

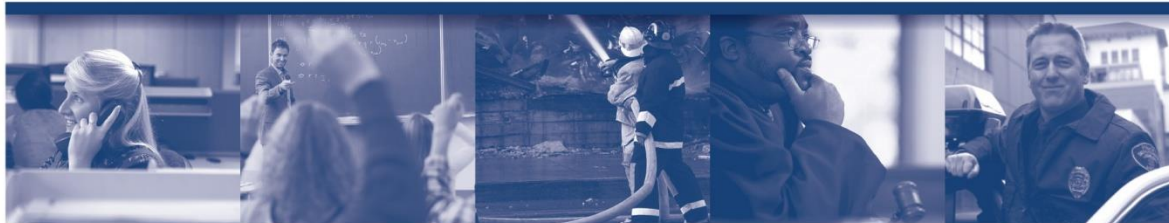


Cavanaugh Macdonald
CONSULTING, LLC

The experience and dedication you deserve

OSERS: Recommendations on Economic Assumptions

October 7, 2021



Experience Study Timeline



- August meeting
 - Analysis and initial recommendations for demographic assumption changes
- October meeting (TODAY)
 - Follow up on any outstanding questions from August meeting
 - Initial recommendations for economic assumptions
- November/December meeting
 - Follow up on any outstanding questions from October meeting
 - Action to adopt assumptions to be used in the January 1, 2022 actuarial valuation

Background



- Pension funding is a long-term proposition with expected benefit payments for current members spanning 80+ years
- Assumptions have a significant impact on the calculation of liabilities and actuarial contribution rates
 - Future benefit payments are dependent on a number of contingent events that are unknown
 - Actuaries use assumptions to estimate the timing, duration and amount of future benefit payments and then calculate their current value (present value)
 - Assumptions will impact the allocation of costs (contributions) so usually set neither overly conservative or aggressive
- Assumptions are just that – assumptions. If actual experience differs from the assumptions over time, the costs (contributions) will differ also.

Purpose of Experience Study



- Assumptions are critical to the calculation of liabilities. Must ensure they are best estimates of future experience.
- Experience study is the basis for analyzing and evaluating the existing actuarial methods and assumptions and developing recommended changes, if needed.
- Actuary's role is to make recommendations for each assumption
 - As fiduciaries, the Board is responsible for the selection of actuarial assumptions
 - Board can adopt all, none, or some of actuary's recommendations
- Assumptions and methods do not affect the true cost of the plan, which is the actual benefit payments paid from the trust
 - Assumptions and methods will influence the timing and amount of contributions

Experience Studies



- Compare actual experience during study period with expected results based on current assumptions

- Past experience provides strong guidance for some assumptions (like mortality) and weak guidance for others (like investment return)

- Both science and art
 - Objective (science): number crunching of actual and expected numbers of members and rates of occurrence
 - Subjective (art): interpreting the information and deciding on appropriate changes



Types of Assumptions

What Are They?

Economic

- Price Inflation
- Investment Return
- Wage Growth
- COLA
- Payroll Growth
- Individual Salary Increases

Demographic

- Retirement
- Disability
- Termination
- Mortality
- Refund

Who Selects Them?

Economic

- Board
- Actuary
- Other Advisors

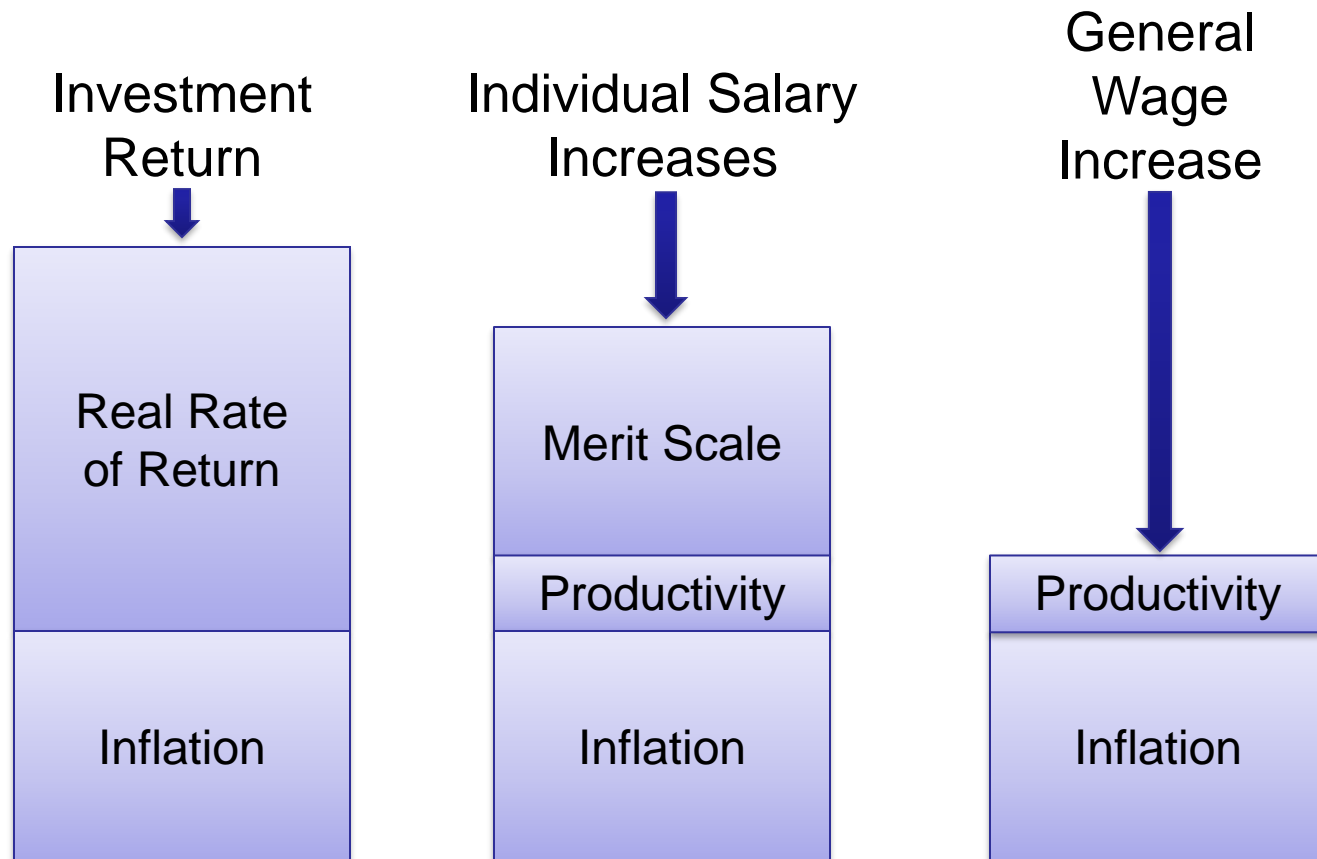
Demographic

- Mostly Actuary
- Board Approves



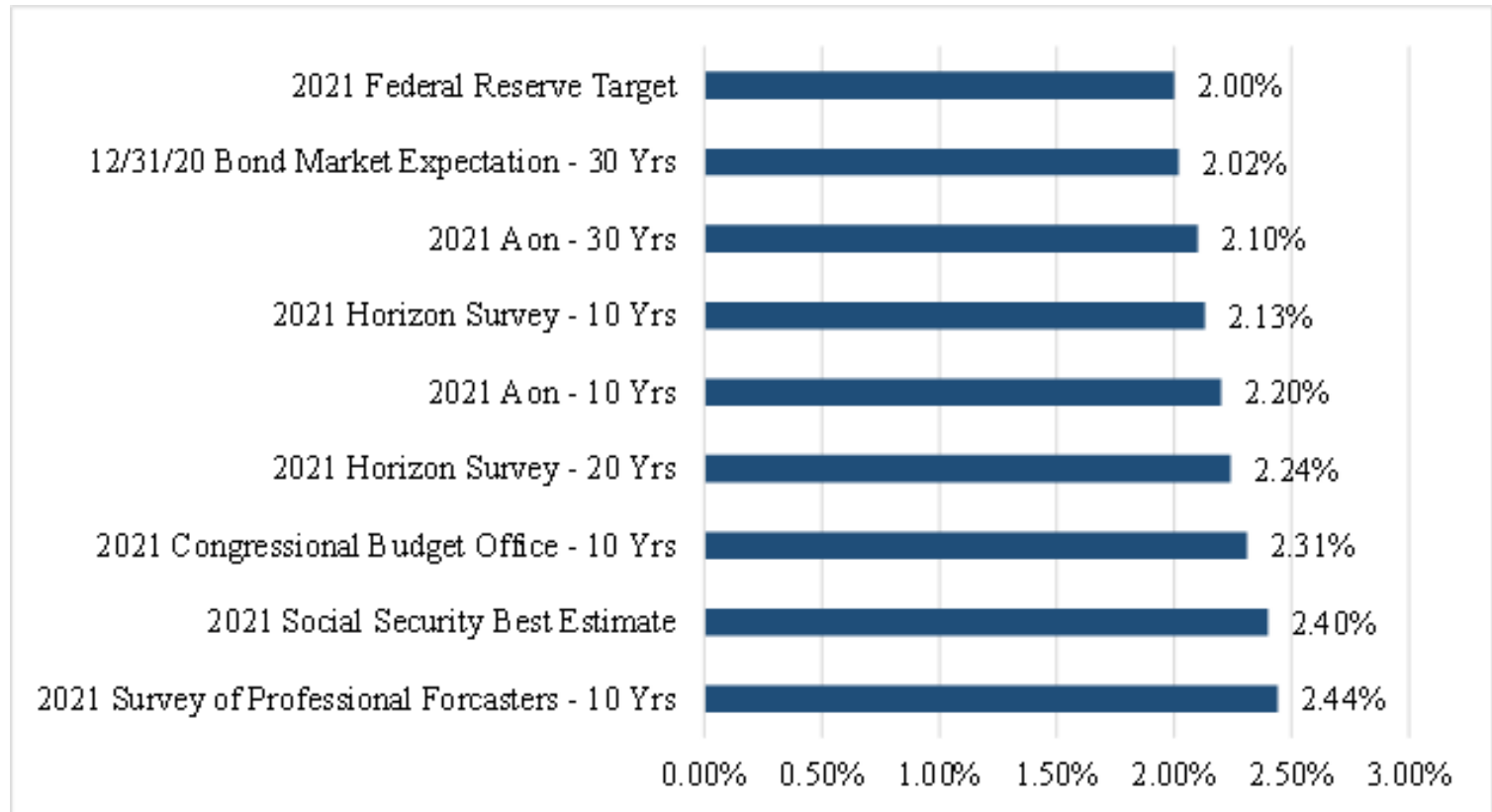
Our focus today is on the economic assumptions

Economic Assumptions Building Block Method



Note: inflation assumption and productivity must be consistent in all assumptions.

Selected Metrics of Expected Rates of Inflation



We recommend the inflation assumption be lowered from 2.75% to an ultimate rate of 2.35%

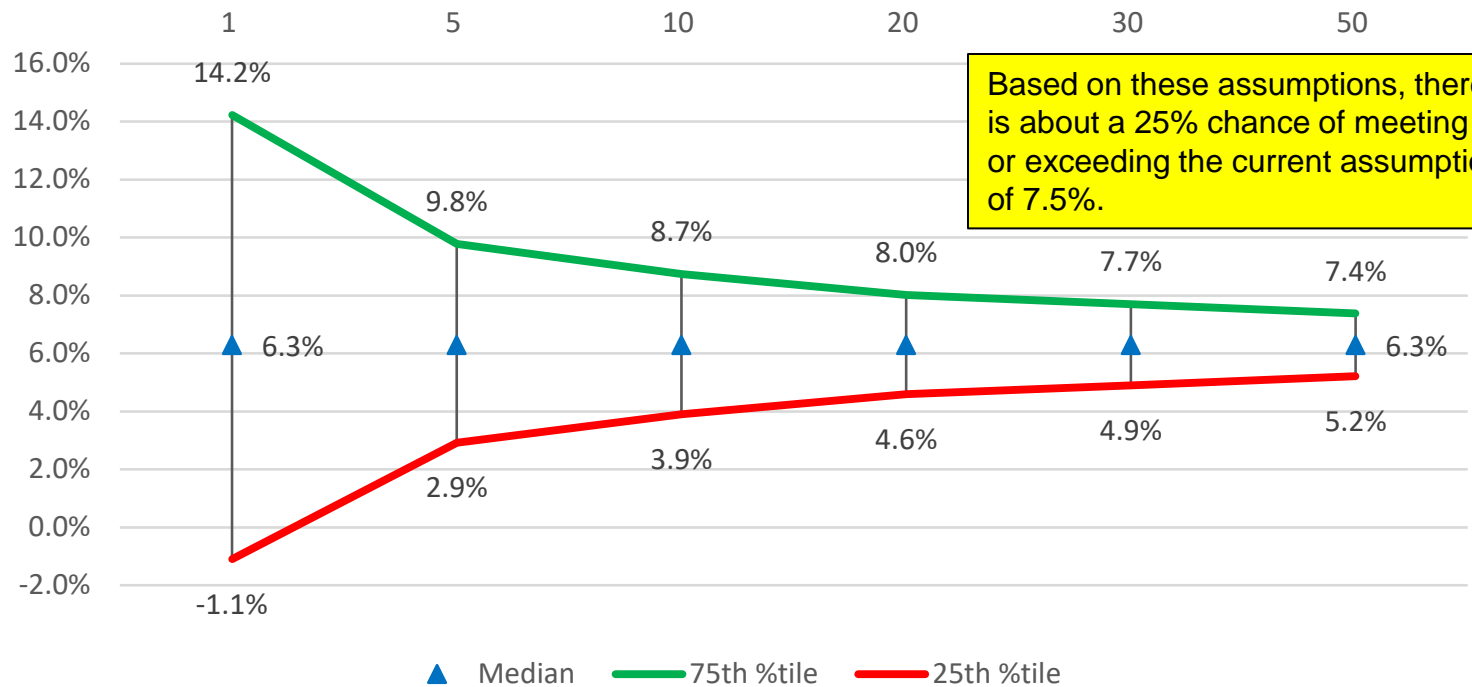
Aon's 30-Year Range of Expected Future Nominal Returns (2020 CMAS)



Estimated Range of Expected Future Nominal Rates of Return

Based on Aon's 30-Year Outlook

Future Years



Investment Return Assumption

Capital Market Assumptions 2020/2021



Source	Nominal Return	Consultant's Inflation Assumption	Real Rate of Return
Aon (10 years) (6/30/20)	5.7%	2.0%	3.7%
Aon (10 years) (6/30/21)	5.7%	2.2%	3.5%
Aon (30 years) (6/30/20)	6.3%	2.1%	4.2%
Aon (30 years) (6/30/21)	6.2%	2.1%	4.1%
2020 Horizon Survey (20 years)	6.97%	2.17%	4.80%
2021 Horizon Survey (20 years)	6.55%	2.24%	4.31%

Aon's expectations are consistent with Horizon Survey over the long term.

Administrative Expenses



- Two approaches
 - Implicit: expenses are netted out of investment return, so theoretically the investment return assumption is lower
 - Explicit: included directly in the annual contribution rate
- OSERS has historically used the implicit approach (about 0.07% of assets in recent years)
- Many peer systems, including NPERS, have recently moved to the explicit approach and this is our preference
 - More transparent and direct allocation of expense
 - Consistent with GASB standards which require administrative expenses to be excluded in determining the long-term rate of return

Administrative Expenses as a Percent of Covered Payroll



- Recommended: moving to explicit approach with 0.24% included in actuarial contribution rate

	Administrative Expense	Covered Payroll	Expense Rate
OSERS	\$ 881,000	\$ 373,700,000	0.24%

- With this approach, the system will receive contributions approximately equal to the administrative expenses that occur during the year.

Investment Return Assumption



	Current Assumptions	Proposed Assumptions
Price inflation	2.75%	2.35%
Real return	<u>4.82%</u>	<u>4.65%</u>
Nominal return	7.57%	7.00%
Adjustment for administrative fees	<u>(0.07%)</u>	<u>0.00%</u>
Net investment return assumption	7.50%	7.00%

We recommend lowering the investment return assumption to an ultimate rate of 7.00% with administrative fees excluded.

Assumption for Cost of Living Adjustment



- COLA varies with benefit tier
 - Hired before 7/1/2013: COLA of 1.5% (not to exceed actual inflation)
 - Hired after 6/30/2013: COLA of 1.0% (not to exceed actual inflation)
- Actual COLA is dependent on actual inflation so an assumption is needed to estimate future COLAs:
 - Current assumption: 1.50% for pre-7/1/2013 members and 1.00% for post-6/30/2013 members
- **Based on the recommended price inflation assumption, we recommend retaining the current COLA assumptions**

General Wage Inflation and Payroll Growth Assumptions



- General wage inflation is Price Inflation + Real Wage Increase
- Recommend no change to the real wage increase assumption of 0.50%
- **Recommendation:**

	Current	Proposed
Price inflation	2.75%	2.35%
Real wage increase	<u>0.50%</u>	<u>0.50%</u>
General wage inflation	3.25%	2.85%
Covered payroll growth	3.25%	2.85%

Individual Salary Increase Assumption



- Typically consists of two pieces
 - General wage inflation assumption (price inflation and productivity)
 - Component that varies by age, or more commonly, service that reflects individual performance and longevity (called merit scale)

- General wage increases have been low in recent years
 - Actual inflation and general wage increases have been below current assumption so expectation is actual salary increases will also be lower than assumed

Individual Salary Increase Assumption



- Actual vs expected salary experience during the study period:

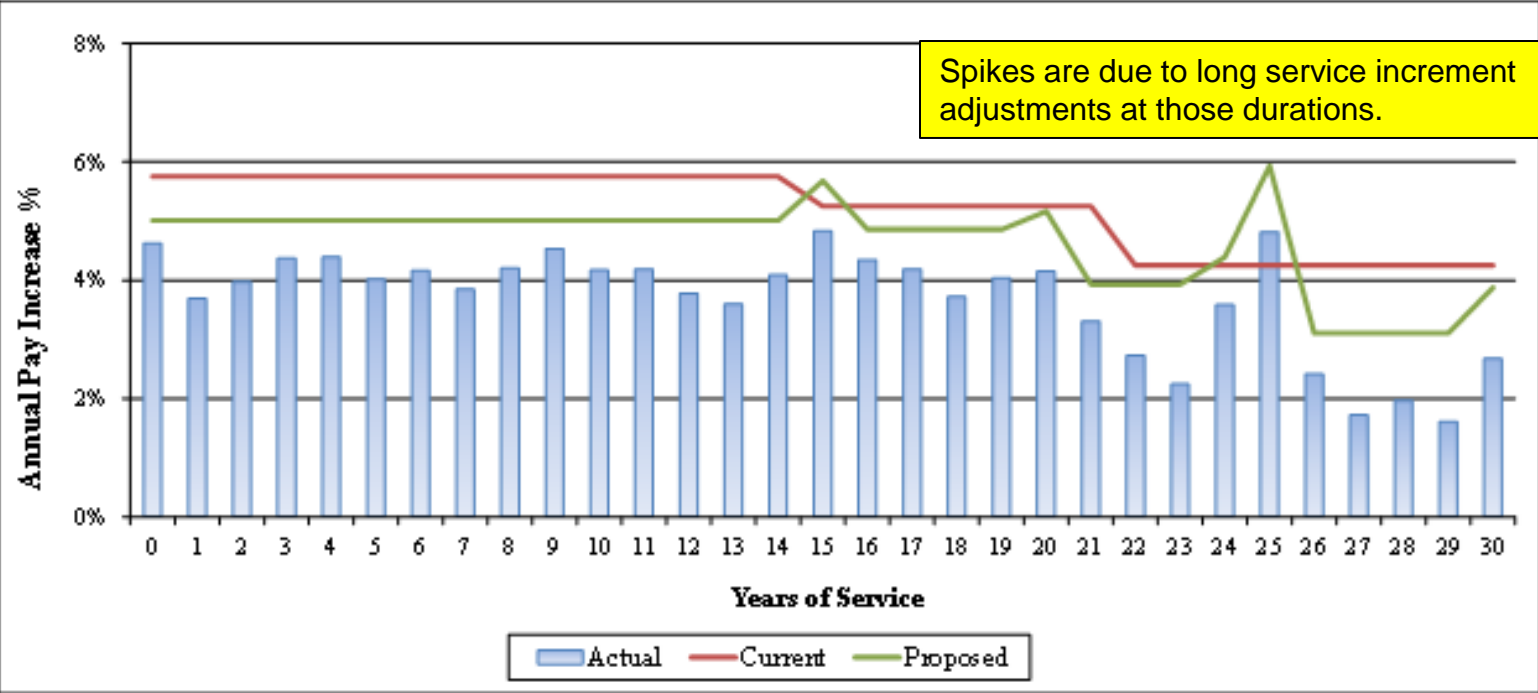
Group	Actual Increase	Expected Increase	Difference
Certificated	3.85%	5.39%	(1.54%)
Classified	3.05%	4.40%	(1.35%)

- Actual inflation was around 2% vs 2.75% expected so some difference should be anticipated
- Increases for long-service members were around 2.0%
- Price inflation assumption is declining by 0.40% which will lower the salary increase assumption. Some adjustment to the merit scale is needed.

Certificated: Individual Salary Increase Assumption



➤ **General wage inflation + merit scale**

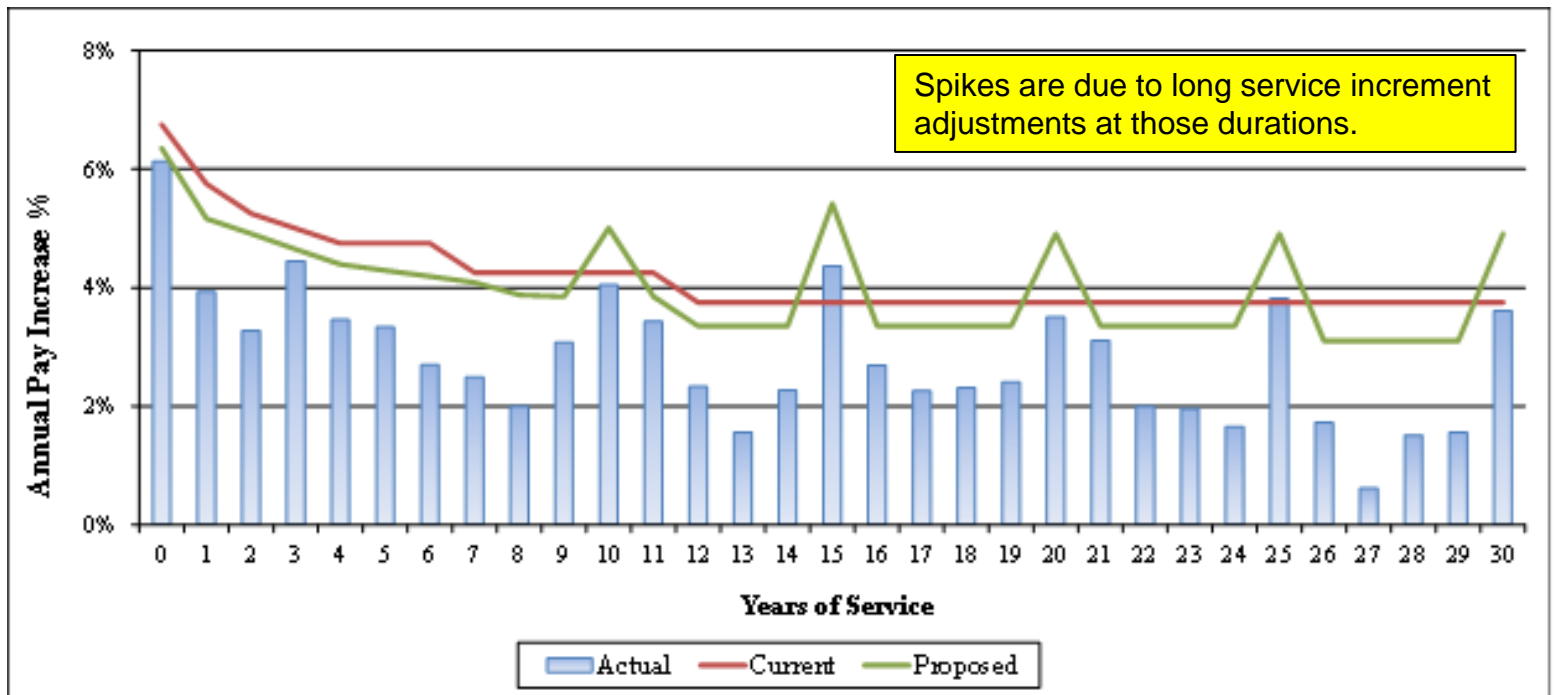


Recommend changes to the individual salary increase assumption as shown in green line above (includes general wage increase of 2.85%). Aggregate expected salary increases decline from 5.39% to 4.83%.

Classified: Individual Salary Increase Assumption



➤ General wage inflation + merit scale



Recommend changes to the individual salary increase assumption as shown in green line above (includes general wage increase of 2.85%). Aggregate expected salary increase declines from 4.40% to 4.19%.

Summary of Recommended Economic Assumptions



	Current	Proposed	Change
Price inflation	2.75%	2.35%	(0.40%)
Investment return	7.50%	7.00%	(0.50%)
General wage inflation	3.50%	2.85%	(0.65%)
Covered payroll growth	3.50%	2.85%	(0.65%)
Cost of living	1.5%/1.0%	1.5%/1.0%	0.00%
Individual salary increase	Varies by service	Varies by service	Decrease

All new assumptions could be implemented in the 1/1/2022 valuation or phased-in over several years as NPERS is doing.

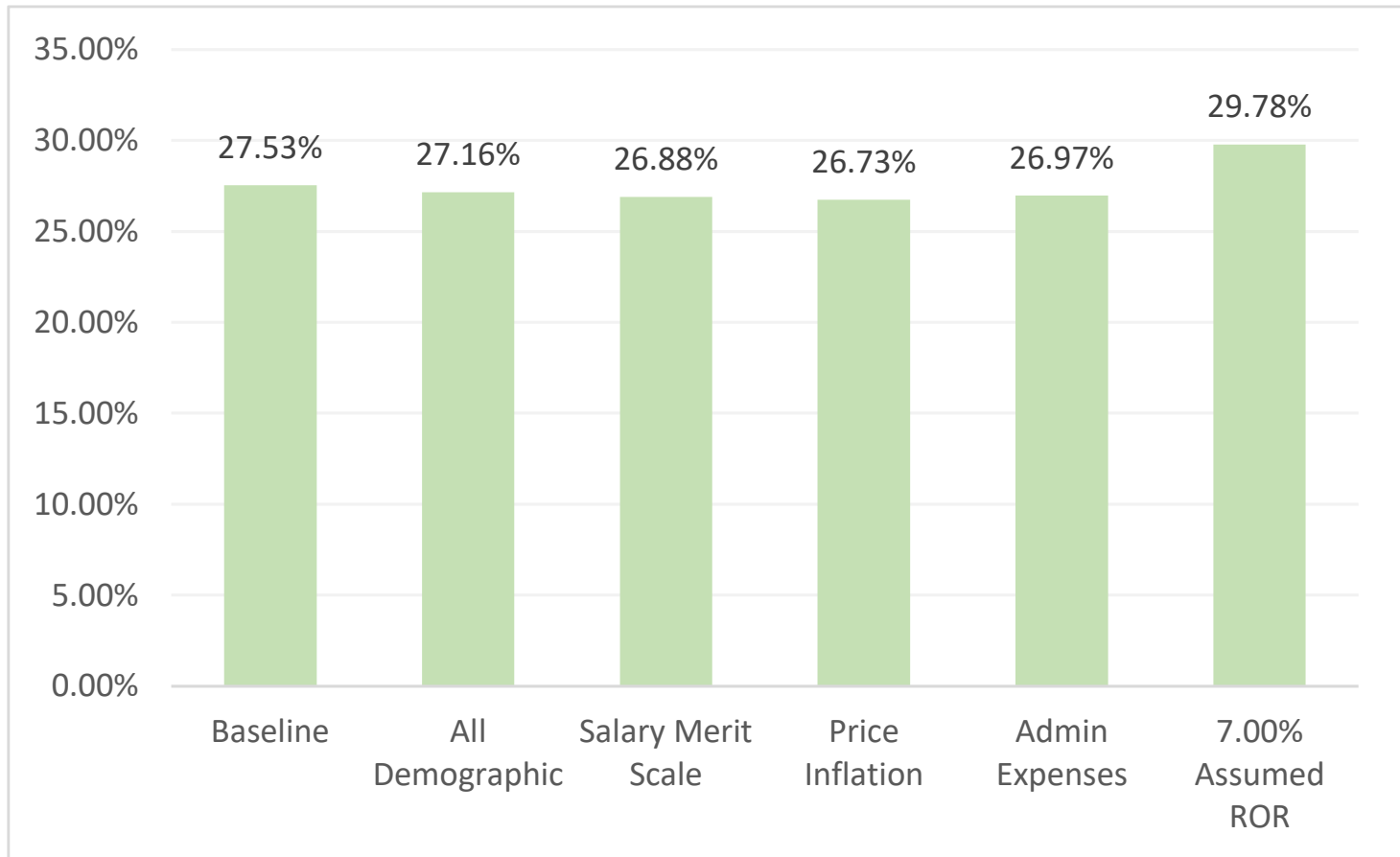
General Cost Impact of Economic Assumption Changes



- General cost impact of each change alone

Assumption	Action	Typical Effect On Liabilities/Costs
Price Inflation	Decrease	Can vary as multiple assumptions are impacted
Investment Return	Decrease	Increase
General Wage Inflation	Decrease	Decrease
Merit Salary	Lower	Decrease
Cost of Living	Decrease	Decrease

Impact on Actuarial Contribution Rate (January 1, 2021 Valuation)



Note: the cost impact of each assumption change is dependent on the order in which the changes are considered. The current amortization policy is used for new experience and assumption bases (30-year periods).

Estimated Cost Impact with Immediate Implementation



	Baseline	All Demographic Changes	All Assumption Changes
Actuarial Accrued Liability	\$2,381,356,000	\$2,363,801,000	\$2,477,709,000
Actuarial Value of Assets	<u>1,467,834,000</u>	<u>1,467,834,000</u>	<u>1,467,834,000</u>
Unfunded Actuarial Accrued Liability (UAAL)	\$ 913,522,000	\$ 895,967,000	\$1,009,875,000
Funded Ratio	61.64%	62.10%	59.24%
Normal Cost Rate	12.76%	12.67%	13.35%
Admin Expenses	0.00%	0.00%	0.24%
UAAL Rate	<u>14.77%</u>	<u>14.49%</u>	<u>16.19%</u>
Total Contribution Rate	27.53%	27.16%	29.78%
Statutory Contribution Rate	<u>(21.66%)</u>	<u>(21.66%)</u>	<u>(21.66%)</u>
Additional District Contribution Rate	5.87%	5.50%	8.12%
Additional District Contribution	\$22,199,627	\$20,800,332	\$30,514,444

Note: Based on the 1/1/21 valuation with current funding policy. The dollar impact of the assumption changes, as measured in the January 1, 2022 valuation, will be different than that shown here.

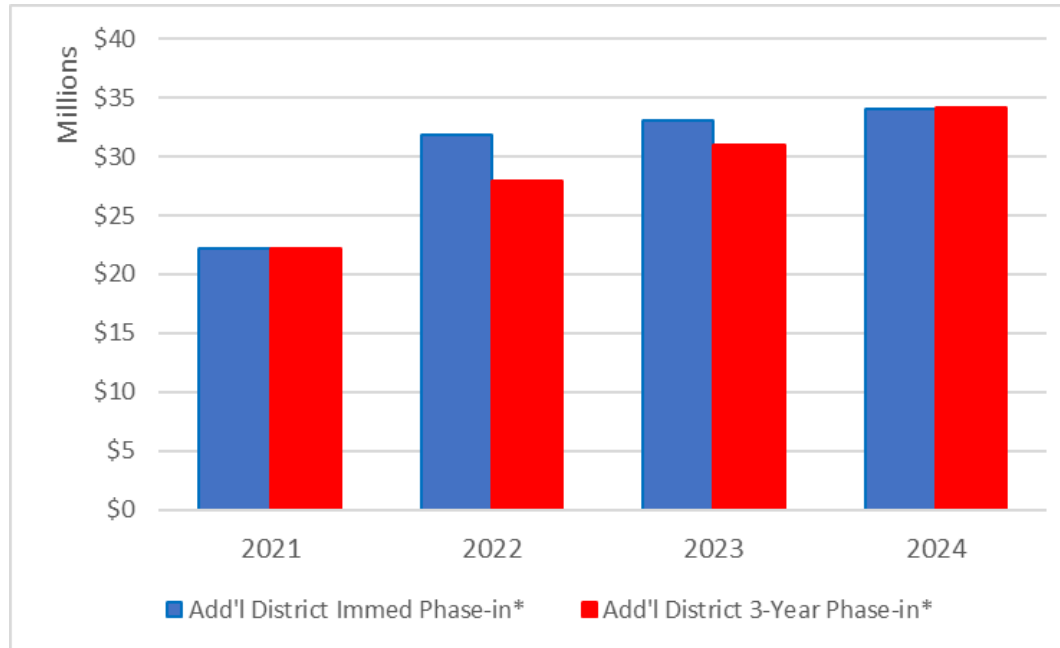
Phase-in Option for Recommended Assumptions



	Current	2022 Valuation	2023 Valuation	2024 Valuation
Price inflation	2.75%	2.55%	2.45%	2.35%
Real rate of return	<u>4.75%</u>	<u>4.65%</u>	<u>4.65%</u>	<u>4.65%</u>
Investment return	7.50%	7.20%	7.10%	7.00%
General wage inflation	3.25%	3.05%	2.95%	2.85%
Covered payroll growth	3.25%	3.05%	2.95%	2.85%
Cost of living (Tier 1)	1.50%	1.50%	1.50%	1.50%

Three-year phase-in of changes to economic assumptions to follow NPERS' schedule. All demographic assumption changes implemented immediately.

Implementation Options-Contributions OSERS



Projection of Additional Contributions				
(\$ in millions)	2021	2022	2023	2024
Employer Contribution	36.9	37.8	39.0	40.2
2% of Pay State Contribution	7.5	7.7	7.9	8.1
Additional District Contributions*				
- Immediate Phase-in	22.2	31.9	33.1	34.1
- 3-Year Phase-in	22.2	27.9	31.0	34.2

Note: The current amortization policy is used for new experience and assumption bases (30-year periods).

OSERS' Funding Policy



➤ Actuarial Cost Method

- Allocates the cost of projected pensions among past, current, and future periods of service

➤ Asset Smoothing Method

- Develops the value of assets used in the actuarial valuation (actuarial value of assets)
- Recognizes variations in actual versus expected returns over a period of time

➤ Amortization Method

- Allocates the cost of benefit changes, assumption changes, and actuarial experience (gains and losses) over future years
- Payment schedule to systematically fund the unfunded actuarial accrued liability

Actuarial Standards of Practice (ASOP)



- Professional guidance issued by the Actuarial Standards Board
 - As credentialed actuaries, we are required to follow ASOPs
 - Provides guidance to actuaries about the process and considerations in the selection of assumptions used in valuing pension benefits
- ASOP 44: guidance on asset valuation methods
- ASOP 4: guidance on cost method and amortization
- Also consider guidance from other sources including GFOA, Conference of Consulting Actuaries and Society of Actuaries

Actuarial Cost Method



- Current Method is Entry Age Normal (EAN)
 - Most common cost method used by public plans
 - Allocates the members' liability over years of service
 - Portion allocated to past service is called Actuarial Accrued Liability
 - Portion allocated to current year of service is the normal cost
 - Portion allocated to future years of service is called present value of future normal costs
 - Normal cost rate is developed as a level percent of payroll over the member's expected working career
 - Payroll is assumed to increase so the dollar amounts of normal cost also increase
 - Required cost method for GASB 67/68 calculations (avoid doing two valuations)

Asset Smoothing Method



- Market value of assets (MVA) is not used directly in the valuation
- Asset valuation method used to smooth the effect of market fluctuations
- Smoothed assets are called “*Actuarial Value of Assets*” (AVA)
- Valuation calculations generally use the Actuarial Value of Assets
 - Funded ratio: Actuarial Assets / Actuarial Liability
 - Unfunded Actuarial Accrued Liability
 - Actuarial Contribution Rate/Additional District Contribution

Actuarial Standard of Practice Number 44



- Actuarial Value of Assets should bear a reasonable relationship to the Market Value of Assets

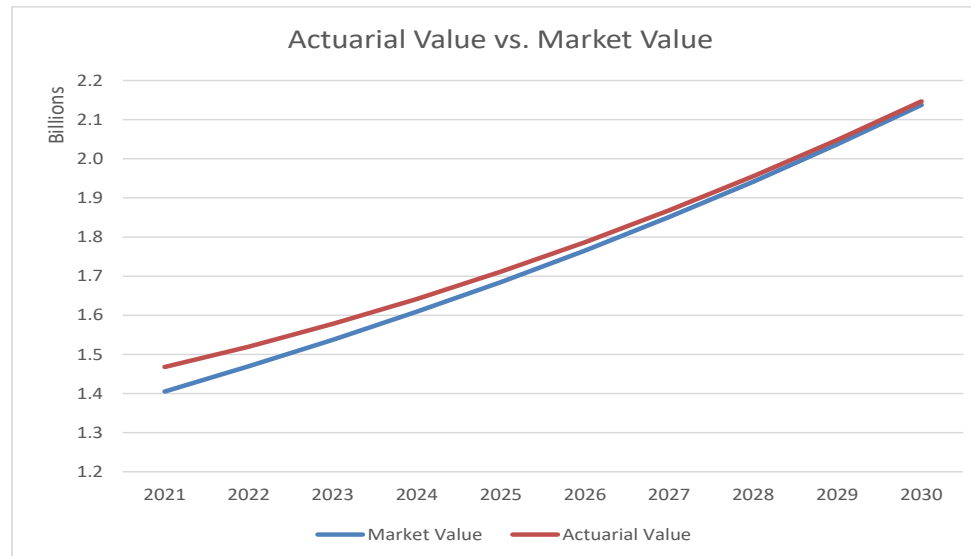
- Should be likely to satisfy both of the following:
 - Produce values within a reasonable range around MVA, and
 - Recognize differences from MVA in a reasonable amount of time

- In lieu of both of the above, either of the below can be satisfied:
 - A sufficiently narrow range around the MVA, or
 - Recognize differences from MVA in a sufficiently short period

OSERS Asset Smoothing Method



- Current Method is 75% of Expected Value + 25% of Market Value
 - Recognizes
 1. Expected investment income on the actuarial value of assets
 2. 25% of the difference between actual market value and the expected value of assets is recognized
 - If all assumptions are met:
 - Actuarial value converges to market value asymptotically



Alternate Asset Smoothing Method (used by NPERS)



- Example of the Closed 5-Year Smoothing Method using actual OSERS returns
 - Recognizes difference in actual vs expected return evenly over a reasonable time period

1. Return to be Spread

Plan Year <u>Ending</u>	Return to be <u>Spread</u>	Unrecognized <u>Percent</u>	Unrecognized <u>Return</u>
2020	\$21,181,246	80%	\$16,944,997
2019	74,166,899	60%	44,500,139
2018	(104,991,443)	40%	(41,996,577)
2017	31,302,756	20%	6,260,551
			\$25,709,110

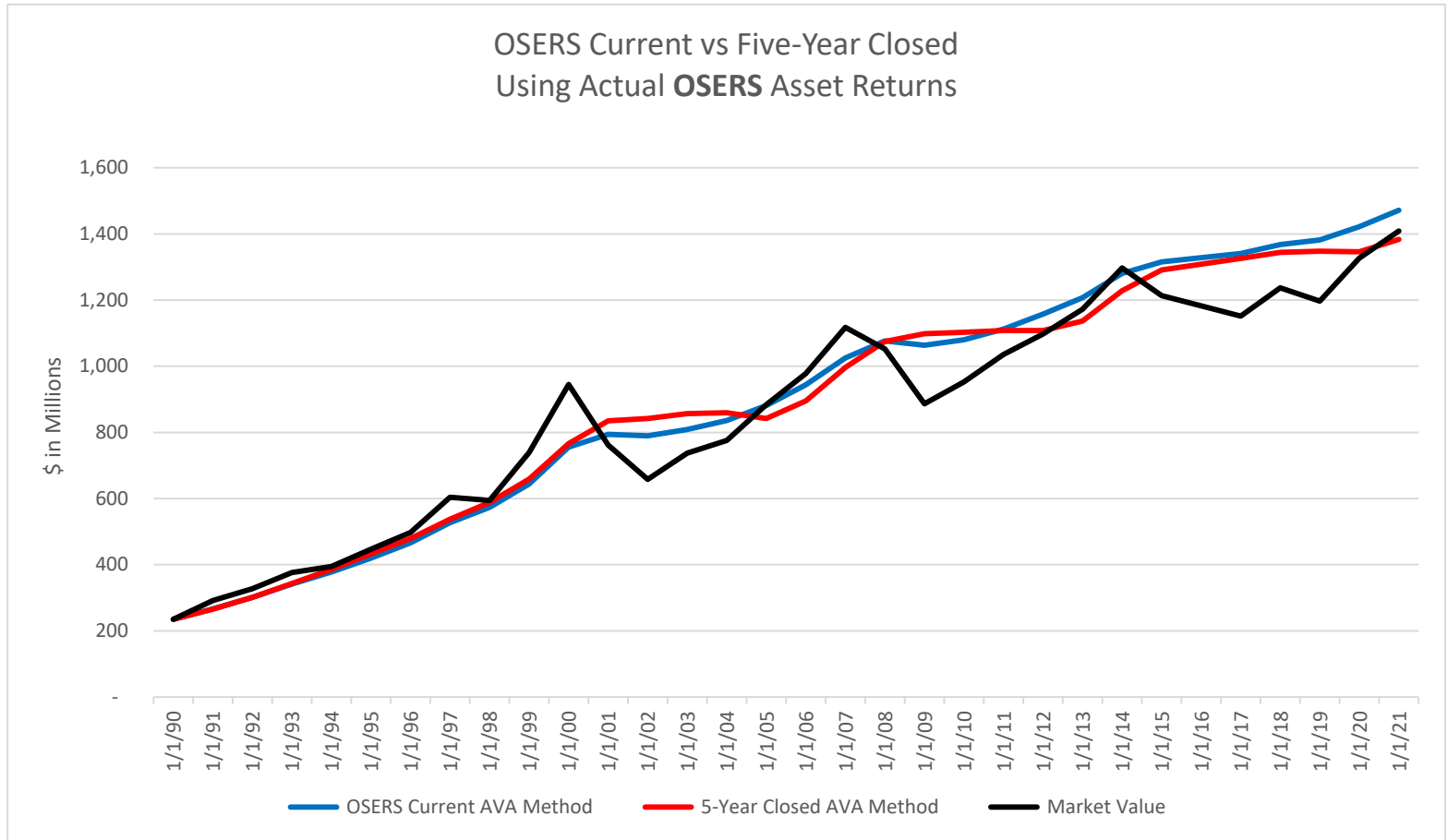
2. Total Market Value of Assets as of Jan 1, 2021 \$1,405,393,000

3. Total Actuarial Value of Assets as of Jan 1, 2021 \$1,379,683,890

[2 - 1]



Comparison of OSERS Current Method and Five-year Closed Smoothing Method



Comparison uses actual asset information going back to 9/1/1991. However, this is for illustrative purposes only, as this does not reflect OSERS reset of AVA to MVA in the 2007 valuation.

Actuarial Value of Assets follows a similar pattern under both methodologies.

Comparison of Asset Valuation Methods



- Both methods effectively smooth the difference between the actual and expected returns
- OSERS Current Method
 - Produces smoother progression of actuarial value of assets
 - “Bounces” back to market value more quickly when strong returns follow low returns
 - Easy to determine the return needed in the current year on market value to meet the assumed return on the actuarial value
 - Not intuitive – often misunderstood as “four-year smoothing”
- Five-Year Closed Smoothing Method (NPERS)
 - Most common method used by public plans
 - Easy to understand but difficult to anticipate the impact of current year’s return on the actuarial assets

OSERS Current Amortization Policy



- Amortization policy determines the length of time and structure of the contributions required to systematically fund the UAAL
- Components of OSERS Amortization Policy

	Current
Number of amortization bases	Multiple (Layered bases)
Payment methodology	Level percent of payroll
Amortization Period <ul style="list-style-type: none">• Number of Years• Open or Closed	Closed 30-year periods beginning 1/1/18

Current Amortization Period is Longer Than Industry Trends



➤ Considerations

- Current amortization period and assumptions result in negative amortization for about ten years (dollar amount of UAAL increases)
- Guidance from outside experts like GFOA, CCA and ASB* all encourage shorter periods, generally 15-20 years
- Third exposure draft of Actuarial Standard of Practice (ASOP) Number 4
 - UAAL should be amortized over a “reasonable time period” or reduce the outstanding balance by a “reasonable amount” each year
 - Not a bright line test but 30 years is unlikely to be considered “reasonable”

* Government Finance Officers Association, Conference of Consulting Actuaries and Actuarial Standards Board

Recommend Shorter Amortization Periods for New Bases



➤ Observations

- Industry trend is to shorter periods
- Professional guidance is consistently lower than 30 years
- Final version of ASOP 4 will likely be effective in next few years. Current amortization policy not expected to meet the new standard.

➤ Recommendation

- Shorten the amortization period for new bases, especially experience gains/losses, to 20-year or 25-year closed periods
- Implement prospectively: existing bases continue to be amortized on their current schedule
- Cost impact depends on whether gains or losses occur and the magnitude of each. Shorter periods will recognize variances more quickly and increase the volatility in the contribution rate.
- Legislation passed this year changed future amortization period for NPERs from closed 30-year to closed 25-year periods

Recommendations on Methods



- Continue using the Entry Age Normal method

- Asset smoothing method: current method is reasonable and acceptable, but alternate (NPERs) method is also reasonable.

- Amortization policy:
 - Layered approach is our preference (*no change*)
 - Payments as a level percent of payroll are a reasonable approach for funding the UAAL (*no change*)
 - Move to 25-year amortization on bases established after January 1, 2021. A 20-year period is also acceptable (*proposed change*)

Cost Impact of Prospective Change to 25 Year Amortization



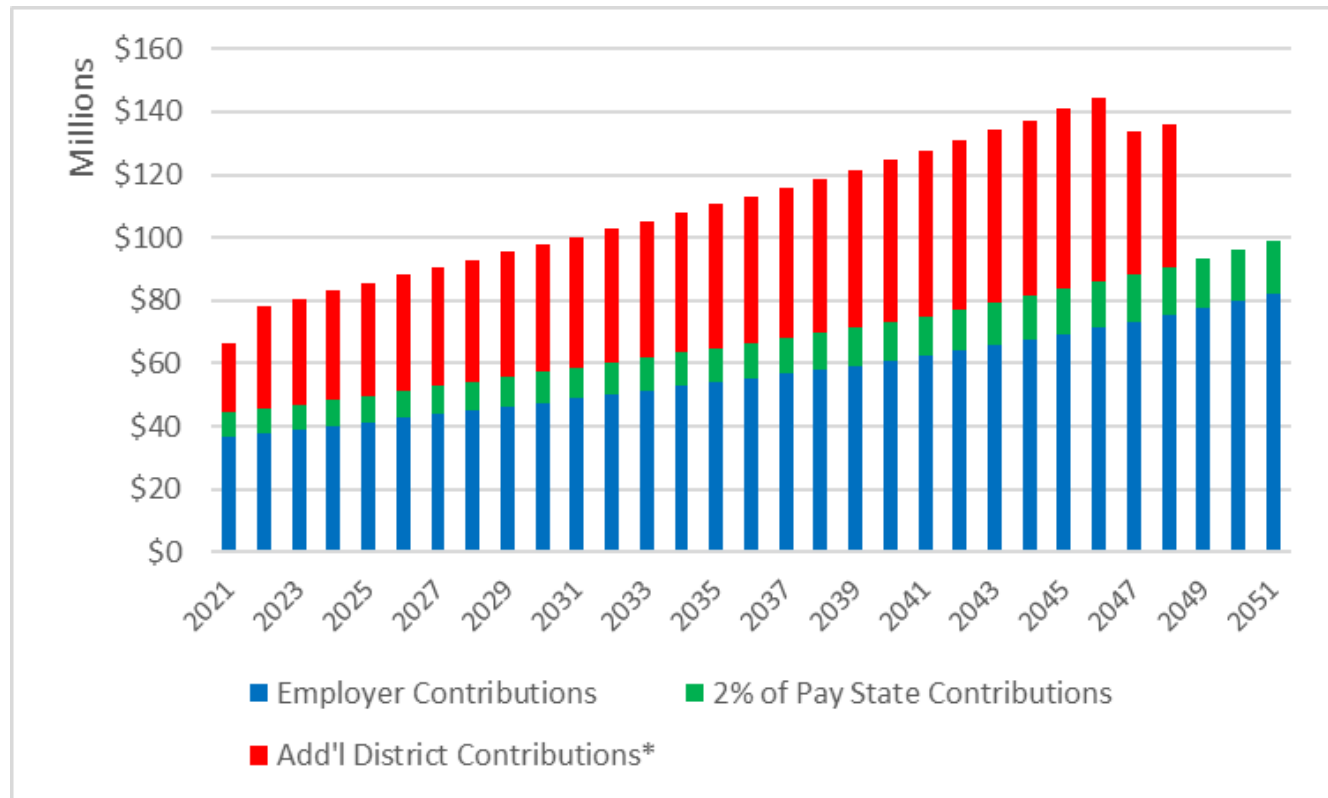
Jan 1	Current: 30-Year Layers			25-Year Layers			Difference
	Actuarial Rate	Statutory Rate	Shortfall / (Margin)	Actuarial Rate	Statutory Rate	Shortfall / (Margin)	
2022	28.83%	21.66%	7.17%	28.93%	21.66%	7.27%	0.10%
2023	29.41%	21.66%	7.75%	29.56%	21.66%	7.90%	0.15%
2024	29.97%	21.66%	8.31%	30.16%	21.66%	8.50%	0.19%
2025	29.97%	21.66%	8.31%	30.17%	21.66%	8.51%	0.20%
2026	29.94%	21.66%	8.28%	30.16%	21.66%	8.50%	0.22%
2027	29.93%	21.66%	8.27%	30.15%	21.66%	8.49%	0.22%
2028	29.92%	21.66%	8.26%	30.13%	21.66%	8.47%	0.21%

Reflects the phase-in of economic assumptions in the first three years and recognition of deferred investment experience in future valuations using the current asset smoothing method.



Projections Using Recommended Assumptions

If all assumptions are met, additional district contributions are expected to continue through 2048.



* Calculated as of August 31

Assumes assumptions are met in all future years.

Projection reflects immediate recognition of all assumption changes in 2022 – 3-year phase-in would show similar results.



Actuarial Certification

We, Patrice A. Beckham, FSA and Bryan K. Hoge, FSA, are consulting actuaries with Cavanaugh Macdonald Consulting, LLC. We are members of the American Academy of Actuaries, Fellows of the Society of Actuaries, and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. We are available to answer any questions or provide additional information as needed.

A handwritten signature in blue ink that reads 'Patrice Beckham' in a cursive script.

Patrice A. Beckham, FSA, EA, FCA, MAAA
Principal and Consulting Actuary

A handwritten signature in blue ink that reads 'Bryan Hoge' in a cursive script.

Bryan K. Hoge, FSA, EA, FCA, MAAA
Consulting Actuary