



MPERS: PENSION SOLVENCY AND REFORM ANALYSIS

Prepared by:

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Reason Foundation

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Overview

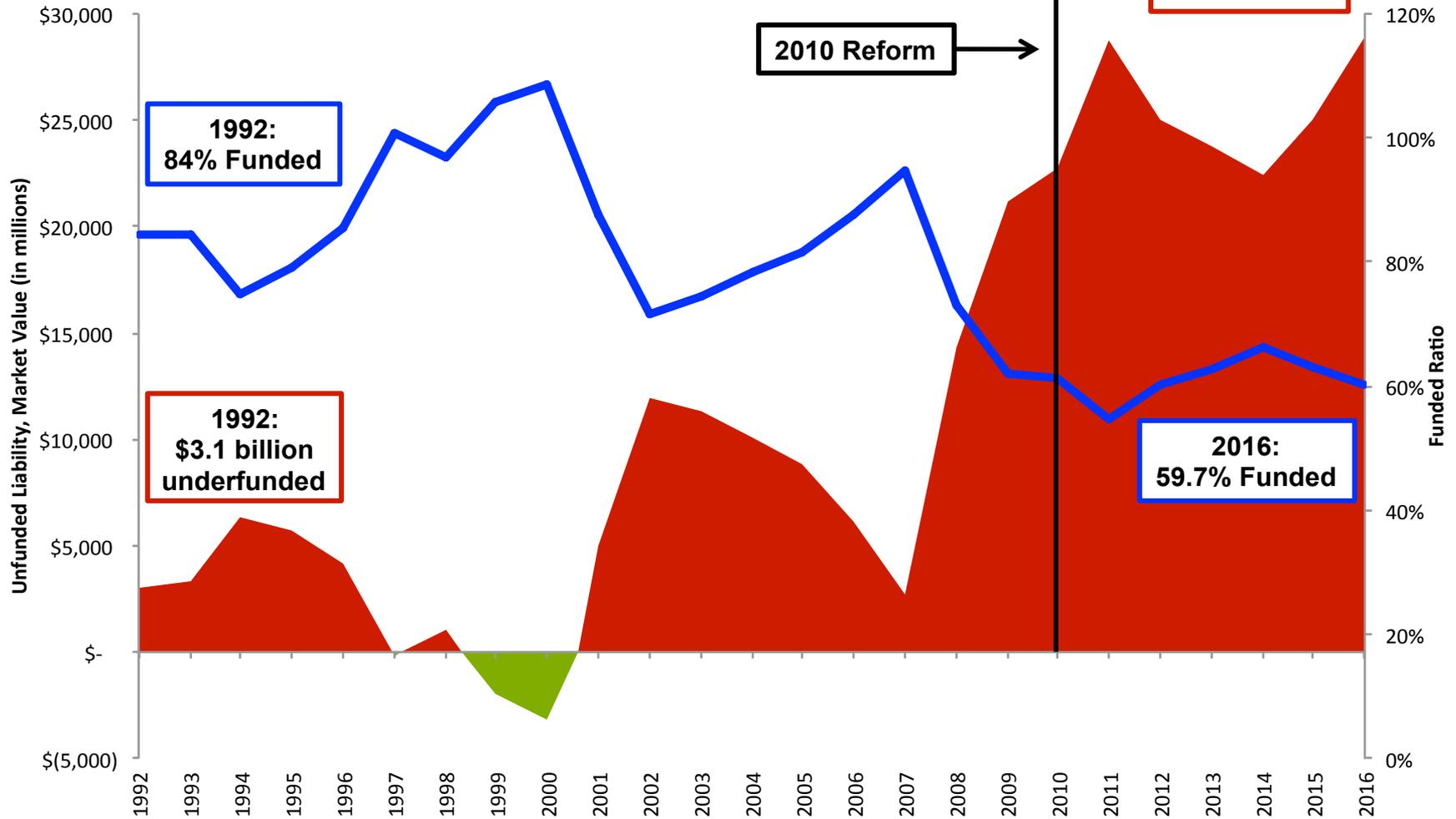
1. Why MPSERS pension reform is needed as soon as possible for plan members and taxpayers
2. What benchmarks indicate whether any proposed pension reform is meaningful and good public policy
3. How the proposed reform for MPSERS stands up to those benchmarks for good public pension policy

1. PROBLEMS CURRENTLY FACING MPSERS

- The Assumed Rate of Return used by the Basic plan and Pension Plus Plan are exposing the state to significant risk
- Some actuarial methods and assumptions are out of step with best practices
- Pension Plus Plan (i.e. “Hybrid”) did not solve the problem



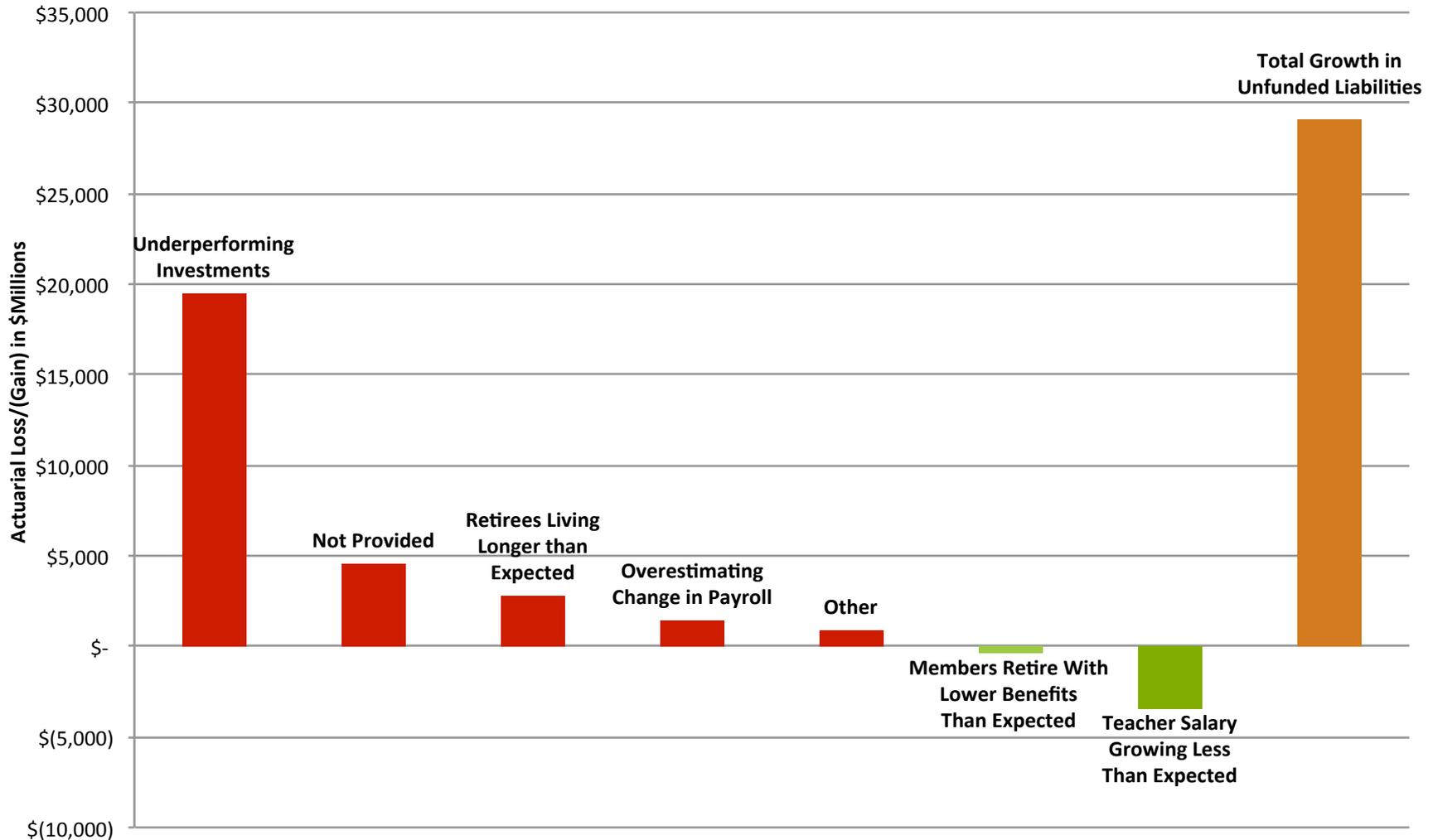
A History of Volatile Funding



Source: Reason Foundation analysis of MPSERS actuarial valuation reports. Figures on an actuarial value basis. Years represent fiscal year ended dates.

The Causes of the Pension Debt

MPERS Actuarial Experience, 2001 to 2016



Source: Reason Foundation analysis of MPERS actuarial valuation reports. Figures on an actuarial value basis. Category "Other" includes \$246.2 million in starting unfunded liability as of FYE 2000.



MPERS Problems

- **Core Challenge: Degrading Solvency**
 - MPERS defined benefit plans have experienced volatile changes in their funded level over the past two decades.
 - 1997 to 2016: unfunded liabilities have increased \$29 billion
 - 1997 to 2016: funded ratio decreased from 100% to 60%
- **Driving Factors**
 - Underperforming investment returns have been the main driver of this problem of degrading solvency.
 - Other aggressive actuarial assumptions and problematic funding policy have also been contributing factors.
 - The payroll growth assumption is overstating future unfunded liability amortization payments.

MPERS Problems

(continued)



- The Pension Plus Plan (i.e. “Hybrid”) is not a long-term solution to the solvency problem
 - The 7% assumed rate of return has only a 40% to 50% chance of actually being achieved over the next few decades.
 - The defined benefit side of the Hybrid plan is exposed to the same risks as the Non-Hybrid plan as they use similar assumptions, including mortality and the payroll growth assumption.
- Benefit: The Hybrid is not working for all teachers
 - Half of teachers hired leave before they earn any retirement benefit, and less than a third of teachers receive a full pension.
- OPEB: Health care costs are likely growing faster than currently anticipated under the plan’s assumptions

2. WHAT GOOD PENSION REFORM LOOKS LIKE

- Principles to guide the development of any proposed pension reform provide benchmarks for good public policy



Objectives of Good Reform

- **Keeping Promises:** Ensure the ability to meet 100% of the promises already made to retirees and active workers
- **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

3. ANALYSIS OF PROPOSED CHANGES

- How the proposed changes to MPSERS measure against the principles of good pension reform

How Well Proposal Meets Objectives

| Element | Baseline | Proposed Reform |
|---------------------|---|--|
| Keeping Promises | UNCERTAIN | YES <i>Creates a path to solvency and affirms the promises made to active members and retirees</i> |
| Retirement Security | UNCERTAIN | YES <i>DC Retirement Plan's 10% default rate will provide the same retirement benefit as for state employees; new Pension Plus 50/50 option provides at least a minimum retirement benefit with supplemental savings</i> |
| Predictability | NO <i>Unfunded liability payments keep increasing</i> | LIKELY <i>DC Retirement Plan rates are wholly predictable; new Pension Plus 50/50 option's 6% assumed return assumption makes plan costs more predictable than status quo</i> |
| Risk Reduction | NO | YES <i>Up to 83% Reduction in New Hire Accrued Liabilities by 2049 depending on number of Tier 1 elections</i> |
| Affordability | NO <i>Unfunded liability payments keep increasing</i> | LIKELY <i>DC Plan costs are fixed and lower than employer contributions to the current plans; employee contributions to the DC Retirement Plan are less than towards current plan</i> |
| Attractive Benefits | SOME | YES <i>The benefit of the proposed DC Plan is competitive and attractive to 21st century employees; provides new Pension Plus 50/50 plan as choice to new employees</i> |
| Good Governance | n/a | SOME <i>6% assumed return for new plan is strong; there is still a need to improve existing plan funding policy by adopting more realistic assumptions</i> |



Questions?

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APPENDIX A: DETAILED ANALYSIS OF THE PROPOSED REFORM

Objective 1: Ensure the Ability to Keep Promises Made to Retirees, Active Workers



1. The Michigan Constitution guarantees the payment of promised pensions, and the proposed legislation affirms that promise
2. The proposed legislation will help to improve the solvency of MPSERS by gradually reducing the possibility of unfunded liabilities; this will help the state keep its promises
3. All current members of MPSERS will continue to be able to earn pension benefits if they want to remain in the existing system

Objective 2: Provide Retirement Security For All Employees, Current & Future



1. Primary functions of defined contribution plans are to:
 - Establish stable, predictable contribution rates for employers and employees.
 - Eliminate all financial risk to state/taxpayers over time; no possibility of new unfunded liabilities for DC plan participants.
 - Provide a portable benefit that is attractive to 21st Century employees (e.g. Millennials) and more equitable to all employees in the public school system.
2. Proposed reform will make it easier to pay off unfunded liabilities in the long-run and ensure 100% funding for promised benefits
 - Creating a new, de-risked Pension Plus Plan with cost sharing and defaulting future MPSERS members into a defined contribution retirement benefit will dramatically limit the growth of accrued liabilities (promised pensions) exposed to any risk.
 - Reducing accrued liability growth means reducing the potential for unfunded liability growth.
3. Proposed reform will provide a choice of competitive retirement benefits for future employees, both a traditional pension benefit option and a portable option

Objective 3: Stabilize Contribution Rates For The Long-Term



1. There is a high probability of volatile employer and state contributions to the Pension Plus Plan because it uses almost all of the same assumptions as the pre-2010 plan
 - The Pension Plus Plan has been fortunate that there have been two strong years of investment returns since its inception, if it had been created a year earlier or later it would likely not be reported as fully funded.
 - The Pension Plus Plan is exposed to risks associated with aggressive actuarial assumptions under the pre-2010 plan — failed assumptions that contributed to the \$29.1 billion in unfunded liability.
 - There is less than a 50% chance of achieving even a 7% assumed return.
2. The proposed DC retirement plan would have no volatility for new hire benefits, creating fixed costs in the long-term; the proposed new Pension Plus Plan would have 50/50 cost sharing, minimizing the potential for contribution rate volatility

Objective 4: Reduce pension system exposure to financial risk and market volatility



1. The proposed changes would result in the gradual reduction in taxpayer promised pensions benefits
2. This reduction in the growth of actuarially accrued liabilities would mean a gradual reduction in risk exposure because there would be fewer promises that could be underfunded



Objective 5: Reduce Long-Term Costs For Employers/Taxpayers & Employees

1. Current forecasted employer contributions for the Pension Plus Plan are based on all actuarial assumptions being correct 100% of the time; historically, this has never been the case
2. The proposed changes would mean a slightly higher employer contribution to retirement benefits compared to the current forecast — but only if all plan assumptions turn out to match reality
3. The proposed changes will mean a *reduction in the total costs of providing retirement benefits* in scenarios where investment returns underperform current expectations because there will be less growth in unfunded liabilities*
 - The state is able to hedge against underperformance with a DC plan.
 - The increased contributions relative to the current baseline amount to a “risk elimination buyout.”
4. Employee contributions to the DC retirement plan (3%) would be less than current contributions to the current Pension Plus Plan (up to 6.5%) or the new Pension Plus Plan

*Note: The same analysis holds true for scenarios where actuarial assumptions are changed to adopt a more conservative funding policy, such as lowering the assumed rate of return to be more in line with where actual investment returns are projected.

Objective 6: Ensure Ability To Recruit 21st Century Employees



1. As of the end of 2016, roughly 40% of teachers hired are expected to leave within five years of joining the MPSERS system; about 60% of non-teachers are expected to leave within five years
2. The Pension Plus Plan requires at least 10 years of service in order to qualify for a normal retirement; members who leave before then are entitled to only a refund of their own contributions
3. This means for the 40% of teachers (and 60% of non-teachers) who select the Pension Plus Plan when they are hired into MPSERS and then leave within five years there is effectively no retirement benefit
4. Alternative benefit designs may be necessary to ensure long-term recruitment and retention success

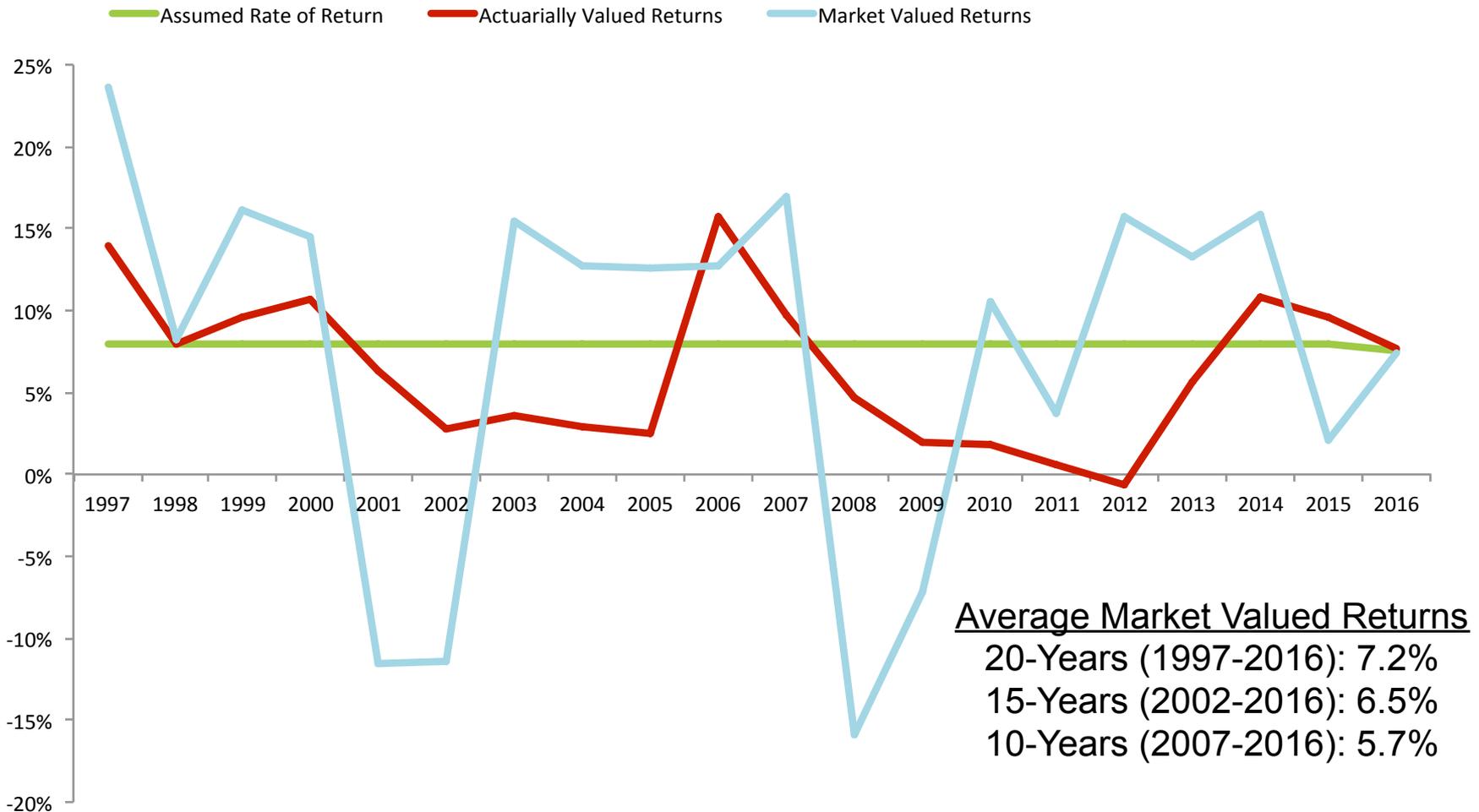
APPENDIX B: DETAILS OF THE PROBLEM

PROBLEM 1: ASSUMED RATE OF RETURN

- Aggressive Expectations: The Assumed Returns for both the Non-Hybrid and Pension Plus Plan are exposing taxpayers to significant investment return risk
- Underpriced Benefit Costs: The Normal Costs calculated for both the Non-Hybrid and Pension Plus Plans are likely underpricing the long-term cost for benefits

MPSERS Problem: Underperforming Assets

Investment Return History, 1997 - 2016



MPERS Problem: Underperforming Assets

Trends: Low Returns & Increasing Risk



- **Underperformance:** Historically, investment returns for MPERS have consistently averaged less than the 8% anticipated:

| <u>Average Market Valued Returns</u> | <u>Average Actuarially Valued Returns</u> |
|--------------------------------------|---|
| 20-Years (1997-2016): 7.2% | 20-Years (1997-2016): 6.4% |
| 15-Years (2002-2016): 6.5% | 15-Years (2002-2016): 5.3% |
| 10-Years (2007-2016): 5.7% | 10-Years (2007-2016): 5.2% |

- **Increasing Risk:** Forcing the MPERS portfolio to target an 8% long-term average rate of return for more than two decades has required increasing risk allocation as markets have changed.
 - *The assets in the Hybrid plan are not protected from this risk, because the assets are comingled in the same portfolio (along with assets for MSERS)*
- **Targeting Unrealistic Rates:** Lowering the assumed return to 7.5% is a good first step, but it is not far enough to meaningfully reduce risk
 - *Reason estimates there is less than a 40% chance of achieving the 7.5% rate*
 - *Reason estimates that there is roughly a 50% chance that the current portfolio will return a 6.8% average return over the next 20 years*



New Normal: The Recovery Has Already Happened, the Market Has Changed

- The “new normal” for institutional investing suggests that achieving even a 7% 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 3% today.
 - Globally, interest rates are at historically low levels.
 - There is an increased demand for fixed income products in part because of the retiring baby boomer generation, which has driven average yields for bonds to between 0% and 2%.
 - Stock markets continue to grow, but at a slower pace than before.
 2. MPSERS is very unlikely to recover with time.
 - Major stock indices have recovered from the financial crisis, but unfunded liabilities remain.

New Normal: The Recovery Has Already Happened, the Market Has Changed (cont'd)



3. A 2014 report from RVK Inc. found that MPSERS assets “must earn annual returns in excess of 11.7% over the next 10 years, or 9.1% over the next 20 years every year without exception in order to reach full funding.”

4. 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 forecast model, the best case scenario for a 60/40 portfolio of equities and bonds is likely to earn less than a 5% return.
 - This suggests that investments in non-transparent, illiquid, potentially riskier alternative assets will be necessary in order to reach even a 7% return, much less 8% return.
 - Because these assets often aren't correlated with the broader market, they become a drag on investment returns during good years.

It should be clear that MPSERS cannot simply wait for “recovery.”



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

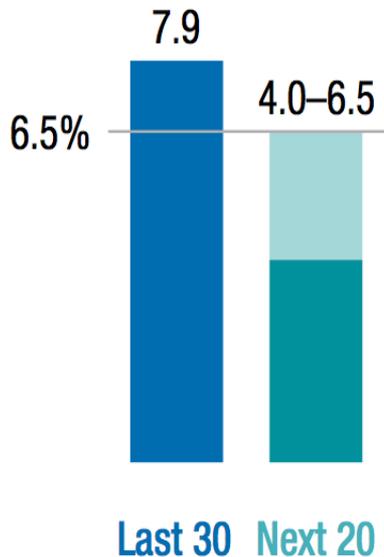
The past 30 years saw returns that exceeded the long-run average

■ Historical real returns
 — Last 100 years average return

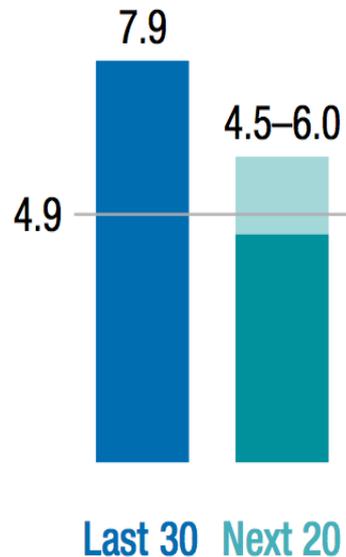
The next 20 years could be more challenging

■ Growth-recovery scenario
 ■ Slow-growth scenario

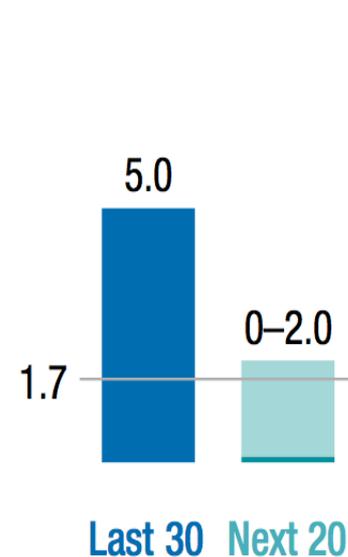
US equities



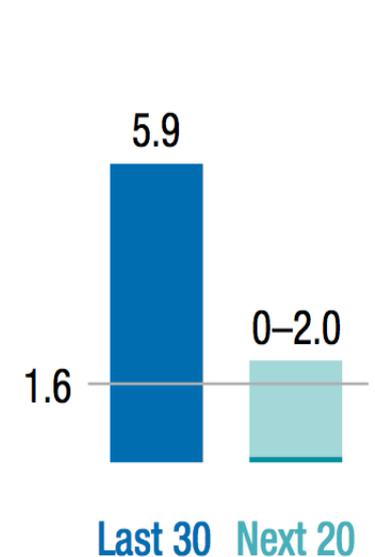
European equities



US bonds



European bonds



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

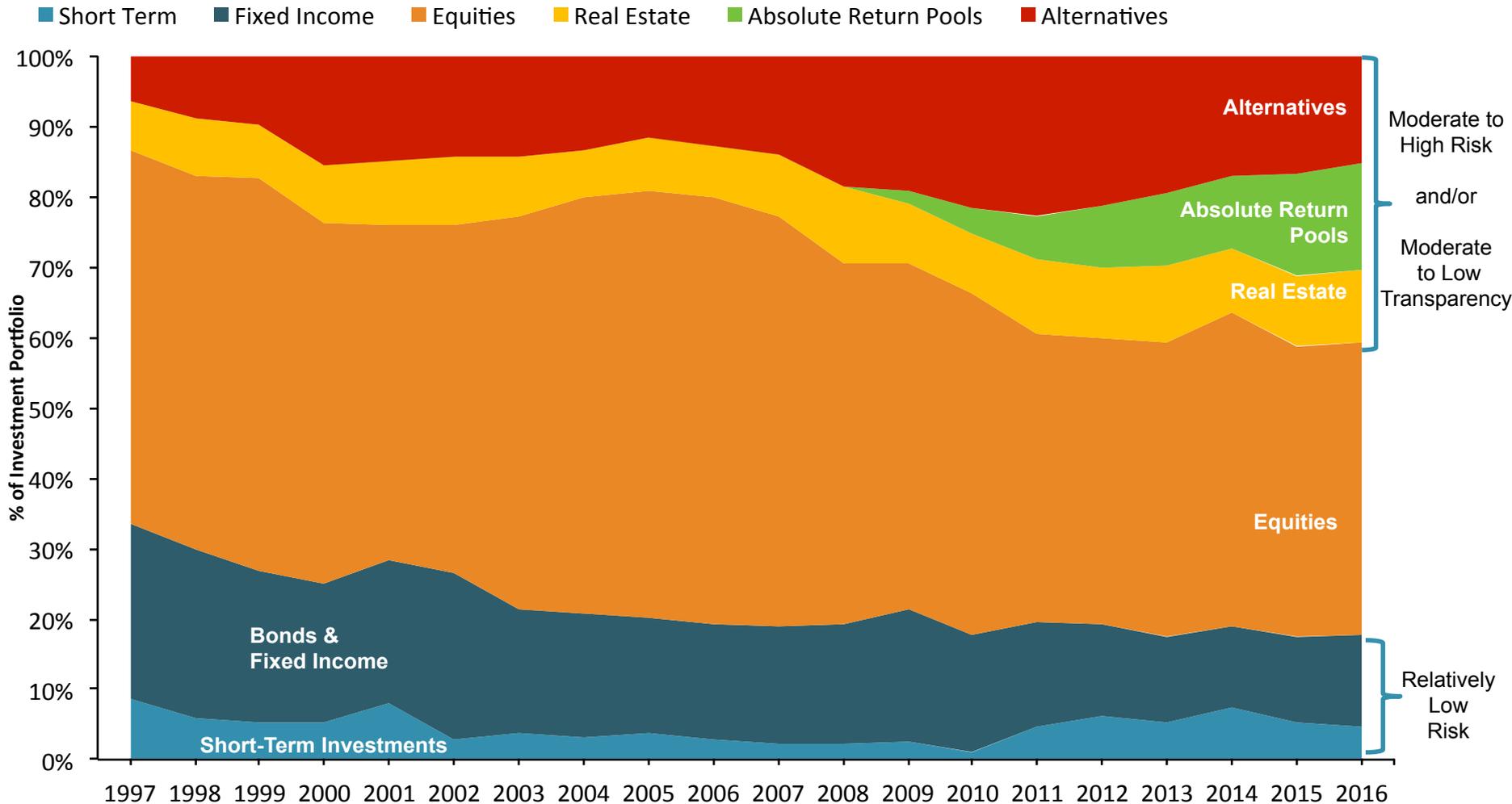


| Possible 20-Year Rate of Return | Probability Based on Assumptions By: | | | | Total Required Pension Debt Payments 2017-38 |
|---------------------------------|--------------------------------------|---------------------|--------------------|------------------------------|--|
| | MPSERS Expectations | BNY Mellon Forecast | JP Morgan Forecast | Research Affiliates Forecast | |
| 9% | 16% | 14% | 13% | 5% | \$39.3 billion |
| 8% | 29% | 27% | 25% | 13% | \$55.7 billion |
| 7.5% | 38% | 35% | 33% | 18% | \$68.1 billion |
| 7% | 47% | 44% | 42% | 25% | \$76.5 billion |
| 6.5% | 56% | 53% | 51% | 34% | \$84.2 billion |
| 6% | 65% | 62% | 61% | 43% | \$91.5 billion |
| 5% | 78% | 78% | 76% | 62% | \$104.5 billion |

Source: Reason Foundation Monte Carlo model based on Michigan Bureau of Investment asset allocation and reported expected of returns by asset class. Forecasts of returns by asset class generally from BNYM, JPMC, and Research Affiliates were used and matched to the specific asset class of MPSERS. Probability estimates are approximate as they are based on the aggregated return by asset class. For complete methodology contact Reason.

MPSERS Asset Allocation (1997-2016)

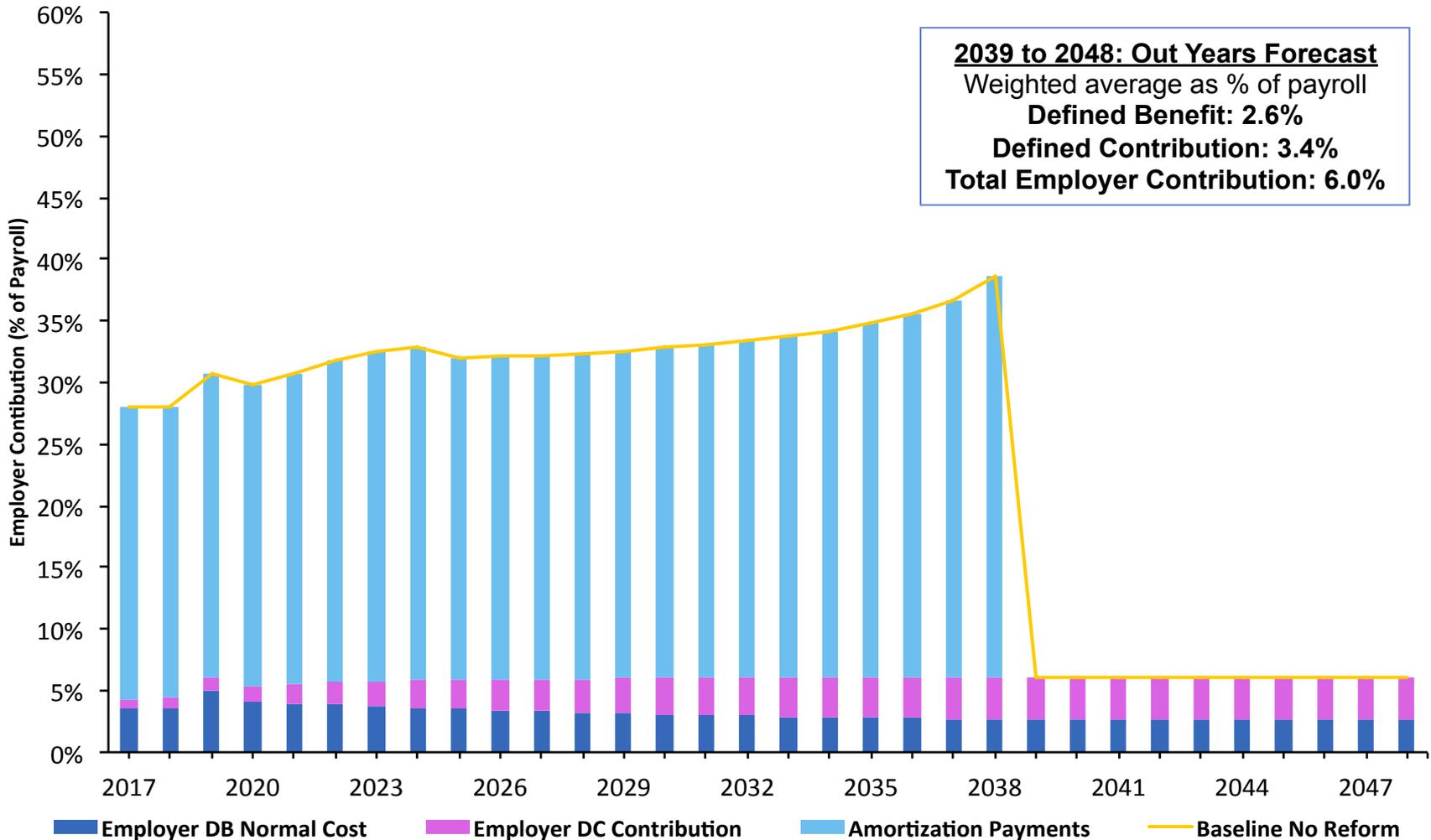
Increasing Investment Risk Over Time



Source: Reason Foundation analysis of MPSERS actuarial valuation reports, State of Michigan CAFRs.

MPERS Employer Contribution Forecast (as % of Payroll) Baseline: Normal Cost + Amortization Payment

Discount Rate 7.5% / 7%, Assumed Return 7.5% / 7%, Actual Return 7.5% / 7%

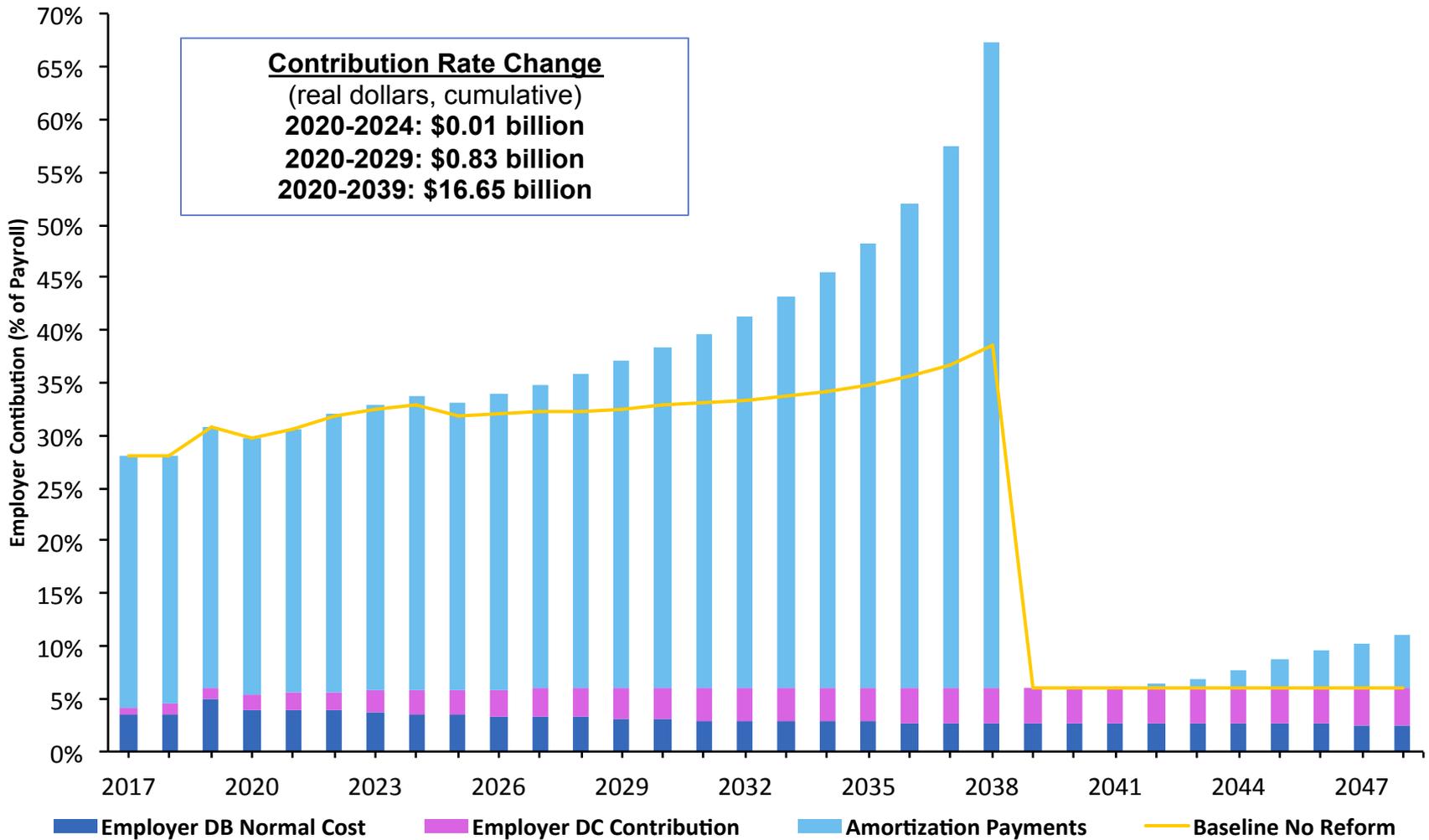


Note: Forecast includes inflation adjusted figures using the plan's inflation assumption. Years shown are contribution fiscal year end dates. Rate of return assumption and discount rates used are relative to the non-hybrid (8%) and hybrid (7%) tiers, as defined by the plan.

MPSERS Employer Contribution Forecast (as % of Payroll)

Underperforming Assets: 6% Actual Return

Discount Rate 8% / 7%, Assumed Return 8% / 7%, Actual Return 6%

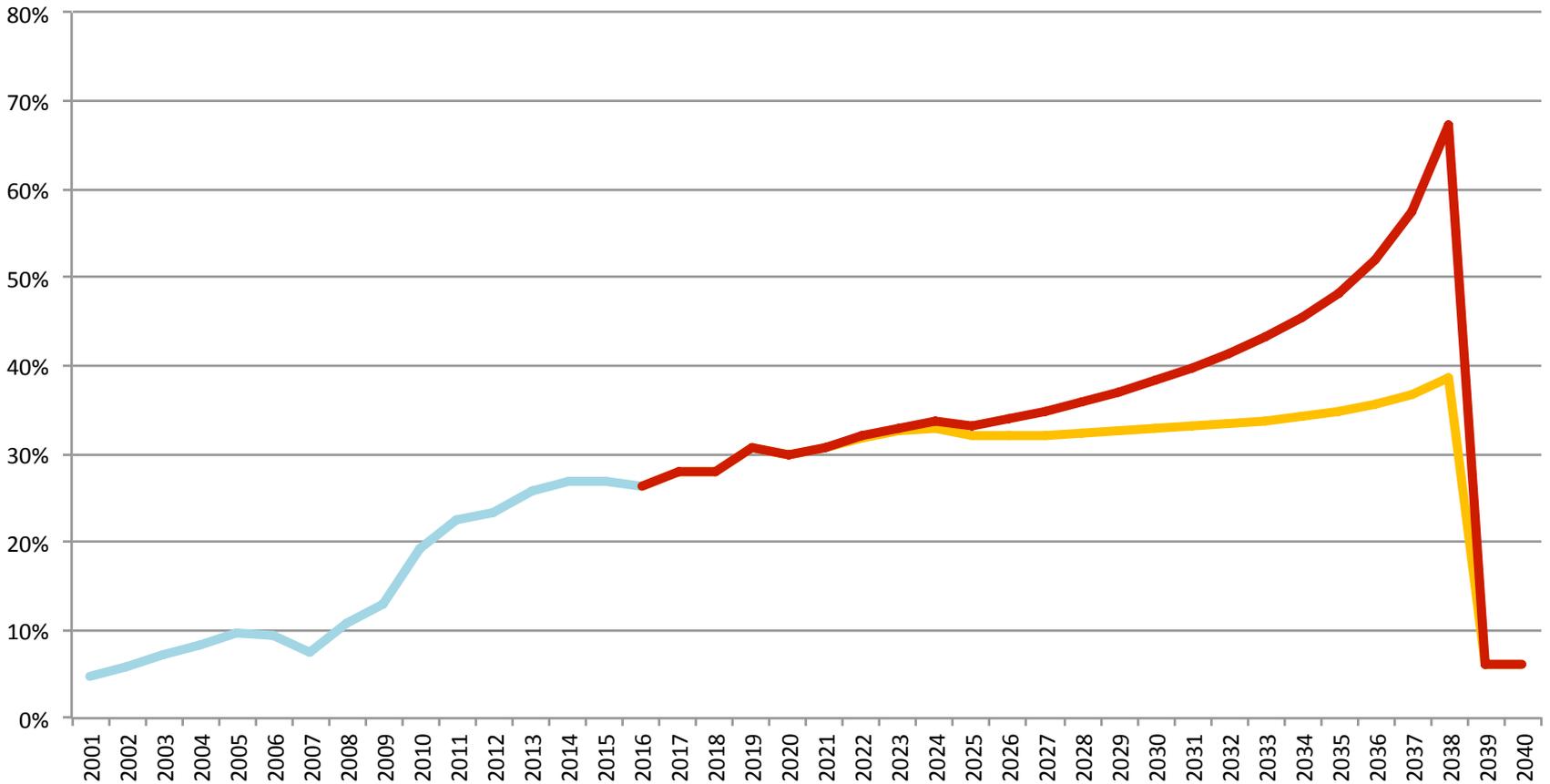


Note: Forecast includes inflation adjusted figures using the plan's inflation assumption. Years shown are contribution fiscal year end dates. Rate of return assumption and discount rates used are relative to the non-hybrid (8%) and hybrid (7%) tiers, as defined by the plan.

MPERS Contribution Rate History and Projection



— Historic Contribution Rates
 — What MPERS is Assuming Will Happen
 > Actual average returns of 7.5% and 7% for the respective pension plans
 — More Likely Scenario
 > Actual average returns of 6%



MPERS Underperforming Assets

Is the Pension Plus Normal Cost Underpriced?



1. The unrealistic assumed rate of return is also a problem for the “Hybrid” Pension Plus Plan — i.e. defined benefits for members hired after July 1, 2010.
 - The defined benefit portion of the Pension Plus Plan depends on MPERS achieving a 7% average return.
 - Even this might be too high given the new normal for investment returns.
 - Plus, the average MPERS returns over 15 years (6.5%), and 10 years (5.7%) are all lower than the 7% target for the Pension Plus Plan, suggesting that when that plan starts to mature it will begin to see degrading solvency from underperforming investment returns.
2. If a 7% assumed return is overly optimistic and MPERS assets underperform, then the current Pension Plus Plan's normal cost will have been underpriced ever since inception.
 - The state can pay more in normal cost now to avoid unfunded liabilities down the road, or keep normal cost low and pay unfunded liability amortization payments later to make up the difference between the underpriced benefit today and actual cost of benefits in the future (plus interest).

Pension Plus Comparative Normal Cost

(Amounts to be Paid in 2018-19 Contribution Fiscal Year, % of payroll)



| | Pension Plus Plan (2016 Val. Report) | Pension Plus Plan (Reason Forecast) | Pension Plus Plan (Reason Forecast) |
|---|---|--|--|
| Assumed Rate of Return | 7% | 6% | 5% |
| Payroll Growth Assumption | | 3% | |
| Gross DB Plan Normal Cost | 7.9% | 9.6% | 11.8% |
| Employee Contribution (Weighted Average) | 4.9% | 4.8% | 4.8% |
| Employer Contribution | 3.1% | 4.6% | 7% |
| Max Tier 1 Member DC Contribution | 1% | 1% | 1% |
| Max Tier 2 Only Member DC Contribution | 3% | 3% | 3% |
| DB Normal Cost + DC Contributions: Total Employer (Weighted Average) | 4.6% | 6.1% | 8.5% |

Note: All figures are on an actuarial value basis and rounded. Normal costs shown are weighted average, we estimate 75% in Tier 1 and 25% in Tier 2 Only.

PROBLEM 2: PAYROLL GROWTH ASSUMPTION

- The payroll growth assumption is likely slowing down the process of paying down the unfunded liabilities

Challenges from Aggressive Actuarial Assumptions

Overestimating Payroll Growth Trends

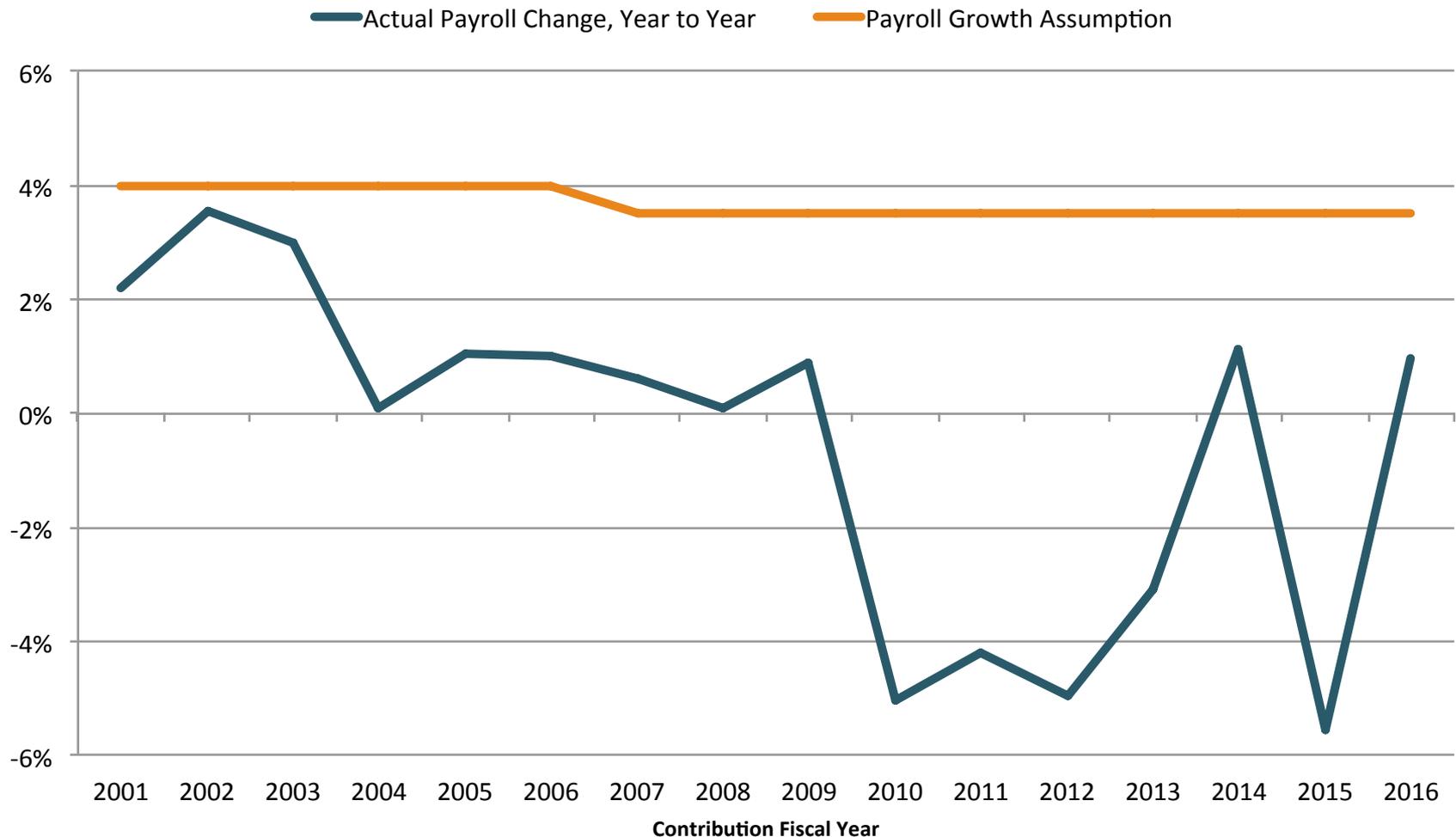


- The payroll growth assumption of the plan has been disconnected from the historic pattern of changes in payroll for MPERS. The overestimation of payroll growth artificially reduced the amount of unfunded liability amortization payments on a dollar basis.
 - Unfunded liability amortization payments have historically been calculated so they are the same amount annually as a percentage of the active member payroll for MPERS. This means the actuarial assumption about how much payroll will grow from year to year is important.
 - For over a decade, the payroll growth assumption has been 3.5%. But the average nominal growth of payroll since then has never been greater than 1.15%, and the average annual change in payroll has been -1.90%.
 - Between fiscal years ending 2001 and 2016, the average payroll growth was -0.60%.
 - This means that actual amortization payments have been less than actuarially assumed for more than a decade, even when 100% of the actuarially required contribution has been paid.

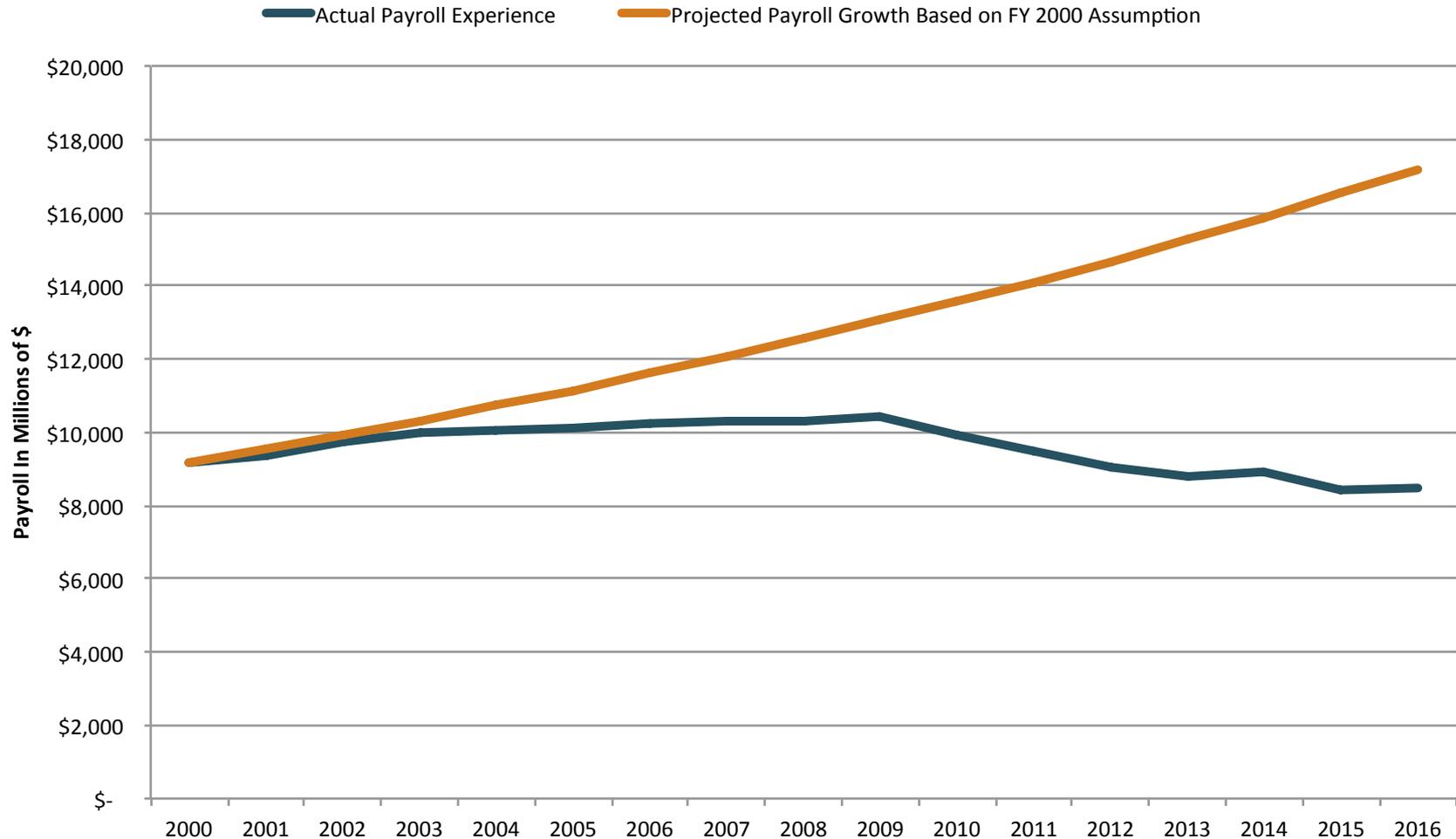


Challenges from Aggressive Actuarial Assumptions, 2001-16

Actual Change in Payroll v. Assumption

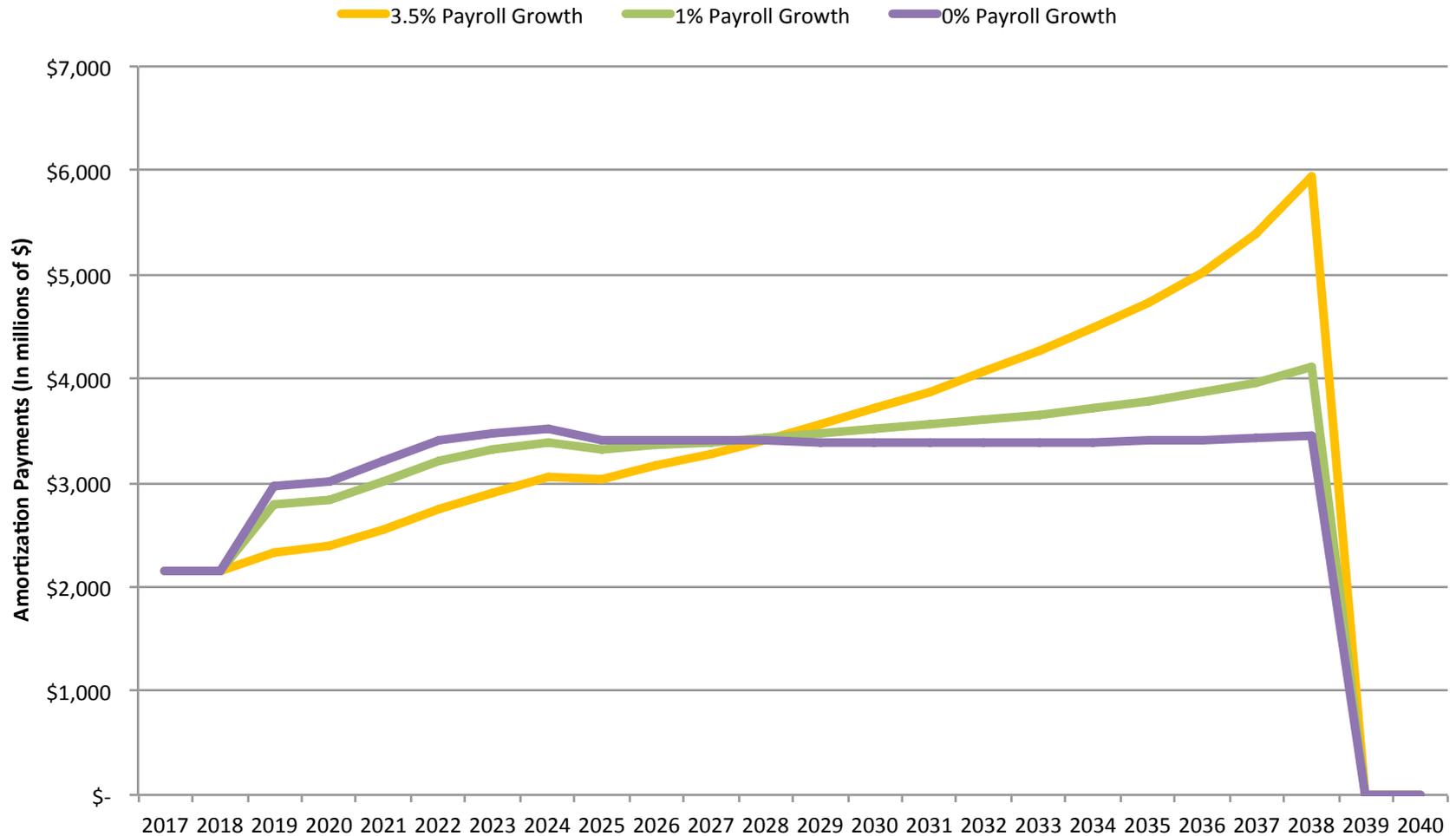


Actual vs. Projected Payroll Using FY2000 Assumption of 4% Growth





Projected Amortization Payments, Different Payroll Growth Rates



PROBLEM 3: UNDERFUNDING AND OTHER ASSUMPTIONS

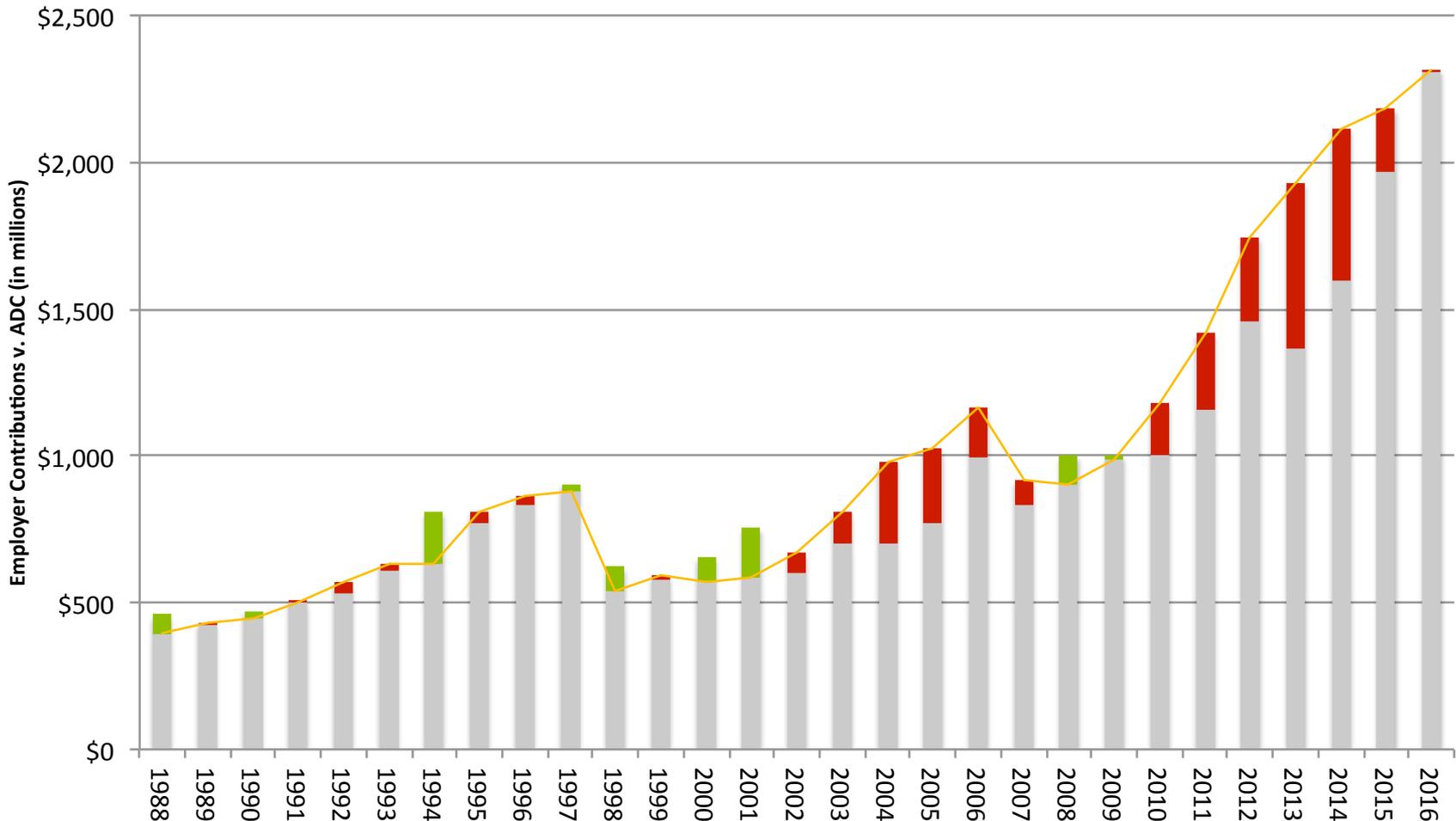
- The methods and practices of MPSERS push various costs out in the future, which reduce near-term contribution rates but also increase total costs

MPSERS Actuarially Determined Employer Contribution History

Actual v. Required Contributions, 1988 - 2016



■ Actual Contribution
 ■ Underfunded Contributions
 ■ Overfunded Contributions
 — Actuarially Determined Contribution



Source: Reason Foundation analysis of MPSERS actuarial valuations and CAFRs.

Amortizing Underpaid Contributions Over 5 Years Increases Pension Debt



- In the time between when actuaries determine the required contribution for employers and when the funds are actually paid in, the necessary amount may rise or fall.
 - The necessary contribution amount has been almost always underestimated
- The state could simply make up the underestimated, unpaid contributions in the next fiscal year — but MPSERS spreads out the repayment over a five-year period.
 - In this time period, new debt is added to debt that isn't recognized before the five-year period is over.
- Stretching out the payment of underpaid contributions over any period of time greater than one year means the taxpayers will have to pay a larger total amount in the long run because interest grows on the unfunded liabilities created by the underpayment.
 - This leads to a perpetual cycle of underfunding where the actual debt owed by the system isn't ever fully realized.

PROBLEM 4: DISCOUNT RATE AND UNDERVALUING DEBT

- The discount rate is likely undervaluing the recognized amount of existing pension obligations



MPERS Discount Rate

Methodology is Undervaluing Liabilities

- The discount rate used to value liabilities should reflect the risk associated with making a given stream of payments.
 - A higher discount rate implies greater risk associated with making benefit payments.
 - Because pension benefits are constitutionally protected, the discount should be low, close to a “risk-free” rate of return. 30-Year Treasury yields are commonly used to estimate this.
- In 2001, 30-Year Treasury yields were about 5.5% when the MPERS discount rate was 8%.
 - Since then, Treasury yields have fallen to 3%, while the discount rate was only changed to 7.5% this spring.
 - The implicit risk premium has increased from 2.5% to 4.5%.
- MPERS either anticipates a high risk of default (which is unlikely) or is **understating the value of its liabilities by using a discount rate that is higher than it should be.**



MPERS Pension Debt Sensitivity

FYE 2016 Unfunded Liability Under Varying Discount Rates

| | Funded Ratio (Market Value) | Unfunded Liabilities | Accrued Liabilities |
|--|--------------------------------|-------------------------|------------------------|
| 7.5% / 7% Discount Rate (Current Baseline) | 60.1% | \$28.8 billion | \$72.7 billion |
| 7% Discount Rate | 54.9% | \$35.8 billion | \$79.3 billion |
| 6% Discount Rate | 49.4% | \$44.5 billion | \$88.0 billion |
| 5% Discount Rate | 44.5% | \$54.3 billion | \$97.8 billion |

Source: Reason Foundation analysis of MPERS actuarial valuations and CAFRs; figures shown are rounded.



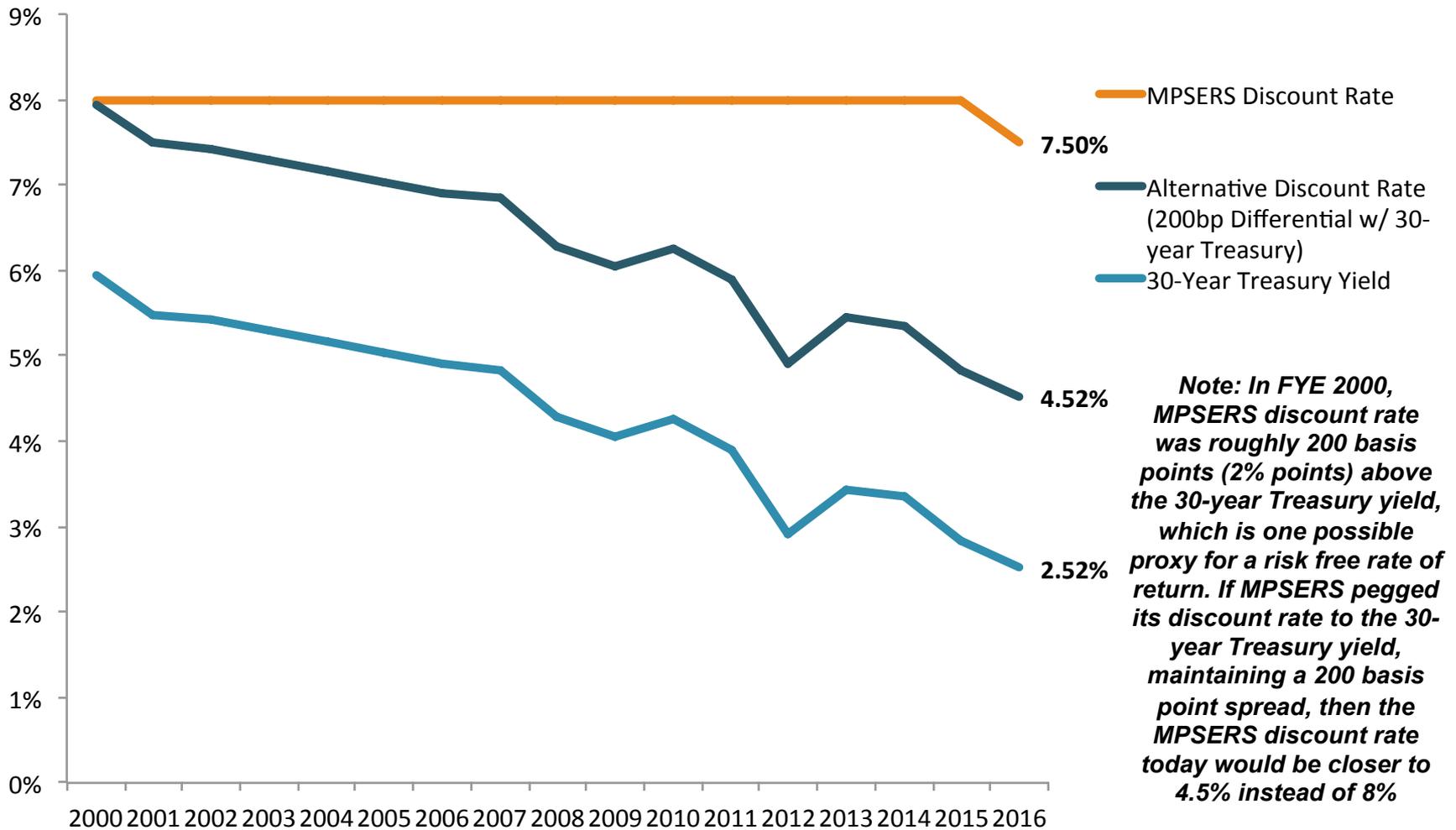
What Should the Discount Rate Be?

There is no perfect answer, it depends on how one views risk

1. The most direct measure of the risk in the liabilities (i.e. that Michigan would not pay all pension benefits) would be a rolling average yield on Michigan's general obligation bonds.
2. Alternatively, Michigan could benchmark the MPSERS discount rate to Treasury yields so that as "risk free" rates of return go up or down the state's measure of risk adjusts accordingly. For example:
 - The discount rate will always be 1% (100bps) above the 30-year Treasury Bond; or
 - The discount rate will always be 2% (200bps) above the 20-year Treasury Bond.



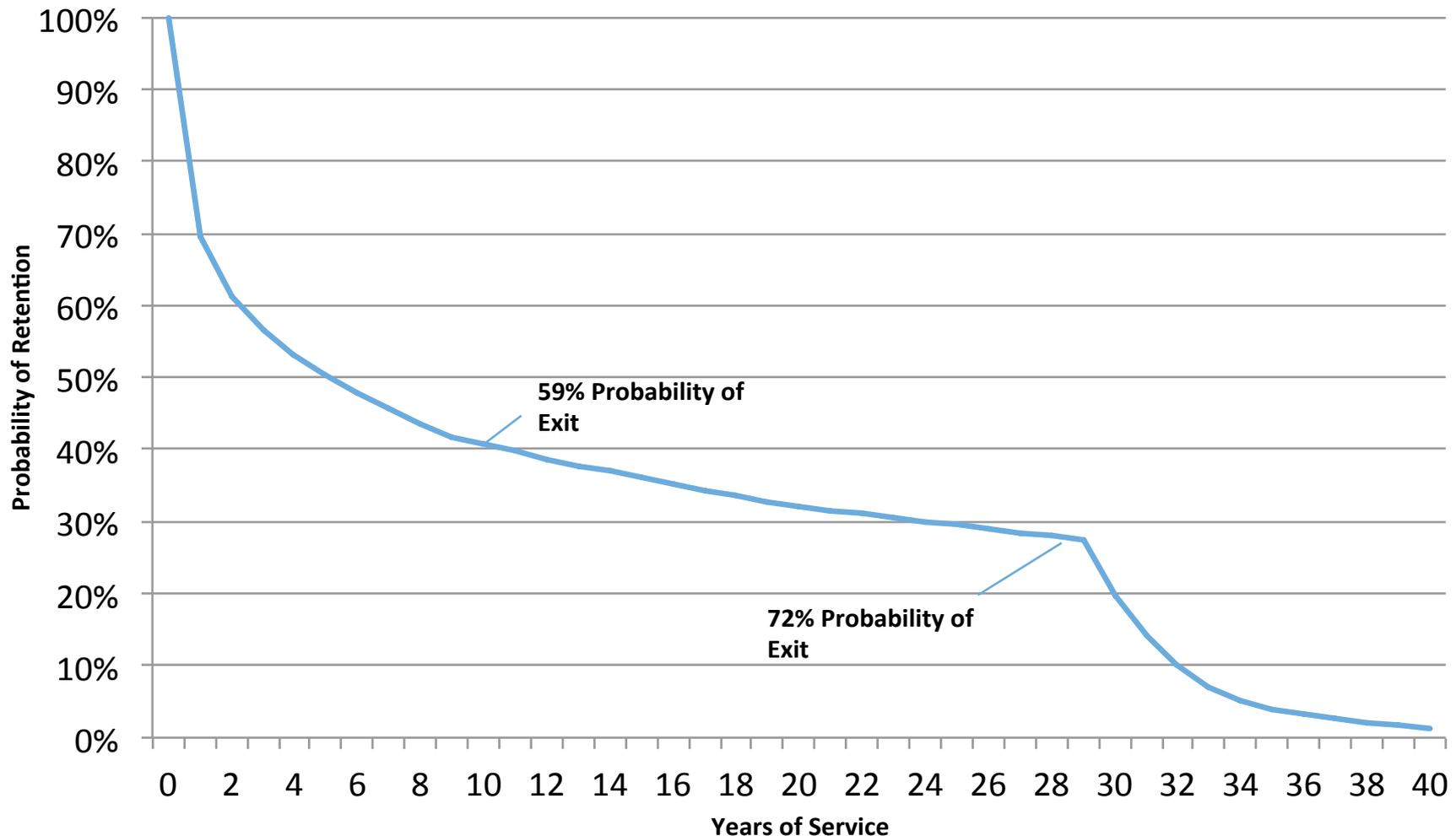
Comparing Change in Discount Rate to the Change in the Risk Free Rate, 2001-2016



PROBLEM 5: THE EXISTING BENEFIT DOES NOT WORK FOR EVERYONE

- The turnover rate for members of MPSERS suggests that a defined benefit plan is not a useful benefit for all people hired in to the pension system.

The Current Benefit Does Not Work for All Teachers: Likelihood of Members Remaining in MPERS

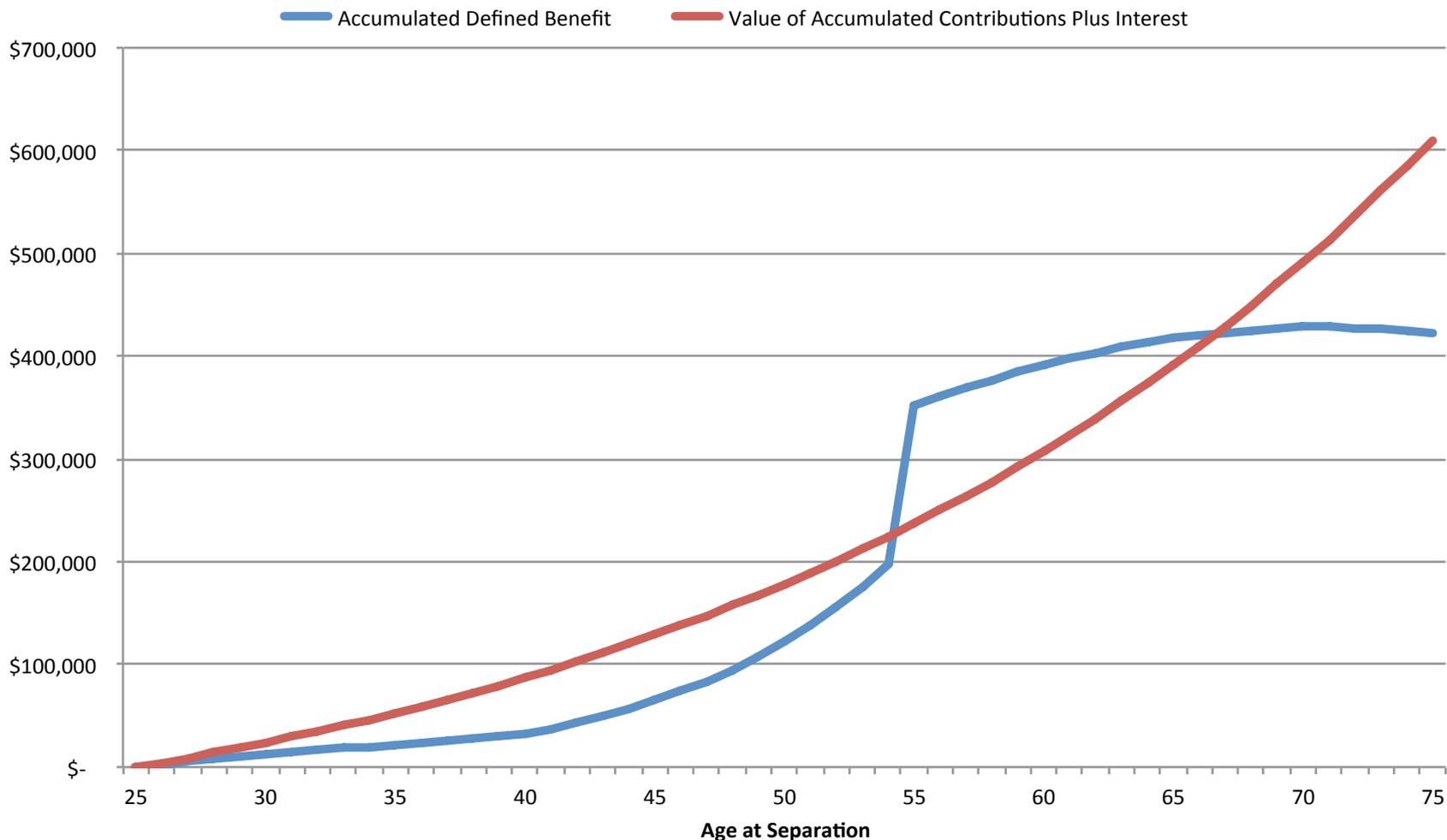


MPERS Members' Benefits Aren't Initially Worth Their Contributions



- MPERS members need to work for 10 years before their benefits become vested.
 - Before this, they are not eligible for MPERS benefits.
 - Only 44% of members will stay long enough to qualify for basic benefits.
- Members leaving MPERS can withdraw their contributions plus interest, but not their accumulated employer contributions.
- In order for MPERS members' vested benefits to exceed their contributions, **they must work for between 10 and 14 years.**
 - Only 44% of MPERS members reach this “break-even” point.

The Value of Benefits Do Not Increase Proportionally to Years Served



Is the Pension Plus Plan Best for 21st Century Recruiting and Retention?



1. As of the end of 2016, roughly 40% of teachers hired are expected to leave within five years of joining the MPSERS system. About 60% of non-teachers are expected to leave within five years.
2. The Pension Plus Plan requires at least 10 years of service in order to qualify for a normal retirement. Members who leave before then are entitled to a refund of their own contributions.
3. This means for the 40% of teachers (and 60% of non-teachers) who select the Pension Plus plan when they are hired into MPSERS and then leave within five years, there is effectively no retirement benefit.
4. Alternative benefit designs or options may be necessary to ensure long-term recruitment and retention success.

Is the Pension Plus Plan Best for 21st Century Recruiting and Retention? (cont'd)



5. Defined benefit plans like the Pension Plus Plan can be attractive for employees looking to work a lifetime career in one place.
 - However, they do not provide a good retirement benefit for a more mobile workforce.

6. Defined contribution retirement plans are attractive options for younger workers who may not want to work a full career in one place or who want to teach for a few years as a public service, or for older teachers who have moved to Michigan but don't want to work the full number of years necessary to earn a complete retirement benefit.
 - However, they do not necessarily bind an employee to a single system the way that defined benefit plans do.
 - The Pension Plus Plan does offer a DC plan with a 1% employer contribution, but this benefit is weak.