2023 CSMFO ANNUAL CONFERENCE

BACK TO THE CAPITAL

SACRAMENTO

JANUARY 31 - FEBRUARY 3, 2023

Pension Basics: Everything you need to know

Communicating Core Mechanics and Risks Regarding your Defined Benefit Plan

CSMFO CALIFORNIA SOCIETY of MUNICIPAL FINANCE OFFICERS

Today's Team

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Agenda

- Fundamental Questions – *level set*
- The Actuarial Valuation – *what goes in, what comes out*
- Actuarial Assumptions – *valuing the promise*
- Actuarial Funding Policies Overview – *determining contributions*
- Asset Smoothing – *managing investment volatility*
- Amortization – *marching toward full funding*
- Funded Ratio – *plan's first impression*
- If time permits: Asset Allocation – *how a plan targets investments*

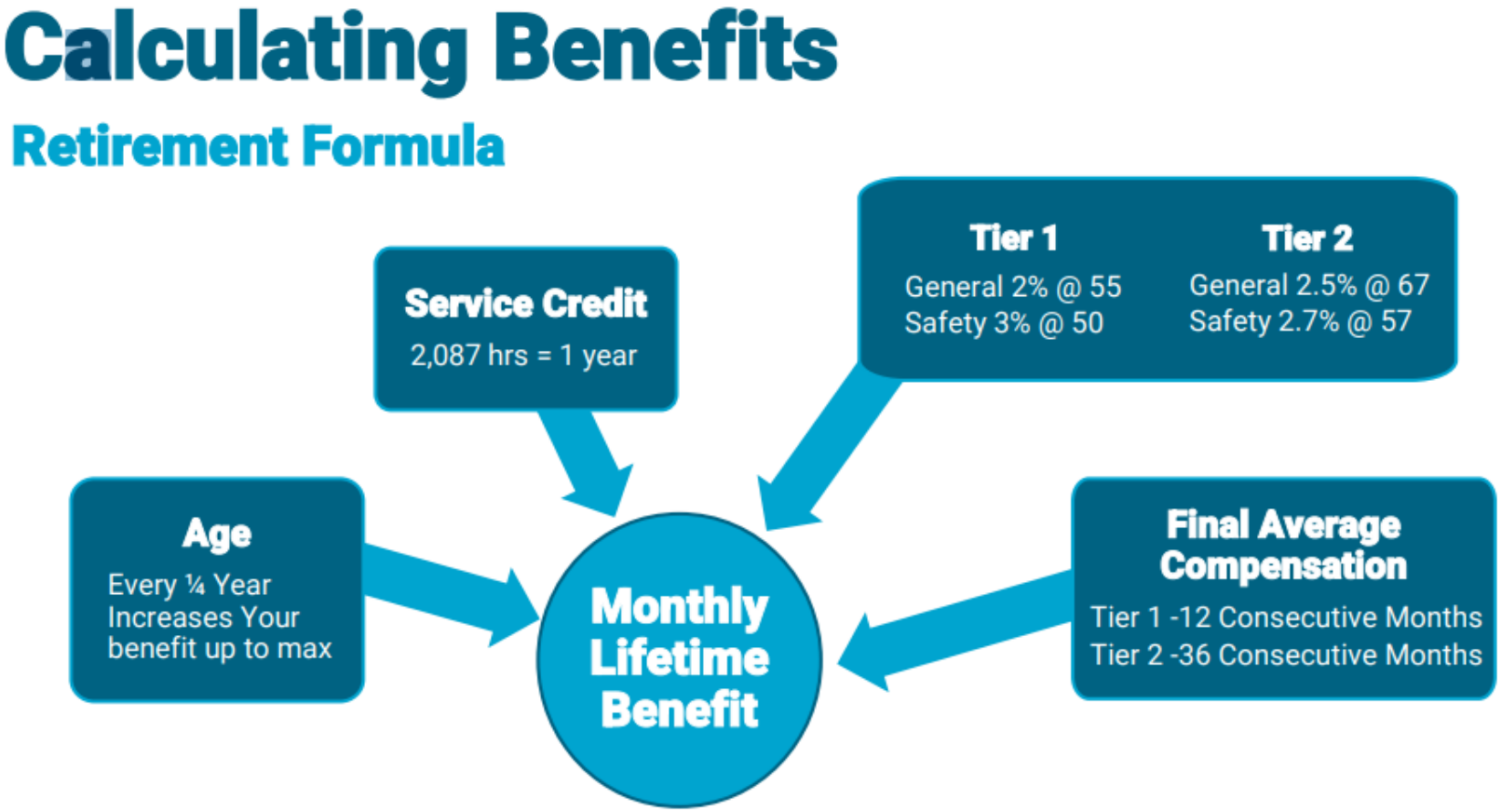
Why are we here?

And what are we doing?

Why Provide a Pension Plan?

- Baseline retirement security
  - Dependability, consistency, stability
- Available to all participants
  - Accessibility
- Known income replacement
  - Financial transparency
- Pooling of longevity, investments, time horizon, and more
  - Cost efficiency, professional management
- Workforce management
  - Recruitment and retention capability

How do Pension Benefits Work?



Excerpt from SBCERA – New Member Orientation

Why Fund a Pension Plan?

- Legal requirements
- Security of the benefits promised
- Allocation of cost to appropriate time period
  - Intergenerational equity
  - Pattern of cost
- Reduction in pension costs

What is an actuary?

- *"A business professional who analyzes the financial consequences of future risks."*
- Unique to a Defined Benefit pension plan
- Acts as the engineer and mechanic for funding the plan
  - Ensures/enables full funding
- Provides various services, including:
  - **Actuarial valuation**
  - Experience analysis
  - Board and staff education
  - Special studies

The Actuarial Valuation

General overview

Actuarial Valuation – the Plan's Actuarial GPS

- A financial check-up serving as a roadmap and guide
  - Where we are and where we are going
- Establishes how far along the plan is:
  - Funding position
  - Assets, liabilities and unfunded liability
- Determines the next steps towards the ultimate goal:
  - Employer and employee contribution rates
- Every once in a while, the unexpected can cause "rerouting":
  - Experience studies with potential assumption changes

The Actuarial Valuation

- Purposes of an Actuarial Valuation
  - Primary:
    - Setting contribution requirements
    - Determining funded status
  - Secondary:
    - Disclosure requirements
    - Basis for special studies and pricing plan changes
    - Analysis of annual demographic experience
    - Analysis of annual financial experience

The Actuarial Valuation

C + I = B + E

Contributions + Investment Income

equals

Benefit Payments + Expenses

- Actuarial valuation determines the current or “measured” cost, not the ultimate cost
- Assumptions and funding methods affect only the timing of costs

Valuation Input

Member Data

Financial Data

Actuarial Valuation

Plan Provisions

Funding Policies

Actuarial Assumptions

Valuation – Key Financial Output

Summary of Key Valuation Results

		June 30, 2019	June 30, 2018
Employer Contribution Rate:[1]	• At the beginning of year	33.99%	34.19%
	• On July 15	34.09%	34.29%
	• At the end of each biweekly pay period	35.20%	35.41%
Actuarial Accrued Liability as of June 30:	• Retired members and beneficiaries	$12,467,859,989	$11,899,136,569
	• Inactive vested members[2]	53,098,066	39,997,203
	• Active members not currently in DROP	6,947,882,378	6,965,022,590
	• Active members currently in DROP[3]	3,005,284,975	2,460,647,257
	• Total Actuarial Accrued Liability	$22,474,125,408	$21,364,803,619
	• Normal Cost for plan year beginning June 30[4]	$460,138,588	$451,305,282
Assets as of June 30:	• Market Value of Retirement Assets	$21,262,200,363	$20,482,132,769
	• Valuation Value of Retirement Assets (VVA)	21,037,711,090	19,840,070,083
	• VVA as a percentage of Market Value of Retirement Assets	98.9%	96.9%
Funded status as of June 30:	• Unfunded Actuarial Accrued Liability on Market Value of Retirement Assets basis	$1,211,925,045	$882,670,850
	• Funded percentage on MVA basis	94.6%	95.9%
	• Unfunded Actuarial Accrued Liability on Valuation Value of Retirement Assets basis	$1,436,414,318	$1,524,733,536
	• Funded percentage on VVA basis[5]	93.6%	92.9%
Key assumptions:	• Net investment return	7.25%	7.25%
	• Price Inflation	3.00%	3.00%
	• Payroll growth	3.50%	3.50%

Valuation – Key Demographic Output

Summary of Key Valuation Results (continued)

		June 30, 2019	June 30, 2018	Change From Prior Year
Demographic data as of June 30:	**Active Members:**			
	• Number of members[1]	13,535	13,442	0.7%
	• Average age	42.2	42.3	-0.1
	• Average years of service	15.2	15.3	-0.1
	• Total projected compensation	$1,583,807,654	$1,546,042,972	2.4%
	• Average projected compensation	$117,016	$115,016	1.7%
	Retired Members and Beneficiaries:			
	• Number of members:			
	– Service retired	8,811	8,623	2.2%
	– Disability retired	1,821	1,883	-3.3%
	– Beneficiaries	2,465	2,384	3.4%
	– Total	13,097	12,890	1.6%
	• Average age	71.5	71.3	0.2
	• Average monthly benefit	$6,135	$5,925	3.5%
	Inactive Vested Members:			
	• Number of members[2]	523	534	-2.1%
	• Average Age[3]	47.7	47.2	0.5
	Total Members:	27,155	26,866	1.1%

Actuarial Assumptions

Avoiding the illusion of precision

Actuarial Assumptions: Demographic

- Rates of “Decrement”
  - Termination, Disability, Retirement, Mortality
- Spousal assumptions
  - Percent married, age difference
- Reciprocity with other systems
- Etc.

Actuarial Assumptions: Economic

- Inflation
  - Component of others, plus COLA
- Investment Return
  - Inflation
  - Real return
  - Expenses
- Salary Increases
  - Inflation
  - Real increases (“across the board”)
  - Merit and promotion

Selection of Actuarial Assumptions

- Objective, long term
- Experience analysis
- Recent experience or future expectations
  - Demographic: recent experience
  - Economic: not necessarily!
- Client specific or not
- Consistency among assumptions
- Desired pattern of cost incidence
  - Assumption setting is “results aware” but not “results based”

Role of Assumptions

- Suppose fund will actually earn 7% every year
- Suppose we assume 8%
  - Current year's cost will be lower
  - Each year, 1% actuarial loss on investments
  - Future costs will gradually increase
- Suppose we assume 6%
  - Current year's cost will be higher
  - Each year, 1% actuarial gain on investments
  - Future costs will gradually decrease
- Good assumptions produce Level Cost

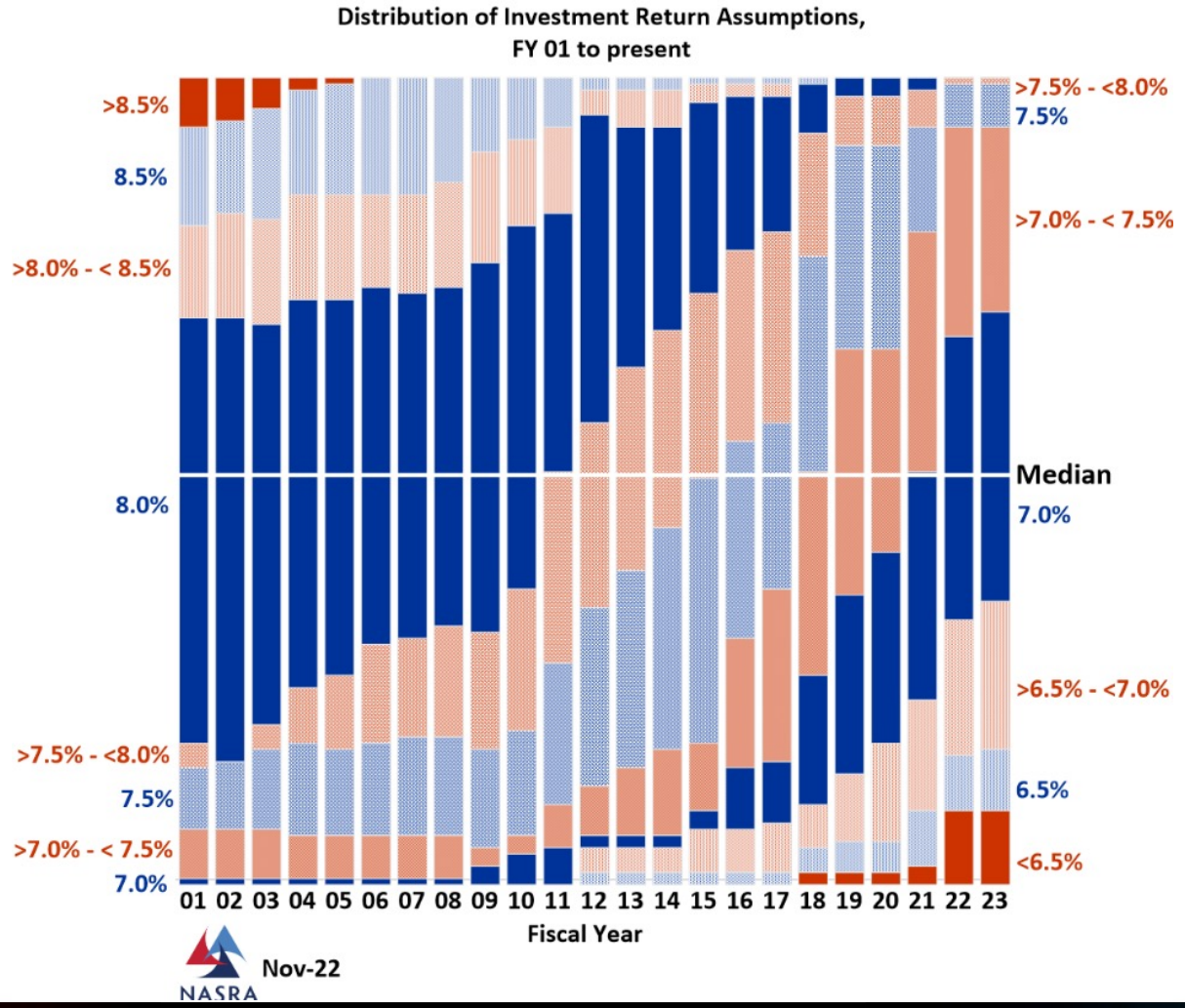
Investment Return Assumption

- Used to set the discount rate for measuring costs
  - Sometimes called the assumed interest rate
- Used for contribution requirements
  - Also for financial reporting (GASB 67 and 68)
- Affects timing of Plan cost
  - Lower assumed rate means higher current cost
  - Ultimately, actual earnings determine cost
    C + I = B + E
  - “Can’t pay benefits with assumed earnings!”

Setting the Investment Return Assumption

	2012 Study	2018 Study
Assumed Inflation	3.25%	2.75%
Portfolio Real Rate of Return	5.08%	5.12%
Assumed Expenses	(0.70%)	(0.75%)
Risk Adjustment	(0.13%)	(0.12%)
Assumed Investment Return	7.50%	7.00%
Confidence Level	51%	51%

Return Assumptions Trending Down



Return Assumptions for CA Systems

System(s)	Assumption	Count
CalPERS	6.80%	
CalSTRS	7.00%	
University of California	6.75%	
1937 CERL Systems	7.25%	2
	7.00%	8
	6.75%	7
	6.50%	2
	6.25%	1
City Systems		
San Francisco	7.20%	
LACERS, LAFPP	7.00%	
LADWP	6.50%	
San Jose	6.625%	
San Diego	6.50%	

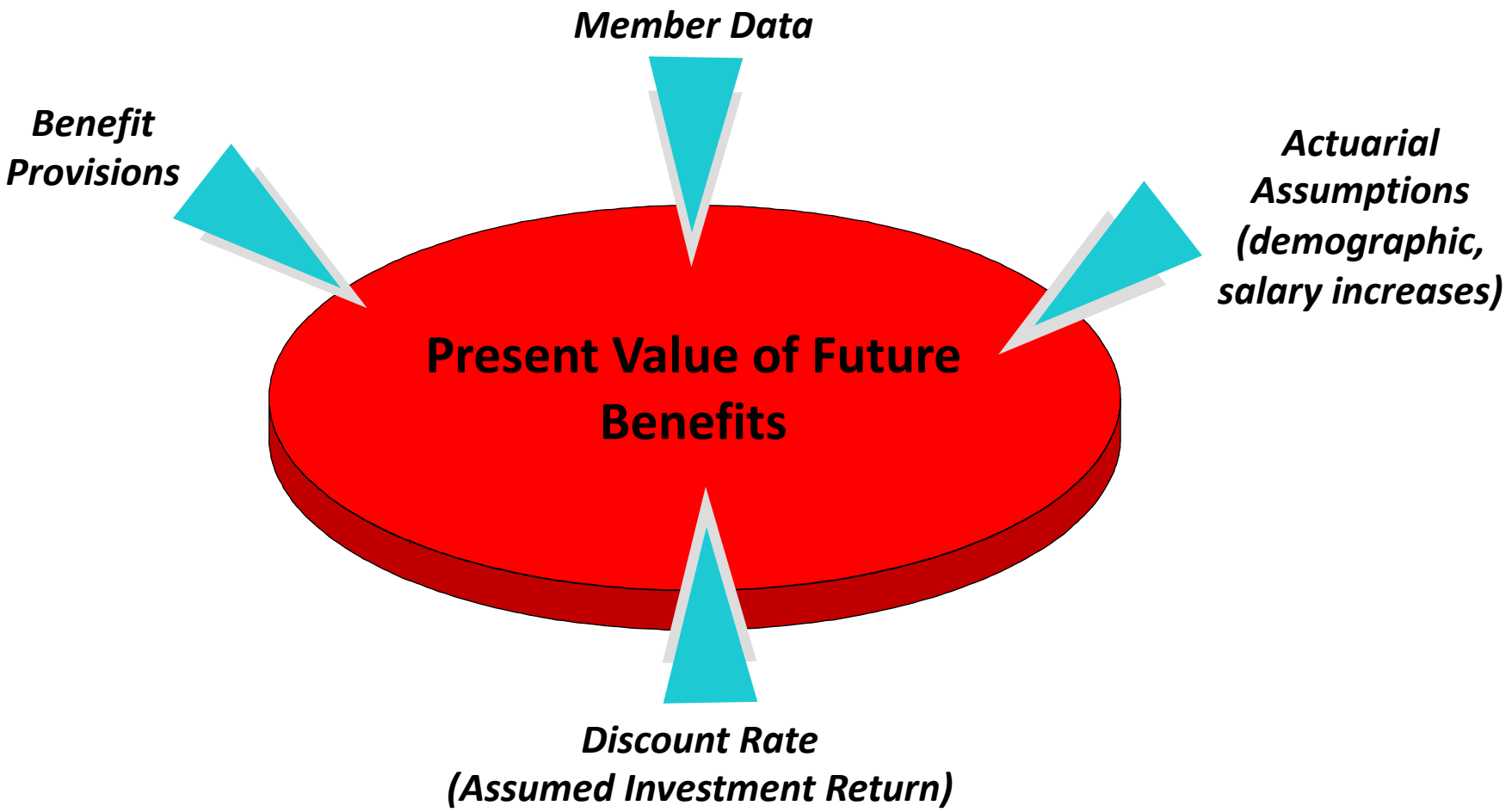
Impact of Lowering the Return Assumption

- Increases UAAL, decreases funded ratio
- Increases current contribution rates (especially employer)
- Reduces risk of future employer contribution increases
- Conflicting policy goals?
  - Everyone wants to lower UAAL, increase funded ratio
  - But more conservative assumptions will increase UAAL
    - Even though assumption changes are fully justified
- "No good deed goes unpunished!"
  - But still vital for long-term plan health

Actuarial Funding Policies

Determining funded status and contributions

Valuing Expected Benefits

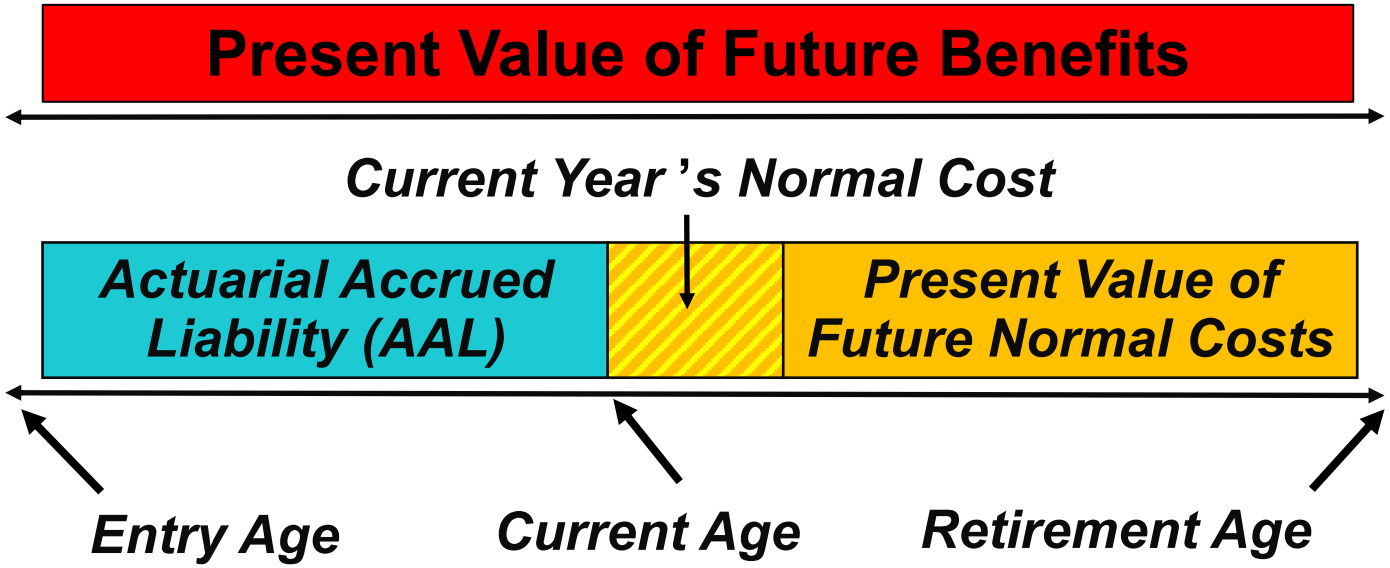


Funding Policy Usually has Three Components

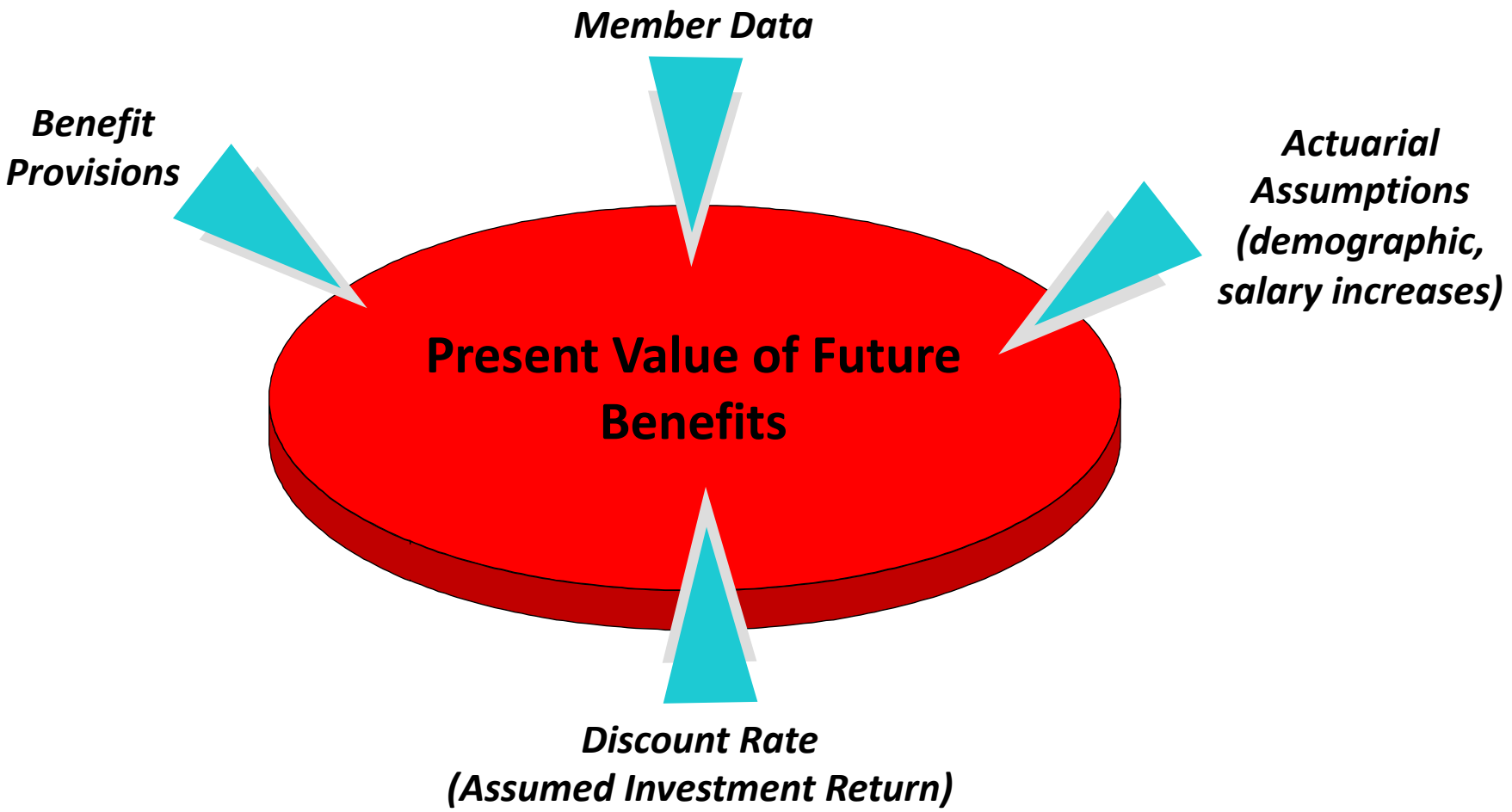
- **Actuarial Cost (or Funding) Method** – allocates present value of member's projected benefits to years of service: past, current and future
  - Defines Normal Cost and Actuarial Accrued Liability (AAL)
- **Asset Smoothing Method*** – assigns a value to assets that manages short term volatility while tracking market value
  - Defines the Unfunded Actuarial Accrued Liability (UAAL)
- **UAAL Amortization Policy** – sets contributions to systematically pay off any UAAL
  - Includes structure, periods and pattern of payments

Actuarial Cost Method

- The **Normal Cost** is the portion of the value of projected benefits for active members that is allocated to each plan year
- The **Actuarial Accrued Liability (AAL)** measures the Normal Cost from past years



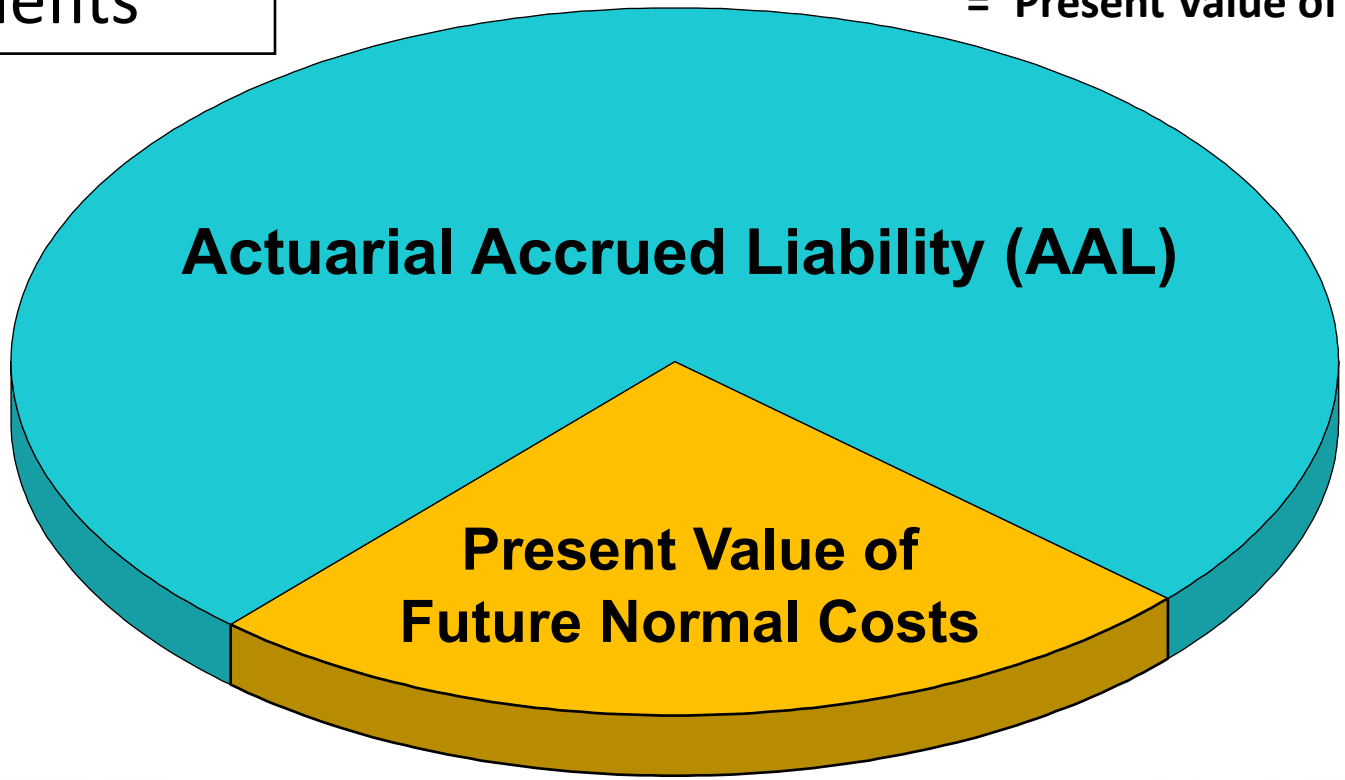
Re: Valuing Expected Benefits



Accrued Liability and Future Normal Costs

Present Value of Future Benefits

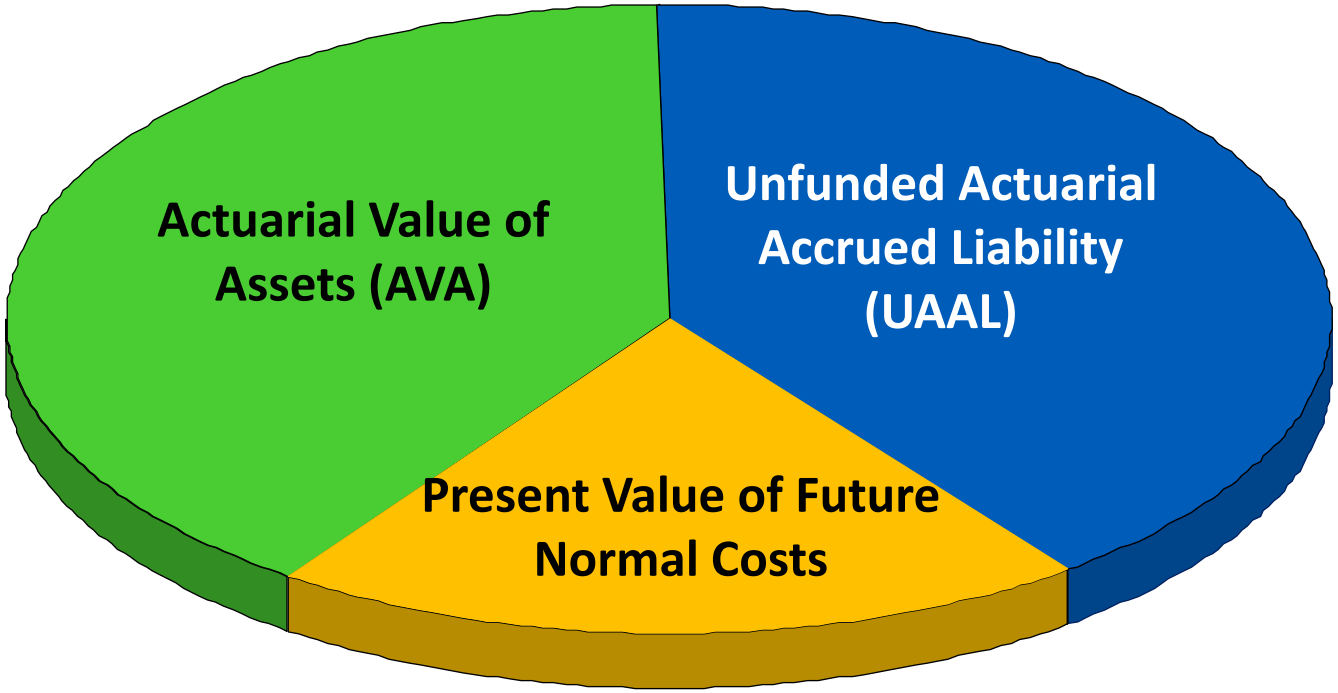
Actuarial Accrued Liability
+ Present Value of Future Normal Costs
= Present Value of Future Benefits



Actuarial Value of Assets and UAAL

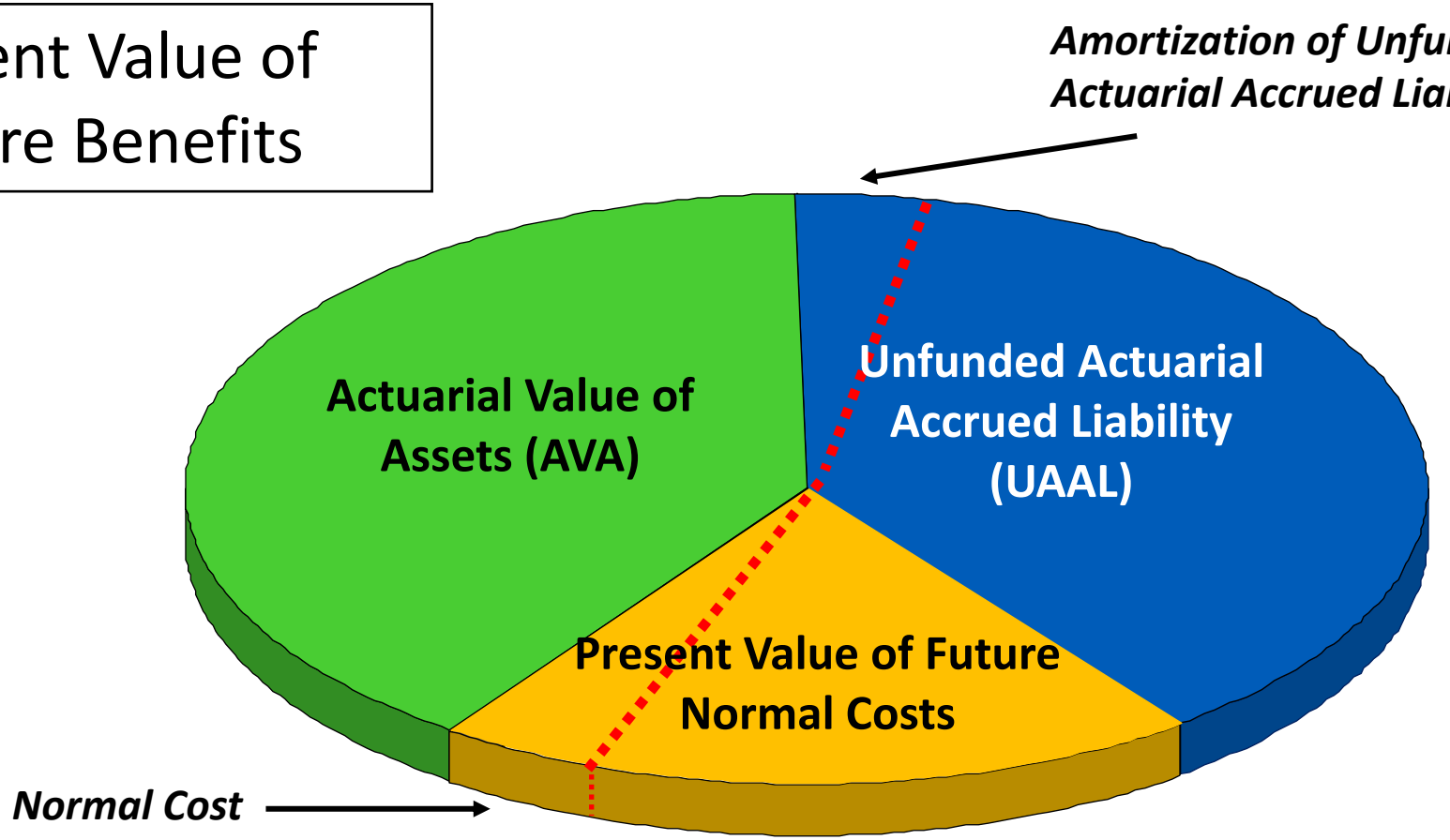
Present Value of Future Benefits

Actuarial Accrued Liability
– Actuarial Value of Assets
= Unfunded Actuarial Accrued Liability



The "Actuarially Determined Contribution"

Present Value of Future Benefits



Contribution Reconciliation

Reconciliation of Average Recommended Employer Contribution Rate from June 30, 2021 to June 30, 2022

		Contribution Rate	Estimated Annual Dollar Amount[1] ($ in '000s)
1	**Average Recommended Employer Contribution as of June 30, 2021**	**32.63%**	**$530,771**
2	Effect of investment return greater than expected (after "smoothing")	(0.54%)	(8,986)
3	Effect of actual contributions more than expected[2]	(0.04%)	(666)
4	Effect of individual salary increases lower than expected	(0.14%)	(2,330)
5	Effect of amortizing prior year's UAAL over a smaller than expected projected total payroll	0.15%	2,496
6	Effect of the 2002 UAAL layer being fully amortized	(0.32%)	(5,325)
7	Effect of changes in demographics of members amongst tiers on Normal Cost	(0.23%)	(3,827)
8	Effect of change in administrative expense load	(0.01%)	(166)
9	Effect of other experience gains[3]	(0.14%)	9,883
10	Effect of member contribution refunds associated with the implementation of Alameda decision in the June 30, 2021 valuation[4]	0.07%	1,165
11	Total change	(1.20%)	$(7,756)
12	**Average Recommended Employer Contribution as of June 30, 2022**	**31.43%**	**$523,015**

Excerpted from SBCERA – Actuarial Valuation dated June 30, 2022

Asset Smoothing

Comparable to “Direct Rate Smoothing”

Asset Smoothing Methods

- “Actuarial Value of Assets” (AVA)
- Objectives
  - Reflect market value of assets (MVA)
  - Smooth out fluctuations in market values
  - Produce smoother pattern of contributions
- Features
  - Practical to both understand and model
  - Consistently lead or lag market
  - Treatment of realized vs. unrealized gains
  - Consistency with other investment policies
  - “Return to Market” conditions

Ex: 5-Year Smoothing, 7% Assumed Return

One good year

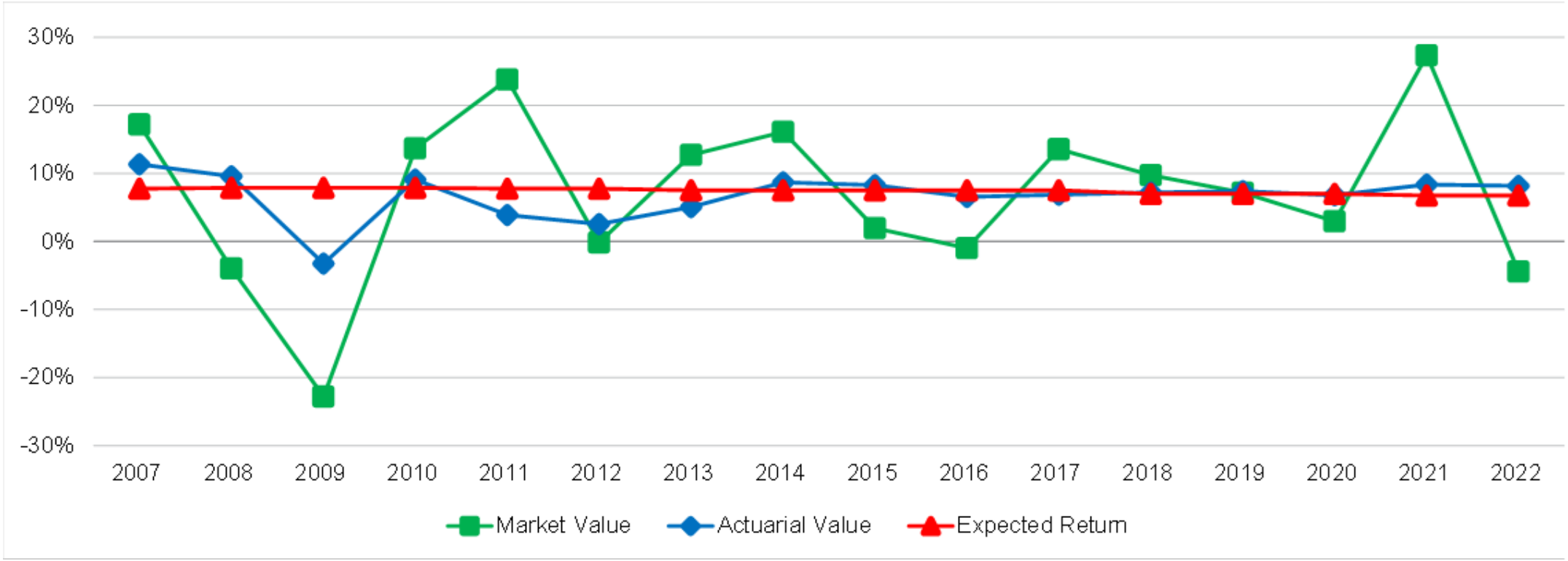
	Year					
	1	2	3	4	5	6
MVA Return	12%	7%	7%	7%	7%	7%
Deferred	(5%)					
Recognized	1%	1%	1%	1%	1%	___
AVA Return	8%	8%	8%	8%	8%	7%

Ex: 5-Year Smoothing, 7% Assumed Return

One good, then one bad year

	Year						
	1	2	3	4	5	6	7
MVA Return	12%	2%	7%	7%	7%	7%	7%
Deferred	(5%)	5%					
Recognized	1%	1%	1%	1%	1%		
	___	(1%)	(1%)	(1%)	(1%)	(1%)	___
AVA Return	8%	7%	7%	7%	7%	6%	7%

Investment Returns – MVA and AVA



Asset Smoothing Mechanics

- When MVA return is **greater** than assumed
  - Smoothing “defers gains”
  - Smoothed value (AVA) is **less** than MVA
  - UAAL and contributions are **larger**
- When MVA return is **less** than assumed
  - Smoothing “defers losses”
  - Smoothed value (AVA) is **greater** than MVA
  - UAAL and contributions are **smaller**

Asset Smoothing Mechanics

- Asset smoothing only delays effect of losses (and gains)
- Delay allows cycles to offset each other
- Metaphor for these bad times: choose between...
  - A full day, crippling migraine headache
  - A week-long dull throb in the back of your head
- Total pain remains the same

- The trouble starts on day three...

Amortization

The unfunded liability payment schedule

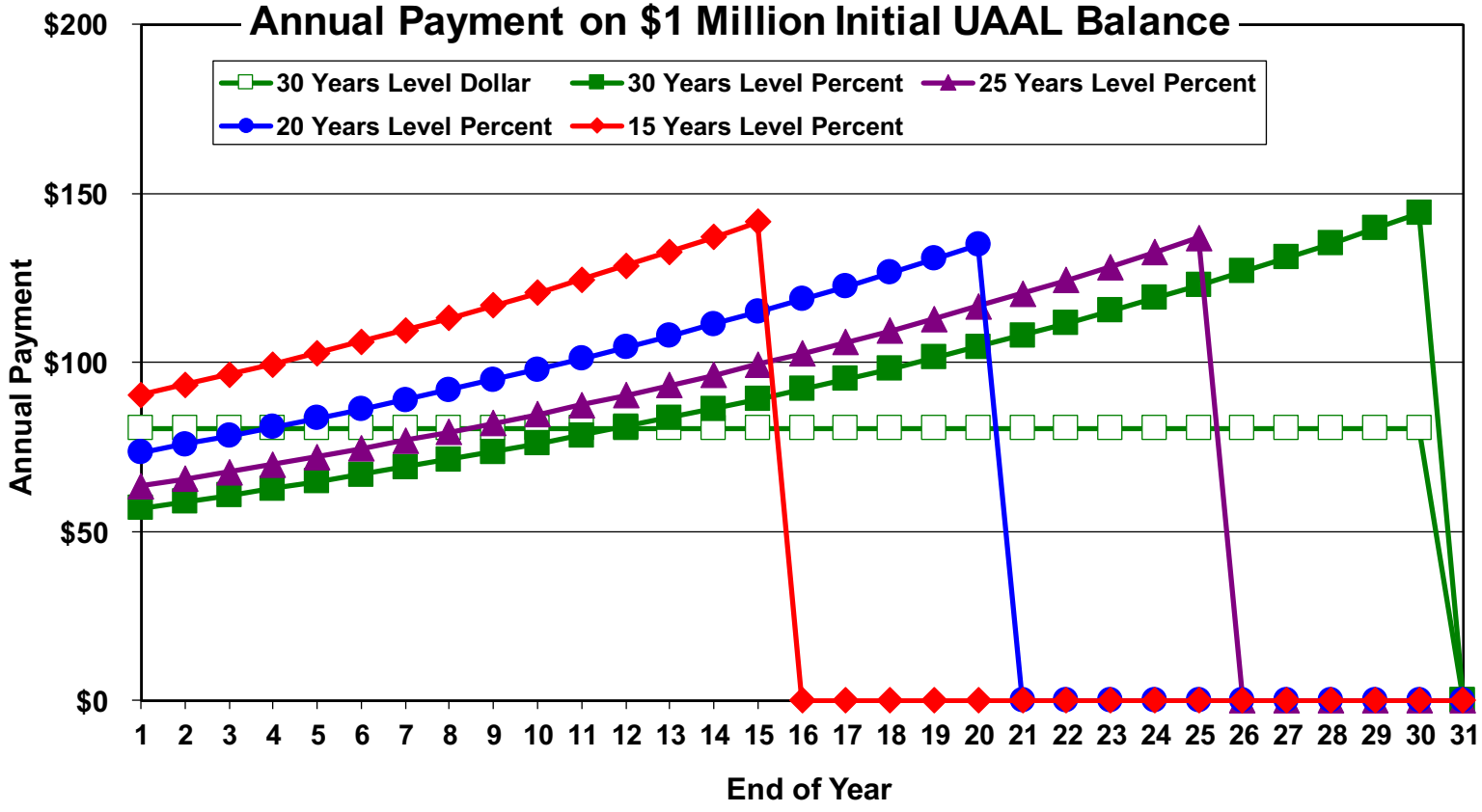
Amortization of the Unfunded Liability

- Source of Unfunded Liability
  - Plan changes
  - Assumption or method changes
  - Gains / losses
- Amortization period
  - Fixed period (closed) or rolling (open)
  - One layer (uniform) or multiple
- Amortization method
  - Level dollar amount
  - Level percentage of pay

Amortization Methods and Periods

7.00% interest	30 years	30 years	25 years	20 years	15 years
3.25% payroll incr.	Level dollar	% of pay	% of pay	% of pay	% of pay
Increase in UAAL	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Amortization amount					
Year 1	$ 80,586	$ 57,070	$ 63,546	$ 73,518	$ 90,490
Year 15	$ 80,586	$ 89,304	$ 99,438	$ 115,041	$ 141,600
Year 20	$ 80,586	$ 104,790	$ 116,682	$ 134,991	$ 0
Year 25	$ 80,586	$ 122,962	$ 136,916	$ 0	$ 0
Year 30	$ 80,586	$ 144,285	$ 0	$ 0	$ 0
Total amount paid					
Principal	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000
Interest	1,417,592	1,827,826	1,394,425	1,026,467	714,202
Total	$2,417,592	$2,827,826	$2,394,425	$2,026,467	$1,714,202

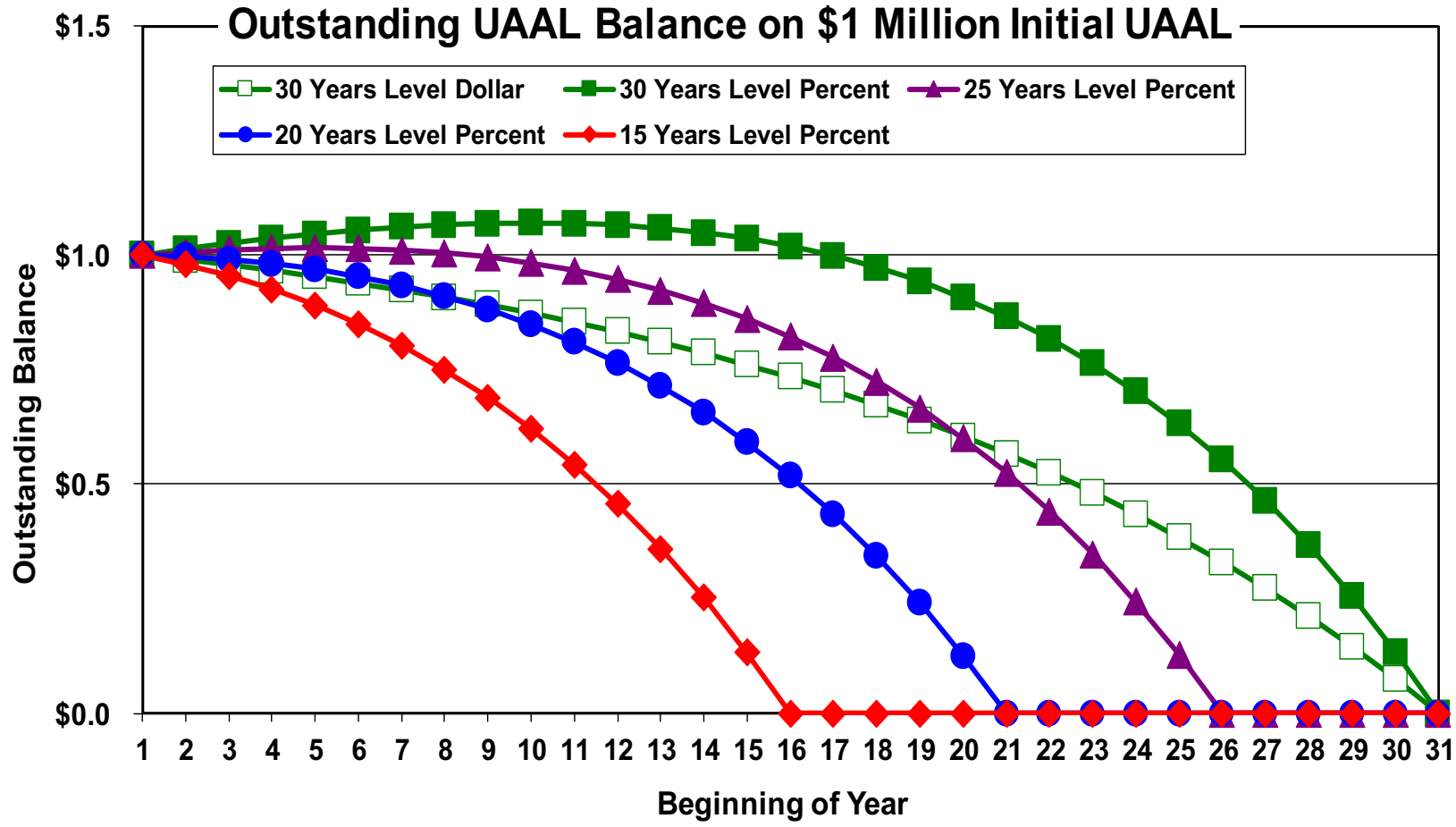
Amortization Payments (in thousands)



Negative Amortization

- $1,000,000 liability, 7.00% interest
- First year interest only is $70,000
- With level dollar payments, payments are always greater than interest
- With level percentage payments, early payments can be less than interest
  - In that case UAAL increases
  - Eventually larger payments cover interest plus increased UAAL

Amortization Balances (in millions)



Layered Amortization

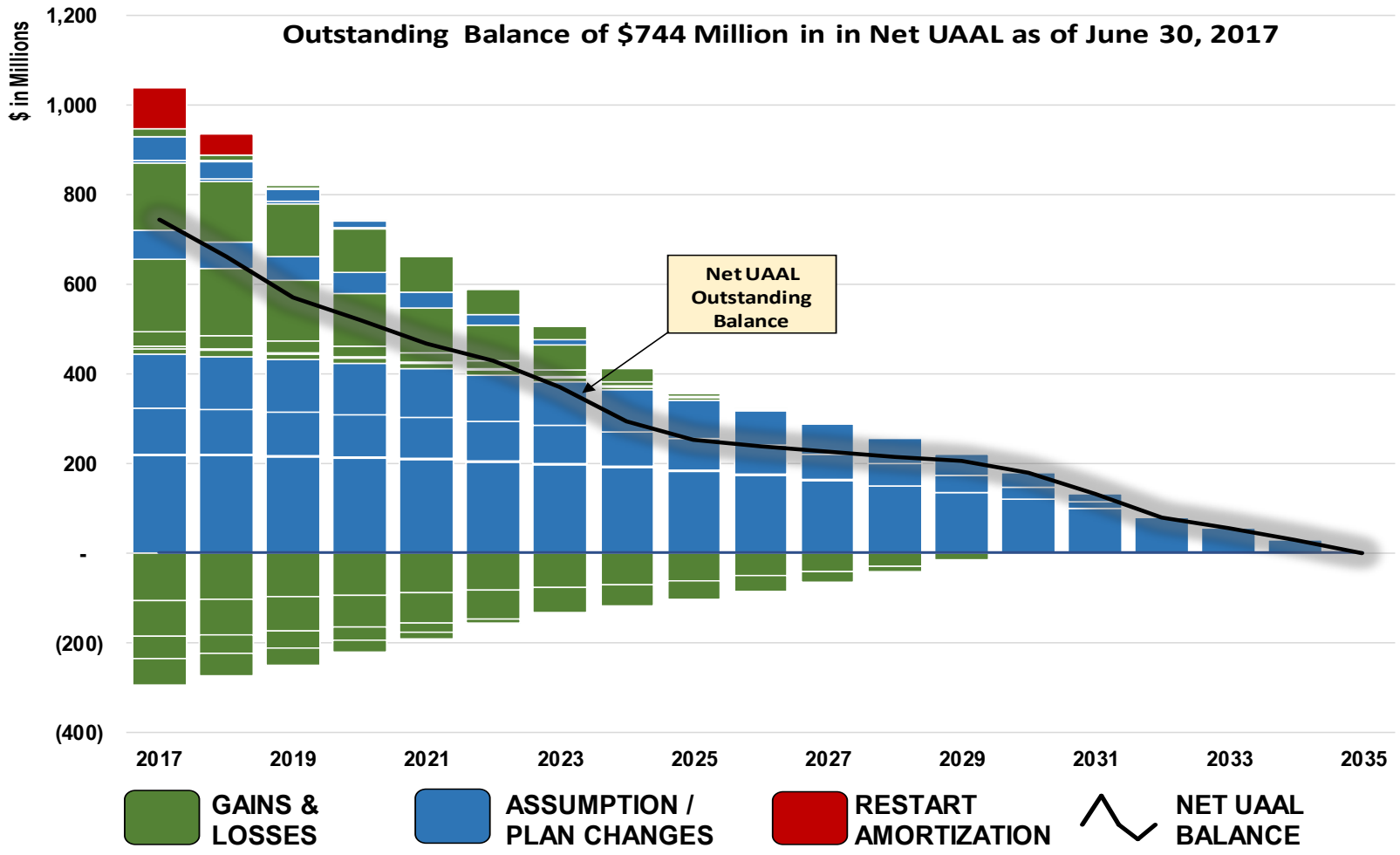
- Layered amortization is considered industry best practice
  - Individual layers amortize each new change in UAAL over separate periods
- Provides transparency on comprehensive plan experience
- Provides accountability in paying off UAAL systematically
- A popular Chinese proverb says:

  "The best time to plant a tree was 20 years ago.
  The second best time is now."
  - The same is true of adopting Layered UAAL amortization!

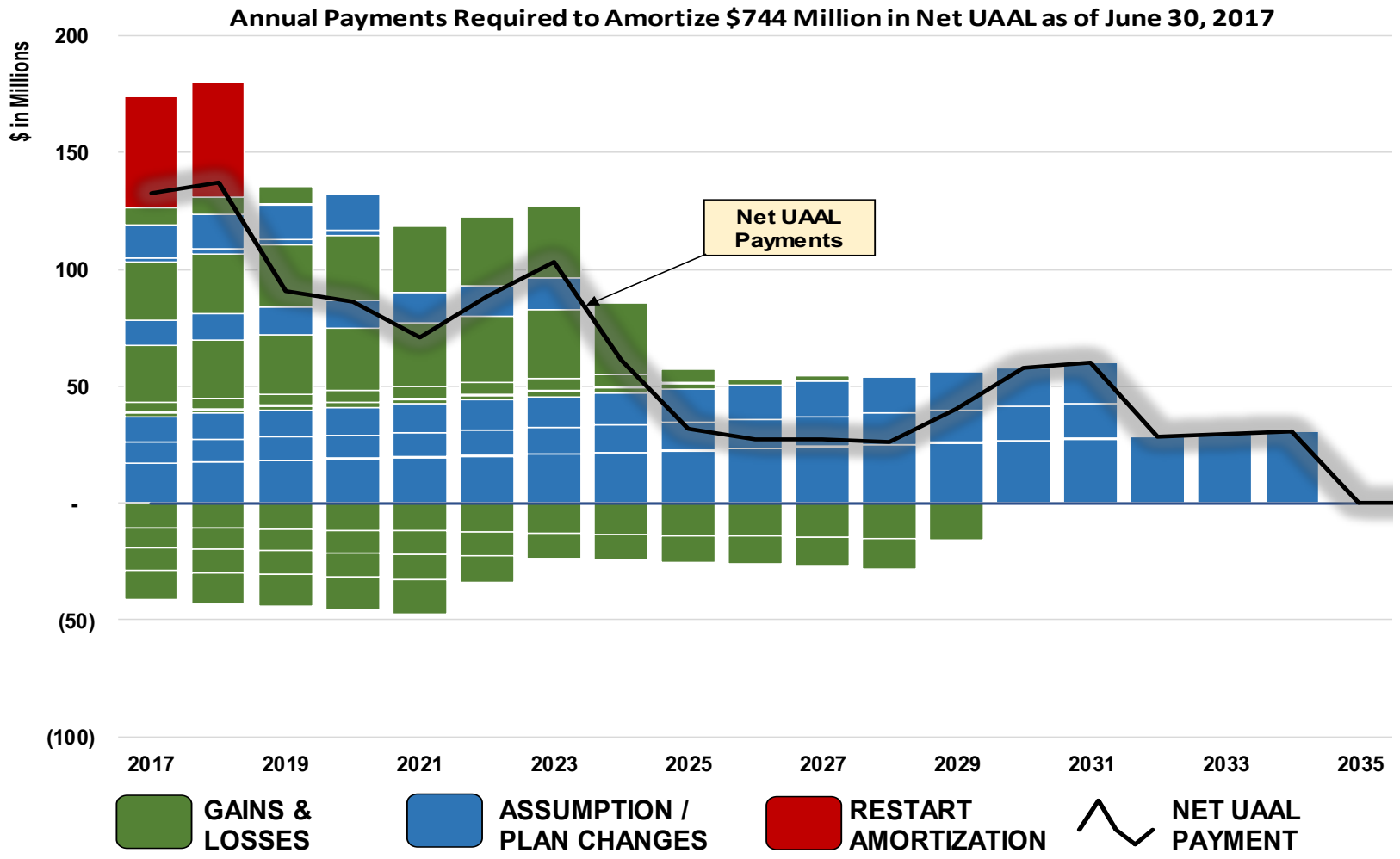
Layered Amortization Schedule Example

Date Established	Source	Initial Amount	Initial Period	Outstanding Balance	Years Remaining	Payment
June 30, 2004	Restart of Amortization	$323,444,000	15	$90,417,000	2	$47,904,000
June 30, 2005	Actuarial (Gain)/Loss	48,849,000	15	19,322,000	3	6,953,000
June 30, 2006	Actuarial (Gain)/Loss	1,358,000	15	673,000	4	185,000
June 30, 2006	Assumption Change	102,790,000	15	51,061,000	4	14,039,000
June 30, 2006	Plan Provision Change	14,731,000	15	7,314,000	4	2,011,000
June 30, 2007	Actuarial (Gain)/Loss	(96,898,000)	15	(56,734,000)	5	(12,710,000)
June 30, 2008	Actuarial (Gain)/Loss	(75,365,000)	15	(49,924,000)	6	(9,493,000)
June 30, 2009	Actuarial (Gain)/Loss	204,600,000	15	149,143,000	7	24,754,000
June 30, 2009	Assumption Change	91,252,000	15	66,505,000	7	11,039,000
June 30, 2010	Actuarial (Gain)/Loss	206,081,000	15	161,917,000	8	23,943,000
June 30, 2011	Actuarial (Gain)/Loss	38,155,000	15	31,802,000	9	4,257,000
June 30, 2012	Actuarial (Gain)/Loss	4,258,000	15	3,732,000	10	457,000
June 30, 2012	Demographic Assumption	123,037,000	20	120,640,000	15	10,761,000
June 30, 2012	Economic Assumption	104,278,000	20	102,248,000	15	9,120,000
June 30, 2013	Actuarial (Gain)/Loss	15,435,000	15	14,022,000	11	1,591,000
June 30, 2014	Actuarial (Gain)/Loss	(87,484,000)	15	(82,051,000)	12	(8,685,000)
June 30, 2015	Actuarial (Gain)/Loss	(109,606,000)	15	(105,359,000)	13	(10,476,000)
June 30, 2015	Assumption Change	218,002,000	20	217,319,000	18	16,998,000
June 30, 2016	Actuarial (Gain)/Loss	(453,000)	15	(451,000)	14	(42,000)
June 30, 2017	Actuarial (Gain)/Loss	2,730,000	15	2,730,000	15	244,000
				$744,326,000		$132,850,000

Layered Amortization Balances



Layered Amortization Payments



Asset Smoothing and UAAL Amortization

- Each year's gain/loss gets amortized in UAAL
  - Asset G/L, Liability G/L
  - Asset G/L based on AVA return (smoothing), not MVA return
- So MVA cost volatility is dampened twice
  - Much of the volatility is removed by asset smoothing
  - Remaining AVA volatility is amortized with other G/L's
- MVA volatility is greater than other experience
  - Needs its own shock absorber to get its volatility down to a level comparable to other experience

The Funded Ratio

Put all your eggs in one basket – and watch that basket!

A funded ratio of 80% or more is within the range that many public sector experts, union officials, and advocates view as a healthy pension system.

U.S. Government Accountability Office
September 2007

The plan currently has around a 71% funding ratio, below the 80% benchmark that healthy pension plans shoot for.

Chief Investment Officer
February 2019

Funded Ratio: Assets Divided by Liabilities

- Not used to determine contribution rates
- Should not have a bright line test like 80%
  - See American Academy of Actuaries Issue Brief *"The 80% Funding Myth"*
  - Plans should always target at least 100% to manage costs
- Is not a simple test of plan health
- But is useful in tracking relative progress

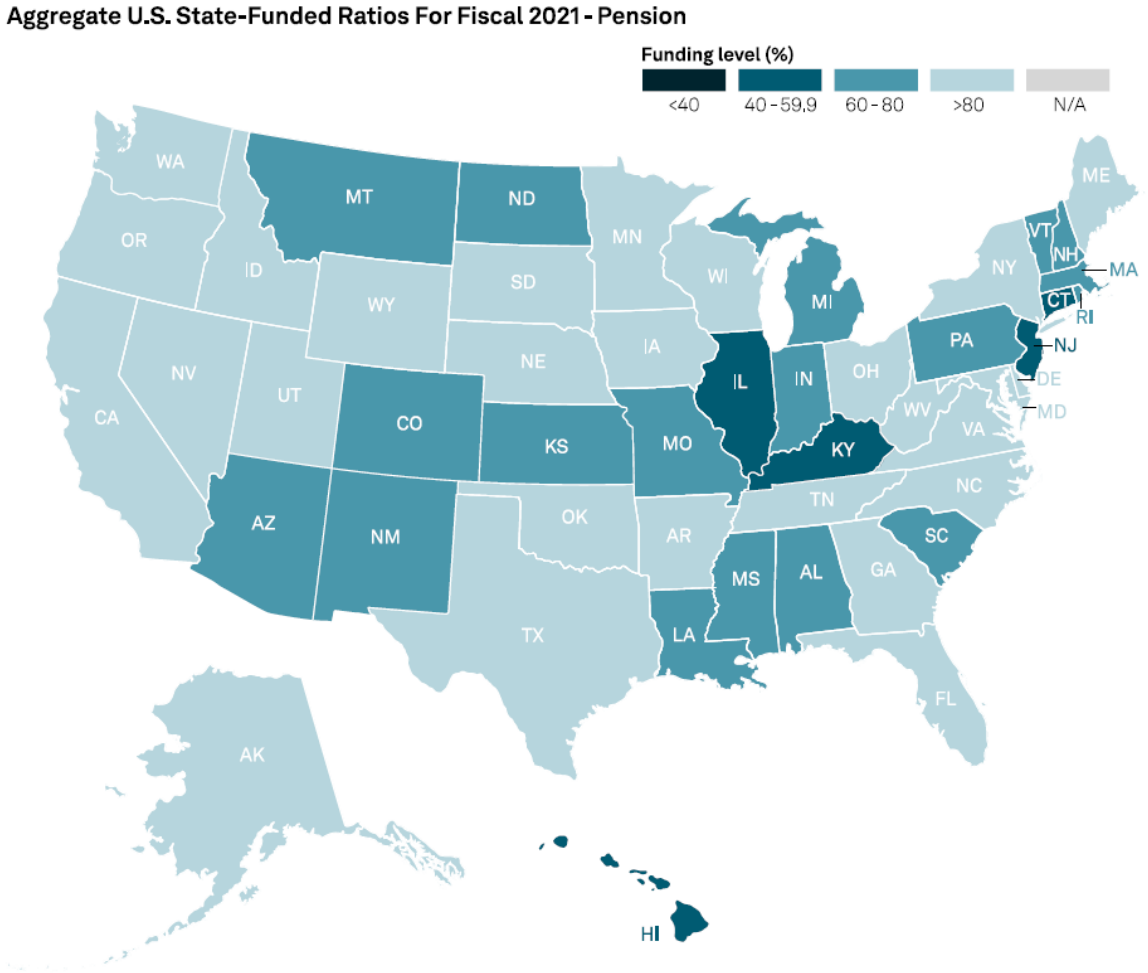
Funded Ratio – Choose a Plan

	Funding Ratio	
Valuation Date	**Plan A**	**Plan B**
2022	**73%**	**82%**

Funded Ratio – Choose a Plan

	Funding Ratio	
Valuation Date	Plan A	Plan B
2022	73%	82%
2021	61%	89%
2020	57%	93%
2019	46%	102%
2018	38%	118%
2017	24%	132%

U.S. States by Pension Funded Ratio



Source: S&P Global Ratings “Market Swings Could Signal Contribution Volatility For U.S. State Pensions And OPEBs”

Funding Discipline is Essential

For The Five Highest-Funded U.S. State Pension Plans, Being Proactive Keeps Liabilities Manageable

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Best Funded Plans

- Early movers to lower discount rate
- Early movers to adopt generational mortality
- Commitment to strong funding policies
- Consistent contributions in full

Worst Funded Plans

- Political resistance to update assumptions
- Invented ways to defer funding commitment
- Ineffective funding policies
- Inconsistent contributions

Questions?

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Appendix: Asset Allocation

Risk and return

Asset Allocation

- Plan trustees are fiduciaries; they must act solely in the best interests of the plan
- Asset allocation is one of the most important decisions a pension board must make
  - Determinants of portfolio performance[(1)]:
    - Asset allocation 92%
    - Securities selection 4%
    - Market timing 2%
    - Other 2%
- Investors are usually, but not always, rewarded for taking risk

(1) Source: Determinants of Portfolio Performance II: An Update. Brinson, et al. *Financial Analysts Journal*, May/June 1991

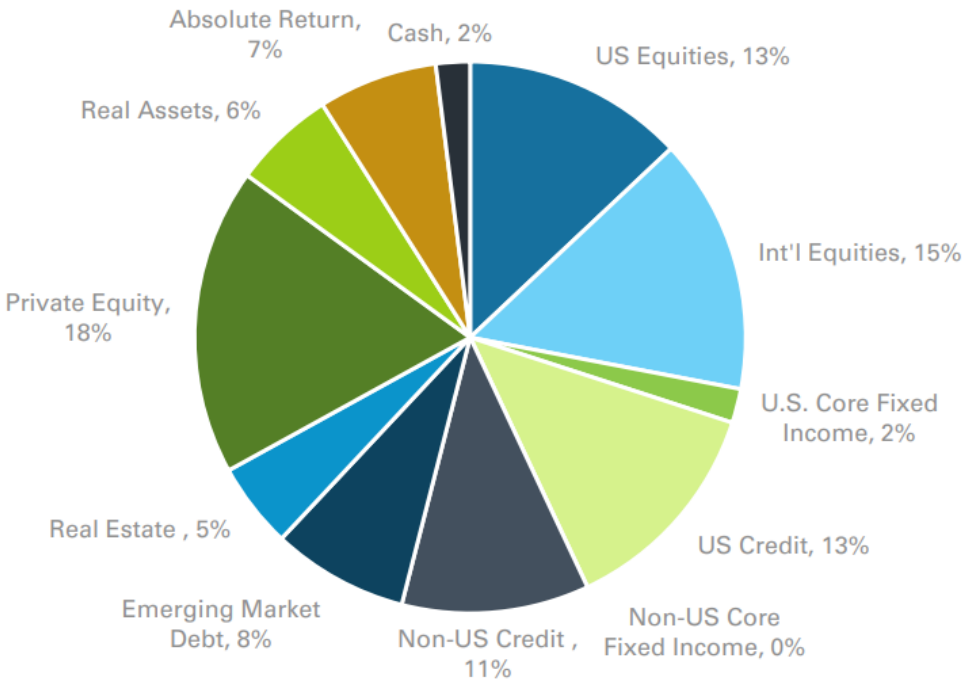
Asset Allocation

- Mean-Variance modeling process
  - Determination of types of assets to include in the modeling
  - Determination of asset class assumptions
    - Expected return
    - Expected risk
    - Expected correlations
    - Asset class constraints (minimum and maximum allocation)
  - Iterative process of modeling alternatives

Risk and Return Assumptions

SBCERA RETURN AND RISK EXPECTATIONS

USING DEC. 31, 2021 CAPITAL MARKET ASSUMPTIONS



	10 Year		30 Year	
	2022	2021	2022	2021
Expected Return	6.9%	7.1%	8.0%	8.1%
Expected Volatility	11.3%	12.2%	11.3%	12.2%
Sharpe Ratio	0.48	0.47	0.51	0.46
Sortino Ratio	0.78	0.73	0.92	0.85

Probabilities using 2022 Assumptions	
Probability of 1-Year Return Under 0.00%	26.3%
Probability of 10 Year Return Under 0.00%	2.3%
Probability of 10 Year Return Under 7.25%	50.7%
Probability of 30-Year Return Under 7.25%	29.3%

Source: NEPC Report – June 2022

Asset Class Return Assumptions

	Asset Class	12/31/2021 10-Year Return	12/31/2020 10-Year Return	Delta	12/31/2021 30-Year Return	12/31/2020 30-Year Return	Delta	12/31/2021 Volatility	12/31/2020 Volatility	Delta
	Cash	1.5%	0.8%	0.7%	1.5%	0.8%	0.7%	0.6%	0.6%	0.0%
	U.S. Inflation	2.4%	2.0%	0.4%	2.4%	2.0%	0.4%			
Equity	U.S. Large-Cap Equity	4.3%	5.4%	-1.1%	6.1%	6.3%	-0.2%	16.6%	16.6%	0.0%
	U.S. SMID-Cap Equity	5.6%	5.7%	-0.1%	6.6%	6.6%	0.0%	20.7%	20.7%	-0.1%
	Non-U.S. Developed Equity	5.2%	5.9%	-0.7%	6.2%	6.5%	-0.3%	19.6%	19.7%	-0.1%
	Emerging Market Equity	8.3%	7.5%	0.8%	8.7%	8.4%	0.3%	28.3%	28.7%	-0.3%
	Global Equity*	5.4%	6.2%	-0.8%	6.8%	7.0%	-0.2%	17.9%	18.0%	-0.1%
	Private Equity*	9.0%	9.3%	-0.3%	10.0%	10.1%	0.0%	13.3%	12.8%	0.5%
Fixed Income	U.S. Aggregate Bond*	2.0%	1.4%	0.6%	3.1%	2.7%	0.5%	5.7%	5.7%	0.0%
	US Leveraged Loans	4.7%	3.9%	0.8%	5.6%	4.8%	0.8%	9.1%	9.2%	-0.1%
	U.S. High Yield Corporate Bond	3.2%	2.9%	0.3%	5.4%	5.0%	0.4%	11.2%	11.5%	-0.3%
	Private Debt*	6.6%	6.1%	0.5%	7.9%	7.5%	0.4%	6.9%	11.2%	-4.3%
	International Fixed Income	1.2%	0.7%	0.5%	2.2%	1.8%	0.3%	9.3%	7.9%	1.4%
	Emerging Market Debt	5.7%	5.0%	0.7%	5.3%	5.1%	0.2%	13.0%	13.0%	0.0%
Real Estate	Real Estate - Core	4.7%	4.4%	0.3%	5.6%	5.6%	0.0%	5.7%	5.2%	0.5%
	Real Estate - Non-Core	5.9%	5.5%	0.4%	6.9%	7.0%	-0.1%	8.8%	8.7%	0.0%
Real Assets	Private Real Assets - Natural Resources	7.1%	8.0%	-0.9%	8.2%	8.5%	-0.3%	15.6%	15.2%	0.3%
	Private Real Assets - Infrastructure	5.3%	5.4%	-0.1%	6.6%	6.6%	0.0%	8.1%	7.8%	0.3%
	Absolute Return*	6.6%	6.1%	0.5%	7.9%	7.5%	0.4%	6.9%	11.2%	-4.3%

Source: NEPC Report – June 2022

Recommendations

Current Policy			
Asset Class	**Policy Target**	**Range**	**Benchmark**
Domestic Equities			**Russell 3000 Index**
Passive Large Cap	8.0%	0% – 11%	
Passive Small Cap	2.0%	-3% – 7%	
Volatility	3.0%	0% – 8%	
Subtotal*	**13.0%**	**8% – 18%**	
International Equities			**MSCI ACWI ex USA Index**
Developed Market	6.0%	1% – 11%	
Volatility	3.0%	0% – 8%	
Emerging Market Equity	6.0%	1% – 11%	
Subtotal*	**15.0%**	**10% – 20%**	
US Fixed Income			**Bloomberg Barclays US Aggregate Bond Index**
Core	2.0%	-3% – 7%	
High Yield/Credit Strategies	13.0%	8% – 18%	
Subtotal	**15.0%**	**10% – 20%**	
Global Fixed Income			**Bloomberg Barclays Global Aggregate Bond ex US Index**
International Core	0.0%	-5% – 5%	
International Credit	11.0%	6% – 16%	
Emerging Market Debt	8.0%	1% – 12%	
Subtotal	**19.0%**	**13% – 23%**	
Real Estate			**NCREIF Property Index**
Core	2.5%	0% – 5%	
Non-Core	2.5%	0% – 5%	
Subtotal	**5.0%**	**0% – 10%**	
Real Assets			**67% Bloomberg Commodity Index + 33% BBG US TIPS Index**
Commodities	4.0%	-1% – 7%	
Infrastructure	2.0%	0% – 6%	
Subtotal*	**6.0%**	**0% – 10%**	
Private Equity	**18.0%**	**6% – 23%**	**Russell 3000 Index**
Absolute Return	**7.0%**	**0% – 12%**	**Bloomberg Barclays US Aggregate Bond Index**
Cash	**2.0%**	**0% – 10%**	**91 Day T-Bill Index**

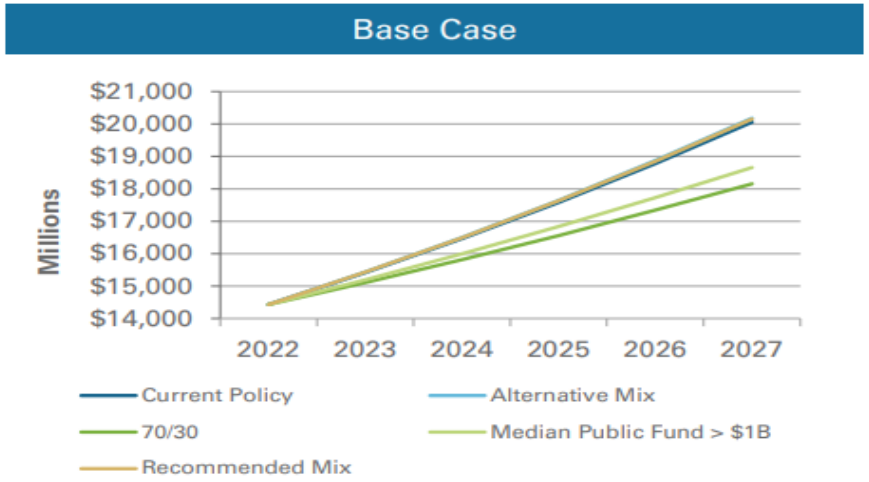
Recommendation			
Asset Class	**Policy Target**	**Range**	**Benchmark**
Domestic Equities			**Russell 3000 Index**
Passive Large Cap	14.5%	0% – 20%	
Passive Small Cap	2.5%	-3% – 7%	
Subtotal*	**17.0%**	**10% – 27%**	
International Equities			**MSCI ACWI ex USA Index**
Developed Market	7.0%	1% – 12%	
Emerging Market Equity	6.0%	1% – 11%	
Subtotal*	**13.0%**	**8% – 18%**	
US Fixed Income			**Bloomberg Barclays US Aggregate Bond Index**
Core*	2.0%	-3% – 7%	
High Yield/Credit Strategies*	13.0%	8% – 18%	
Subtotal	**15.0%**	**10% – 20%**	
Global Fixed Income			**Bloomberg Barclays Global Aggregate Bond ex US Index**
International Core*	0.0%	-5% – 5%	
International Credit*	11.0%	6% – 16%	
Emerging Market Debt*	6.0%	1% – 10%	
Subtotal	**17.0%**	**11% – 21%**	
Real Estate			**NCREIF Property Index**
Core	2.5%	0% – 5%	
Non-Core	2.5%	0% – 5%	
Subtotal*	**5.0%**	**0% – 10%**	
Real Assets			**67% S&P GSCI + 33% BBG US TIPS Index**
Commodities	4.0%	-1% – 7%	
Infrastructure	2.0%	0% – 6%	
Subtotal*	**6.0%**	**0% – 10%**	
Private Equity*	**18.0%**	**6% – 23%**	**Russell 3000 Index**
Absolute Return*	**7.0%**	**0% – 12%**	**Bloomberg Barclays US Aggregate Bond Index**
Cash*	**2.0%**	**0% – 10%**	**91 Day T-Bill Index**

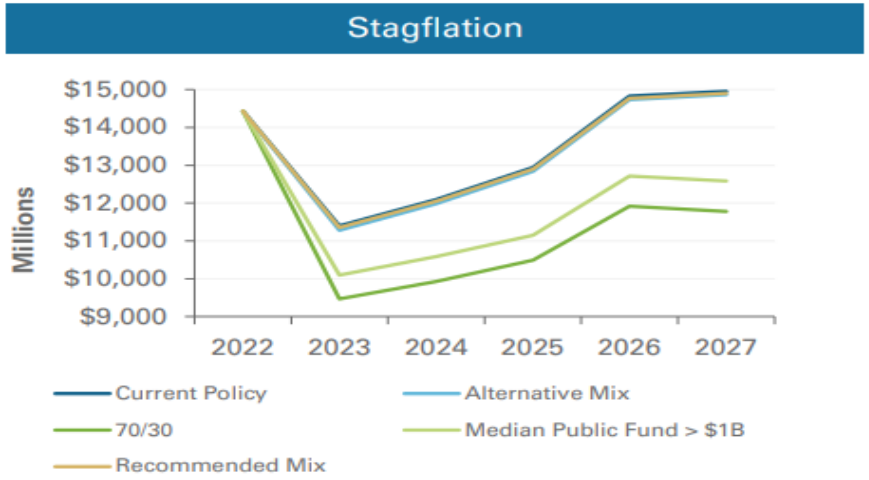
Red shading denotes recommended decrease/ change

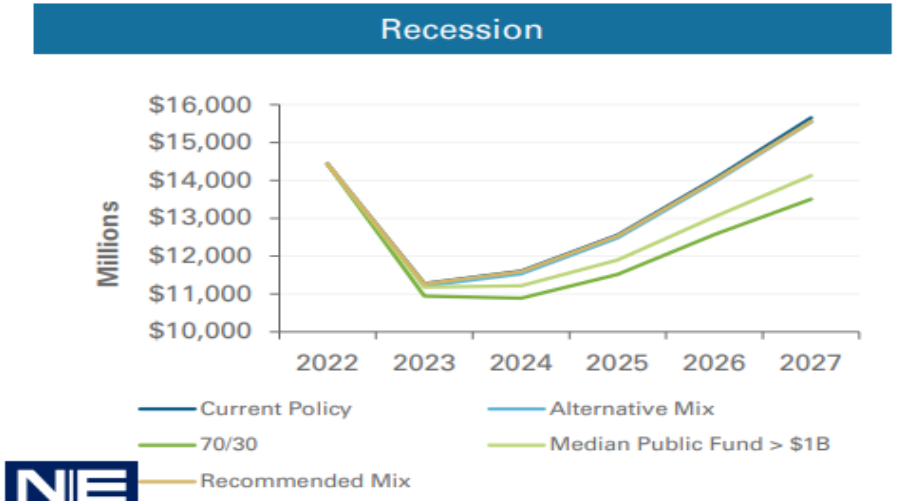
Green shading denotes recommended increase/ change

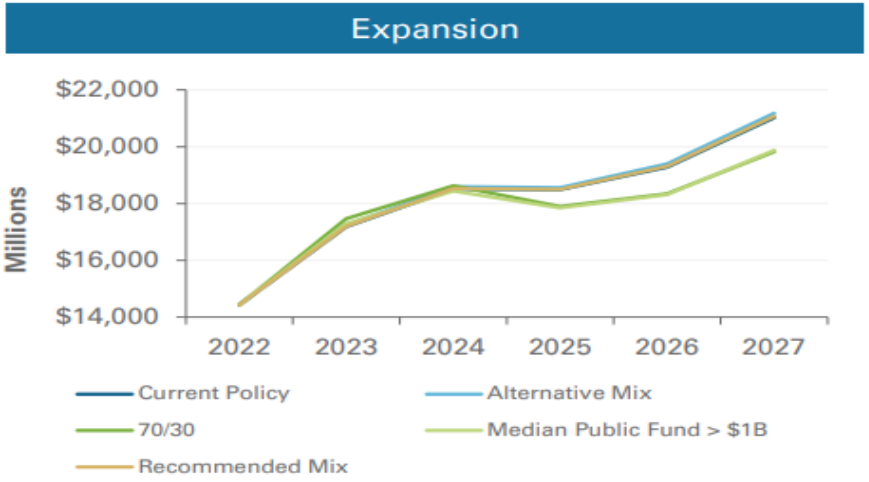
Source: NEPC Report – June 2022

Scenario Analysis









Source: NEPC Report – June 2022

Source: NEPC Report – June 2022

Asset Allocation: Why you should care

- Remember C+I = B+E
- If I underperforms, and B+E cannot be changed, then C must go up!
- Budgetary impacts
- Crowding out other needs (community priorities, infrastructure spending, etc.)
- Headline risk