysis of Montana TRS actuarial reports and Treasury yield data from the Federal Reserve.



Change in the Risk Free Rate Compared to TRS Discount Rate (2000-2020)



Source: Pension Integrity Project analysis of Montana TRS actuarial reports and Treasury yield data from the Federal Reserve

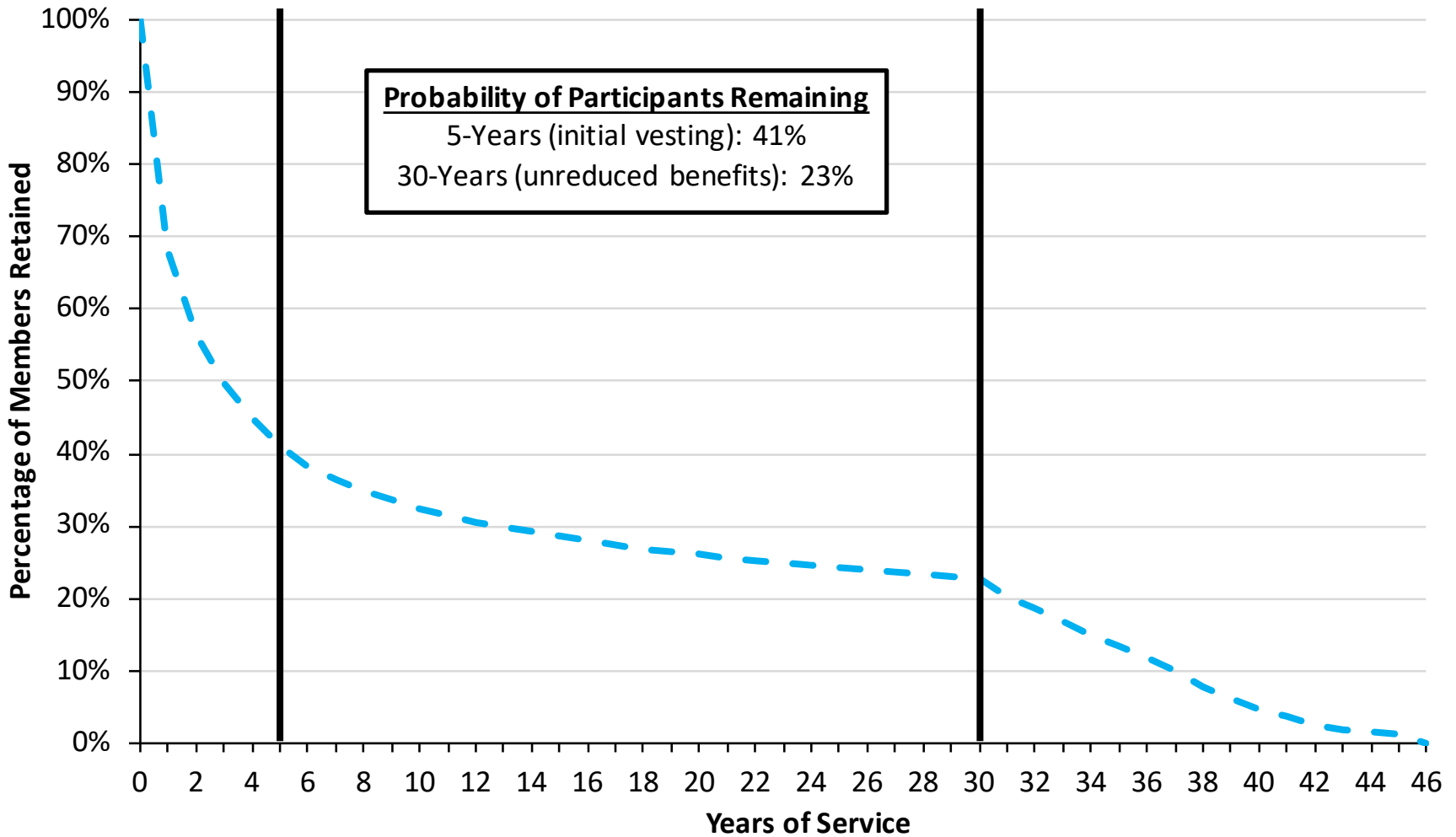


CHALLENGE 5: THE EXISTING BENEFIT DESIGN DOES NOT WORK FOR EVERYONE

- More than 70% of TRS members do not work long enough to earn a full pension
- The turnover rate for Montana teachers suggests that the current retirement benefit design is not effective at encouraging retention in the near-term, and may be pushing out employees at the end of their careers.



Probability of Members Remaining in TRS



Does TRS Retirement Plan Work for All Teachers?



- **59%** of new teachers leave before 5 years
 - TRS members need to work for 5 years before their benefits become vested.
 - Another 9% of new teachers who are still working after 5 years will leave before 10 years of service
- **23%** of all members hired will still be working after 30 years, long enough to qualify for full, unreduced pension 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 enter public employment.
- The most likely incentive to increase recruiting to the public workforce is increased salary.

■ Retaining Employees:

- If worker retention is a goal of the TRS system, it is clearly not working, as nearly 70% of employees leave within 5 years.
- After 15 to 25 years of service there is some retention effect, but the same incentives serve to push out workers in a sharp drop off after 30 years of service or reaching “Rule of 80” threshold.



FRAMEWORK FOR SOLUTIONS & REFORM



Objectives of Good Reform

- **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



Practical Policy Framework

1. 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

2. Adopt better funding policy, risk assessment, and actuarial assumptions
 - These changes should aim at minimizing risk and contribution rate volatility for employers and employees

3. Create a path to retirement security for all participants
 - Consider offering members that won't accrue a full pension benefit access to other plan design options (e.g., cash balance, DC, hybrid, etc.)

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



- **Current amortization policy for TRS targets time horizons that are too long:**
 - TRS targets a 30-year window to pay off unfunded liabilities.
 - The longer the unfunded liability amortization period, the greater chance that market risk drives unfunded liabilities higher.
 - The Society of Actuaries Blue Ribbon Panel recommends amortization schedules be no longer than 15 to 20 years.
- **Rethink amortization in two steps**
 - Step 1:** Address the Current Unfunded Liability
 - Segmenting accrued unfunded liabilities from any gains or losses in future years can allow policymakers to set the past debt on a direct and fiscally realistic course to being fully funded.
 - Prevents the need to revisit the issue in subsequent sessions.
 - Step 2:** Develop a Plan to Tackle Future Debt
 - Adopting “layered” amortization for future unfunded liabilities. would ensure that any new pension debt accrued in a given year is paid off much faster—preferably 10 years or less—than the current 30+ year period.
 - Covering future pension losses with consistent annual payments over a decade or less would align TRS amortization policy with actuarial best practice.

2. Adopt Better Funding Policy, Investment Policy, Risk Assessments and Actuarial Assumptions (1 of 2)



- **Current funding policy has created negative amortization and exposes the plan to significant risk of additional unfunded liabilities**
 - Establishing TRS contribution rates in statute, and requiring political intervention with uncertain outcomes, makes it difficult in practice to respond quickly to changing economic circumstances.
 - This policy is in contrast with the more common funding method based on normal cost and the amortization cost that pays down unfunded liabilities over a predetermined, closed period.
 - Given the volatility of their amortization policy, it will likely take more than 30 years to amortize current unfunded liabilities, exposing TRS to major financial risks over that period.
 - Options to consider include:
 - Requiring employers and future employees that accrue defined benefits to make contributions on a pre-defined cost sharing basis (such as a 50-50 split) as actuarially determined
 - Using short (10-year or less) periods to pay off any new, annual unfunded liabilities that might accrue

2. Adopt Better Funding Policy, Investment Policy, Risk Assessments and Actuarial Assumptions (2 of 2)



■ Improve risk assessment and actuarial assumptions

- Look to lower the assumed return such that it aligns with more realistic probability of success
- Adjust the portfolio to reduce high risk assets no longer needed with lower assumed return target
- Work to reduce fees and costs of active management
- Consider adopting an even more conservative assumption for a new hire defined benefit plan
- Require regular stress testing for contribution rates, funded ratios, and cash flows with look-forward forecasts for a range of scenarios
 - While pension plans can, and some do, implement a limited risk assessment under current financial reporting, an independent risk assessment/stress test review using a range of pre-built stress scenarios is the ideal approach

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



- **Montana TRS is not providing a path to retirement income security for all educators**
 - For example, only 23% of teachers make it to the 30 years necessary for a full, unreduced pension. This means the majority of teachers could be better served by having the choice of an alternative, more portable plan design — such as a cash balance, hybrid or defined contribution retirement plan.

- **Employees should have options when selecting 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
 - Montana has a long history of managing cash balance plans through municipality, county, and district systems
 - Defined contribution plans can be designed to auto-enroll members into professionally managed accounts with low fees that target specified retirement income and offer access to annuities



Questions?

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