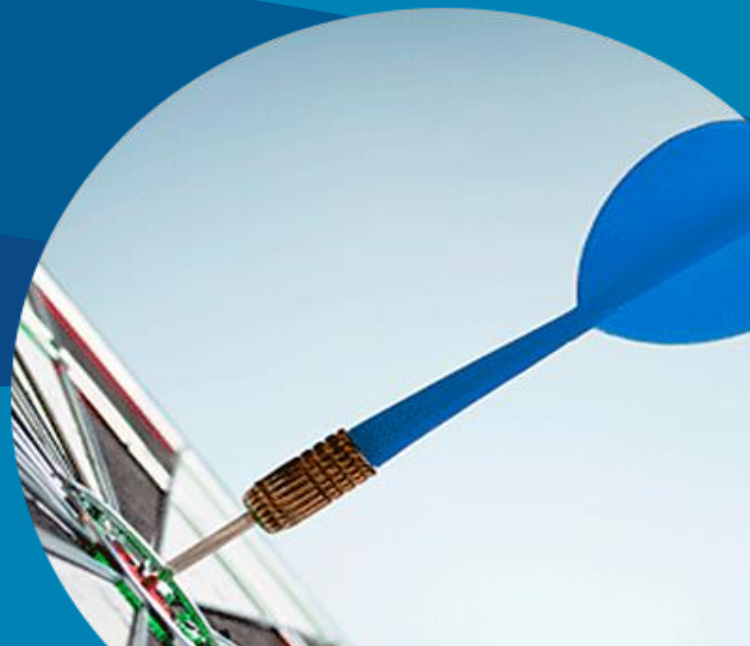
Maryland State Retirement and Pension System

Stress Testing Extract from June 30, 2024 Actuarial Valuation
Presentation to the Board of Trustees

October 15, 2024



Stress Testing

Purpose

- To assess and more fully understand:
  - The risks characteristics of the System
  - The System's financial sustainability under various stresses
- Provide relevant information to the Board for managing liabilities and making funding decisions
- Stress Testing is a "process for assessing the impact of adverse changes in one or relatively few factors affecting a plan's financial condition."[1]
- Method used
  - Scenario test
    - "A process for assessing the impact of one possible event, or several simultaneously or sequentially occurring possible events, on a plan's financial condition." [1]
    - Deterministic

[1] *Actuarial Standard of Practice (ASOP) No. 51.*

Stress Testing
Identifying Key Risks

Risk = "The potential of actual future measurements deviating from expected future measurements resulting from actual future experience deviating from actuarially assumed experience."[1]

Investment risk	Inflation risk	Assumption change risk	Contribution risk	Demographic risk
• Lower than expected investment returns leading to increases in the UAAL, which leads to additional contributions to make up the investment return shortfall.	• Higher inflation than expected will lead to greater than assumed pay increases and retiree COLAs, leading to increases in the UAAL and require additional contributions.	• Potential that actuarial assumptions will need to change to reflect the circumstances surrounding future actuarial valuations.	• Actual contributions may differ from expected future contributions. For example, actual contributions may not be made in accordance with the System's funding policy or material changes may occur in a relevant factor that determines the amount of contributions the System will receive.	• Demographic experience differs from what the actuarial valuation assumes.

[1] *Actuarial Standard of Practice (ASOP) No. 51.*

Stress Testing
Identifying Key Risks

Historical Actuarial Valuation Results - State Only ($ Millions)												
Valuation Year	Demographic (Gain)/Loss and Other Sources		(Gain)/Loss due to Pay Increases		(Gain)/Loss due to Retiree COLAs		Investment (Gain)/Loss		Impact of Benefit Changes		Impact of Assumption Changes	
	$	% of BOY AAL	$	% of BOY AAL	$	% of BOY AAL	$	% of BOY AAL	$	% of BOY AAL	$	% of BOY AAL
2017	$ (92)	-0.1%	$ (186)	-0.3%	$ (301)	-0.5%	$ 254	0.4%	$ -	0.0%	$ 117	0.2%
2018	(45)	-0.1%	(341)	-0.5%	163	0.3%	305	0.5%	1	0.0%	140	0.2%
2019	89	0.1%	(116)	-0.2%	13	0.0%	847	1.3%	-	0.0%	(754)	-1.1%
2020	(627)	-0.9%	204	0.3%	(182)	-0.3%	794	1.2%	-	0.0%	-	0.0%
2021	(121)	-0.2%	(222)	-0.3%	(404)	-0.6%	(1,540)	-2.2%	-	0.0%	1,262	1.8%
2022	(36)	0.0%	223	0.3%	668	0.9%	(98)	-0.1%	-	0.0%	-	0.0%
2023	(32)	0.0%	1,301	1.7%	1,014	1.3%	769	1.0%	(4)	0.0%	-	0.0%
2024	(95)	-0.1%	925	1.1%	627	0.8%	763	0.9%	0	0.0%	914	1.1%
Total	$ (959)		$ 1,789		$ 1,598		$ 2,095		$ (3)		$ 1,679	

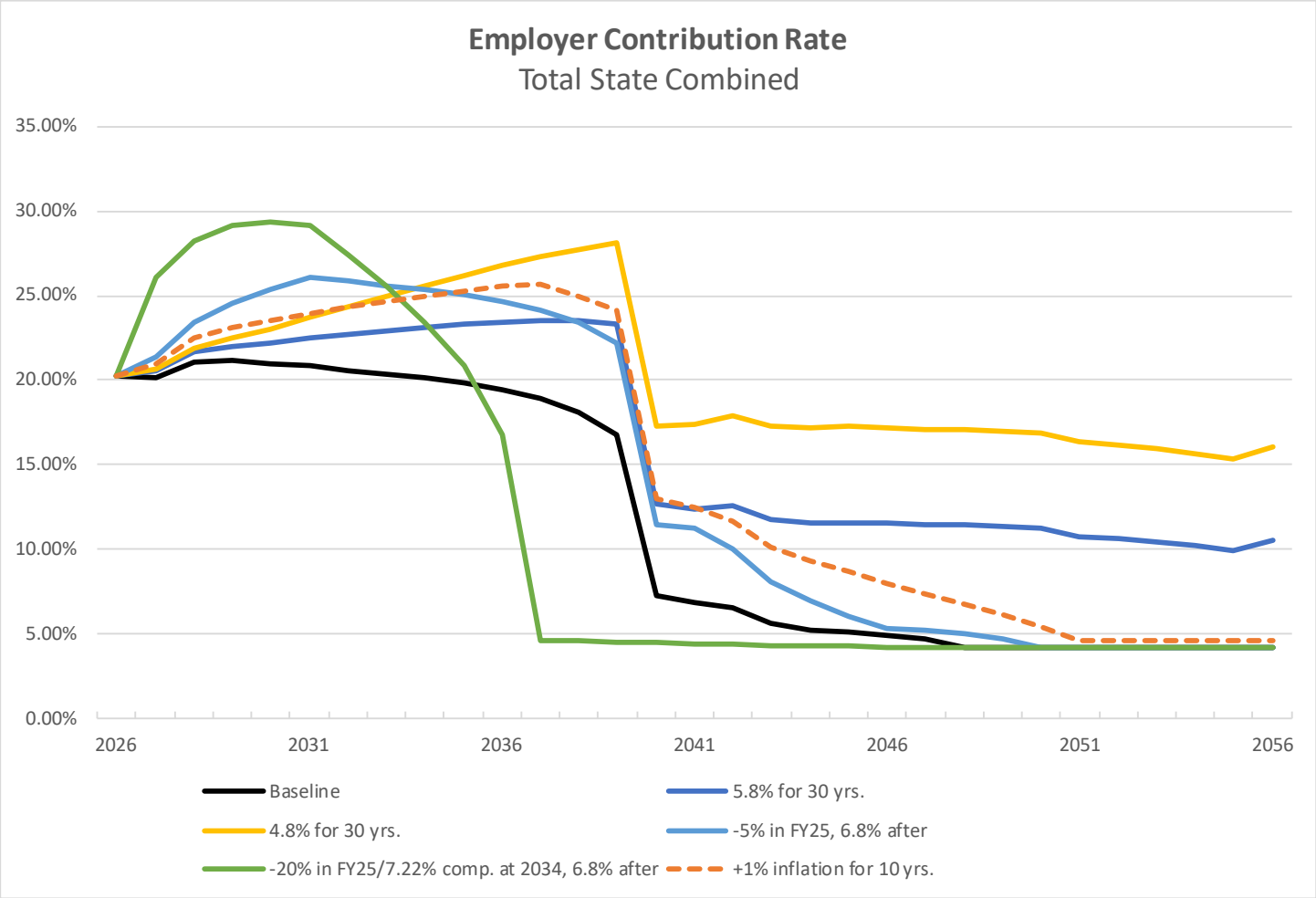
- Investment experience, pay increases, retiree COLAs, and assumption changes have made significant impact on the UAAL. Inflation experience affects both pay increases and retiree COLAs.

Stress Testing
Scenario Testing (Deterministic)

- Scenarios
  - Persistently low returns
    - Annual investment returns are 1% lower than the assumed rate of return (5.8%)
    - Annual investment returns are 2% lower than the assumed rate of return (4.8%)
  - Asset “shocks”
    - -5% return in FY 2025 (-11.8% loss), then 6.8% after (no recovery)
      - Still within one standard deviation of portfolio’s return
    - -20% return in FY 2025 (-26.8% loss) with recovery until 2034, then 6.8% after
      - 10-year (through 2034) annualized compound return equal to 7.22% (10-year geometric average return from 2024 Experience Study)
      - Requires the annualized compound return from 2026 to 2034 to equal 10.8%
  - Inflation is 1% higher than assumed for 10 years
    - Liabilities and benefits are increased due to additional inflation
      - Inflation will have less impact on retiree COLAs as time goes on due to COLA caps
    - Payroll is unchanged in order to compare contribution rates with other scenarios
- 30-year projections of employer contribution rates and funded ratios
  - No change to the assumptions or funding policy

Stress Testing

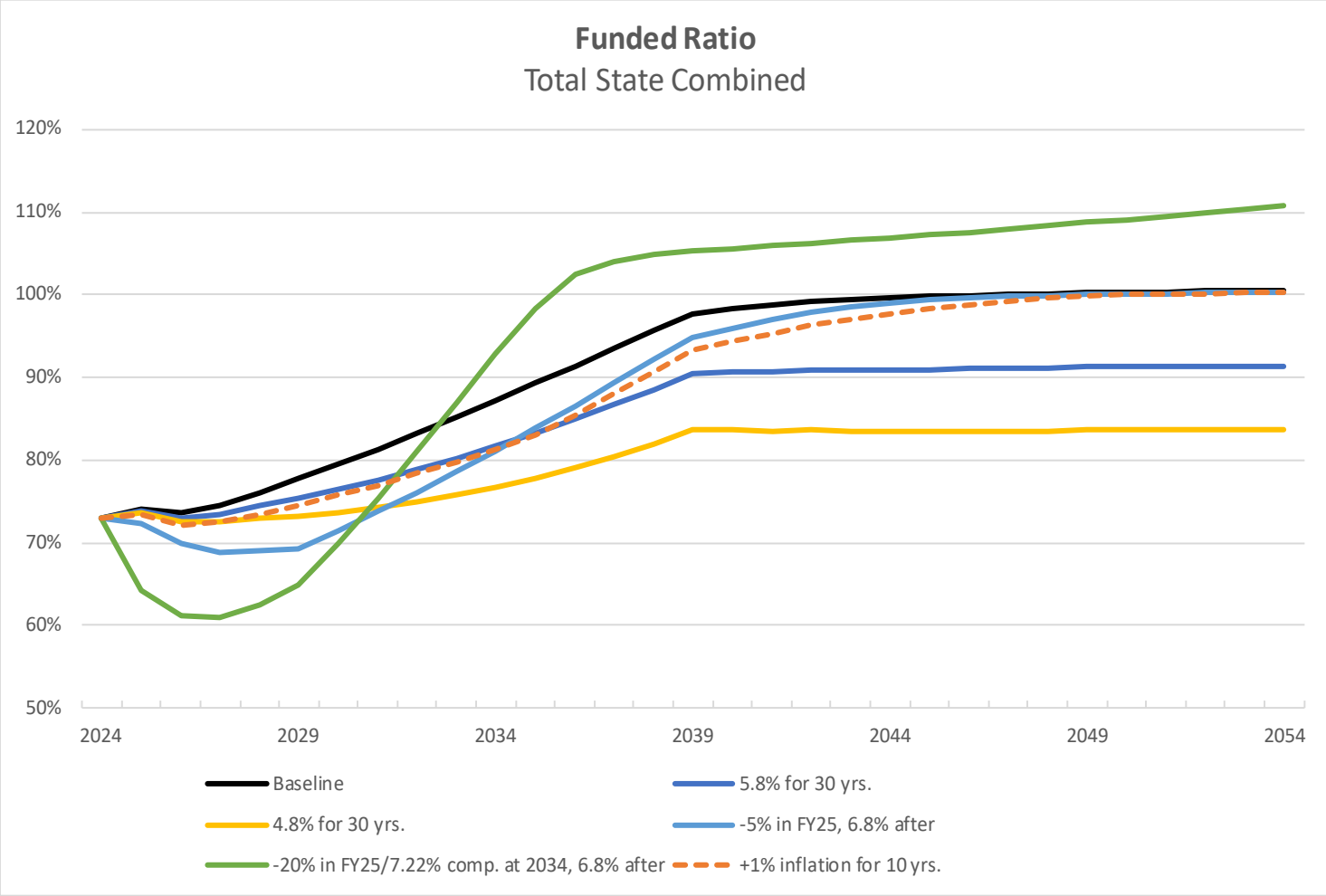
Scenario Testing (Deterministic): Employer Contribution Rates



- Baseline scenario
  - Employer Contribution Rates increase initially to 21% due to deferred asset losses, then decrease as time goes on due to amortizing the majority of the UAAL and decreasing normal cost
- 5.8% scenario
  - Rates increase steadily to 23.5% of pay in late 2030s
  - After majority of UAAL is paid off, rates remain over 10%
- 4.8% scenario
  - Rates increase to 28% in 2039, but remain over 15% after
- -5% in FY25 scenario
  - Sharper increase than the previous scenarios with peak at 26% of pay
  - Rates drop below 10% in the 2040s and return to baseline in the 2050s
- -20% in FY25 with recovery scenario
  - Dramatic increase to 29% of pay due to initial loss, but recovery brings rates down below baseline within 10 years
- 1% higher inflation for 10 years
  - Rates increase steadily and peak at 26%
  - Rates decrease to just above baseline about 10 years after majority of UAAL is paid off

Stress Testing

Scenario Testing (Deterministic): Funded Ratio



- Baseline scenario
  - 100% funding projected in 2047 (98% in 2039)
- 5.8%, 4.8% scenarios
  - Funded ratio plateaus at 91% and 84%, respectively due to persistent losses
  - Progress is made through 2039 despite losses
- -5% in FY25 scenario
  - Achieves 90% funding by 2039 after initial drop into the high 60% range
  - 100% is achieved about same time as baseline scenario
- -20% in FY25 with recovery scenario
  - Initial drop into the low 60% range
  - Achieves 100% funding by 2036 due to recovery period where returns exceed assumptions for 9 years
- 1% higher inflation for 10 years
  - 90% funding by 2039 after slower progress
  - 100% is achieved a few years after baseline scenario

Stress Testing
Summary of Observations

- Based on deterministic scenario testing
  - One-time moderate asset shock (-5% in FY2025) leads to a moderate decrease in the funded ratio, however the funded ratio reaches 100% at a similar time as the baseline
  - A significant one-time asset shock (-20% in FY2025) leads to a dramatic decrease in the funded ratio initially, however a recovery that results in a 10-year annualized return of 7.22% sets a course to reach 100% funding even sooner than the baseline
  - Persistent investment losses (5.8% and 4.8% returns) means the funded ratio will stagnate at 91% and 84%, respectively
  - Excess inflation (+1% for 10 years) slows the funding progress but 100% funding is still achieved in a similar timeframe as the baseline scenario
- The funding policy of the State Systems is fairly robust since the majority of the current UAAL is scheduled to be amortized by 2039
  - Progress toward 100% funding is still made despite economic hardships
- Contributing the actuarially determined employer contribution (ADEC) is the key to sustainability
  - Stress testing projections assumed 100% of ADEC was contributed
- Goal is to achieve 100% funding and stay there
  - Regardless of the scenario, as funding level approaches 100%, the Board may wish to reconsider the funding and investment policies with an objective of preserving the 100% funded ratio