Wisconsin Retirement System

Experience Study Results for 2018-2020

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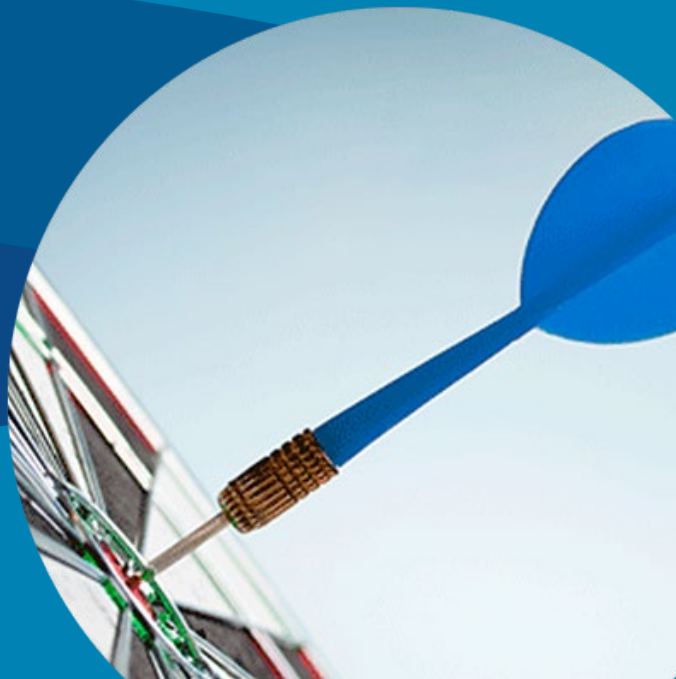

Agenda

1. Introduction
2. Experience Study Process
3. Demographic Assumptions
4. Mortality Assumption
5. Economic Assumptions
6. Effect on Valuation Results

Introduction

- Each year the actuarial liabilities of WRS are calculated as part of the December 31 valuation
- In order to perform the valuation, we must make assumptions about the future experience of the System with regard to various risk areas
- The results of the liability calculations depend upon those assumptions

Introduction

Primary Risks	
Demographic	**Economic**
Normal Retirement	Price Inflation
Early Retirement	Wage Inflation
Death-in-Service	Investment Return
Disability	
Other Separations	
Pre and Post Mortality	
Merit and Longevity Pay Increases	

Introduction

- Assumptions should be carefully chosen and continually monitored
  - Continued use of outdated assumptions can lead to ...

Introduction

Understated costs resulting in:

- Sharp increases in required contributions at some point in the future leading to a large burden on future members, employers and taxpayers
- In extreme cases, an inability to pay benefits when due

Overstated costs resulting in:

- Benefit levels that are kept below the level that could be supported by the employer and member contribution rates
- An unnecessarily large burden on the current generation of members, employers and taxpayers

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Introduction

- No single set of assumptions will be suitable indefinitely
- Things change, and our understanding of things also changes
- WRS statutes require reviewing assumptions every 3 years
- A systematic review of assumptions is called an “Experience Study”

Experience Study Process

Analysis

- Based upon experience during 2018-2020
- Compared trends with prior studies
- Generally, we give confirmed trends more credibility than non-confirmed trends
- Some assumptions were set using "liability weighting" - instead of counting people to set assumption we counted liabilities

Philosophy

Do not overreact to results from any single experience period

- It is better to make a series of small changes in the right direction, rather than a single large change that could turn out with hindsight to be in the wrong direction

Assumptions

- Demographic assumptions typically recommended by actuary and adopted by Board
- Economic assumptions – actuary recommends range of reasonable economic alternatives and Board adopts based on input from actuary and advisors

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New to This Study: State Specific Rates

- For the first time, the WRS experience study developed separate decrements for state and non-state members
  - Resulting in separate proposed liability-weighted assumptions for state and non-state members
- State member assumptions to be used in Sick Leave valuation as well as in WRS valuation
  - Reasonable to use liability-weighted assumptions since both sick leave and pension liability are driven primarily by pay and service

Potential Impact of COVID

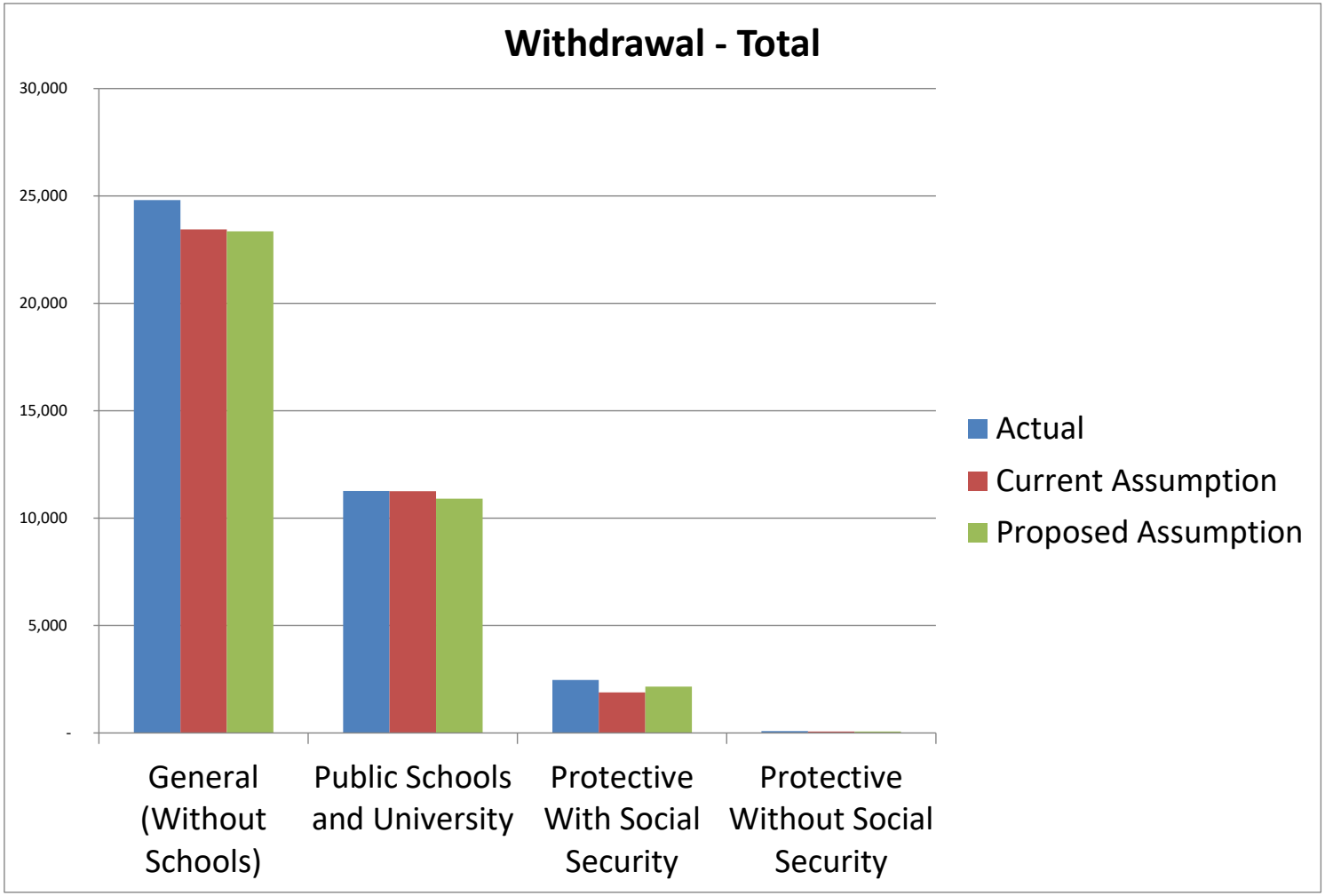
- All analysis is based on data through December 31, 2020
  (a year of COVID data included in study)
- Generally two schools of thought:
  - COVID is a one-time shock and things will return to 'normal'
    - Any impact will result in gains or losses in 2020 and 2021 valuations
    - Future long term trends and assumptions will align with prior trends
  - COVID will have a long-lasting impact for many years to come
    - Will need several years of data to collect relevant information
    - Could have impact on all actuarial assumptions (not just mortality), but trends will emerge over time

Potential Impact of COVID (continued)

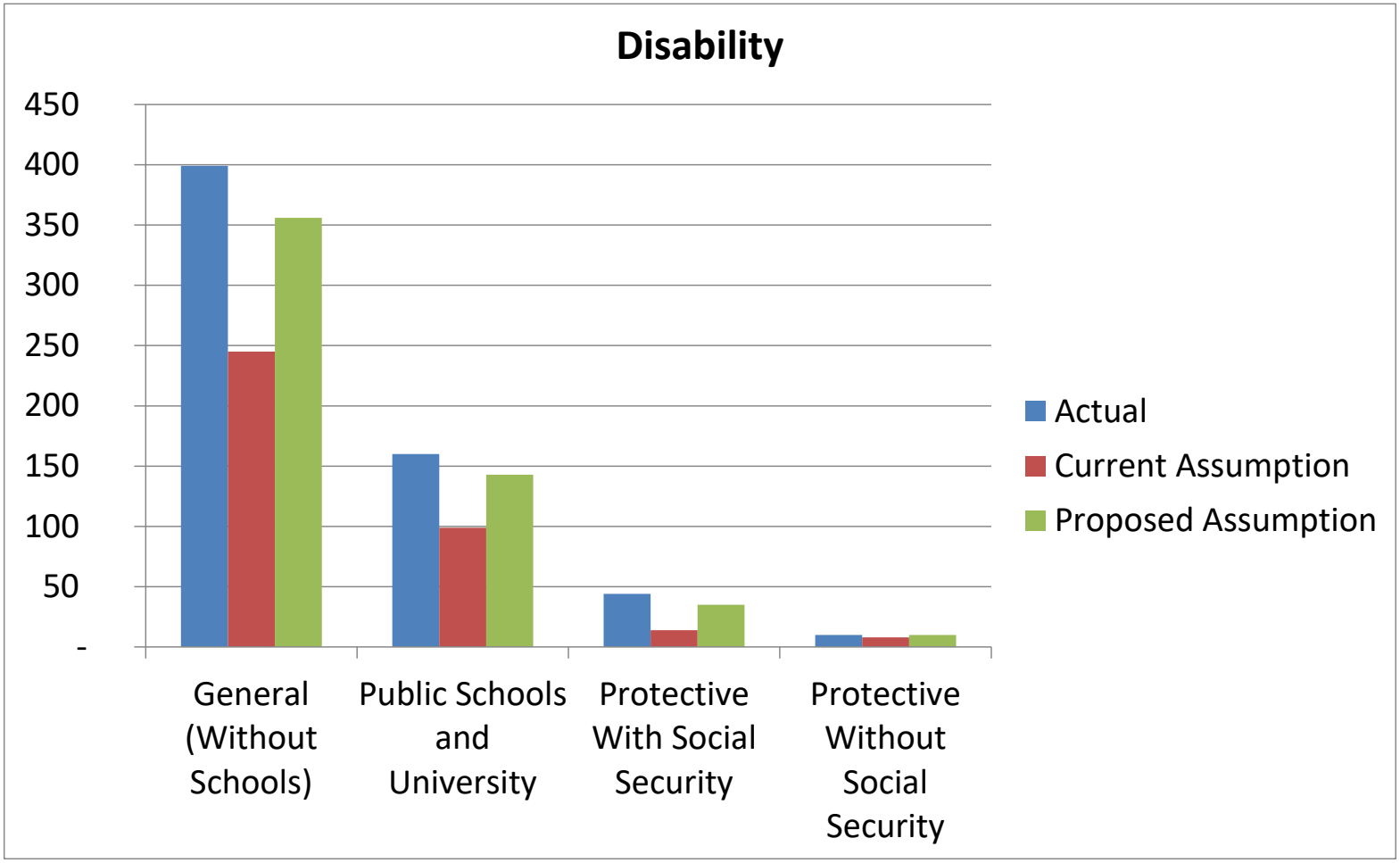
- General recommendation – do not overreact until we have better information (generally need 3 to 5 years of data)
- The actuarial valuation is ‘self-correcting’ as each year’s valuation takes into account actual experience
- For mortality, 5 years of data was studied to avoid giving too much weight to one year impacted by COVID (2020)

DEMOGRAPHIC ASSUMPTIONS

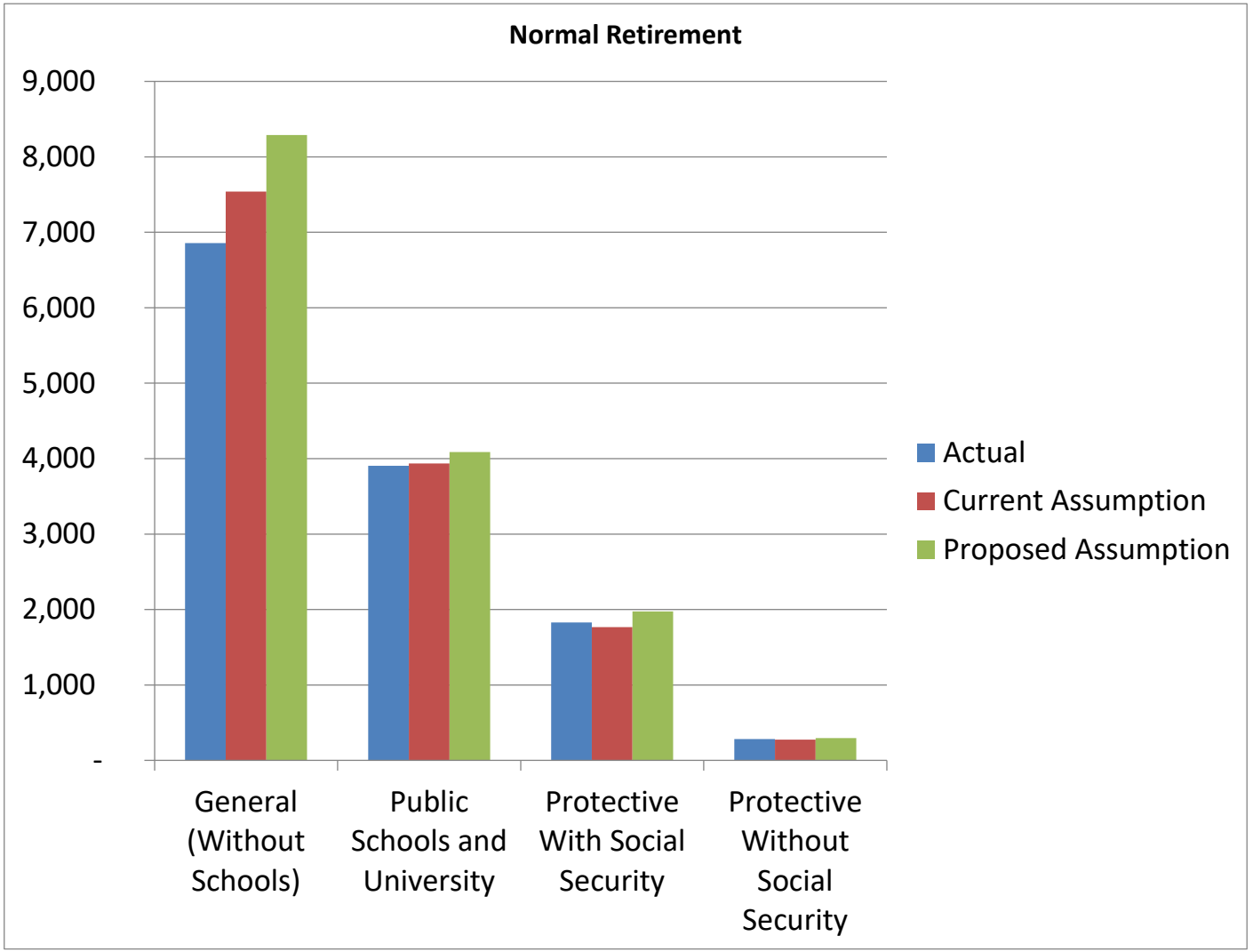
Summary of Withdrawal Experience Results (Liability Based)



Summary of Disability Experience Results (Population Based)

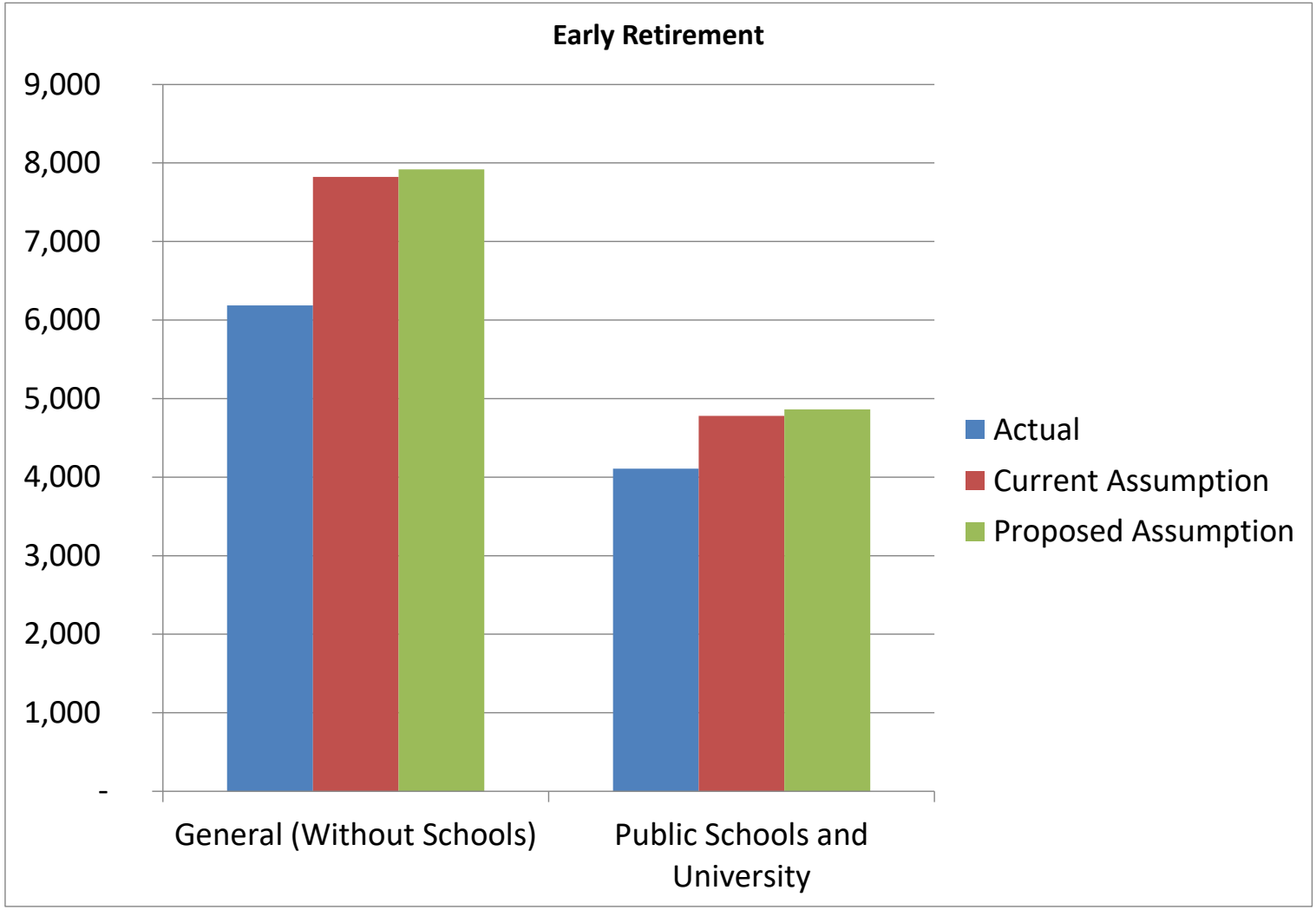


Summary of Normal Retirement Experience Results (Liability Based)



The figures shown are for people below age 75.

Summary of Reduced Retirement Experience Results (Liability Based)



MORTALITY ASSUMPTION

Mortality for WRS

Mortality

- Mortality assumption consists of two components
  - Base table – reflects expected mortality rates as of today
  - Projection Scale – reflects anticipated improvements in mortality over each member's future lifetime
- New Public Sector Tables (Pub-2010) were recently developed by the Society of Actuaries (94 different versions)
- Use WRS specific data for recommended base table (credible sample size)
  - Started with various PUB-2010 tables, adjusted for WRS experience
- Similar adjustments were used to create tables for pre-retirement and disability retirees (smaller sample size)

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Mortality for WRS

Mortality

- The last actuarial audit recommended investigation of separate mortality tables for different employee classifications (general, teacher, public safety, etc.)
  - One concern: Breaking down the data into smaller and smaller subgroups erodes credibility for distinct groups
  - Another concern: Possible unintended impact on the dividend process, reserve transfers and optional forms of payment
- Conclusion: Continue having a single “Wisconsin” mortality table, based on most recent base/projection Mortality tables

Generational Mortality

Mortality

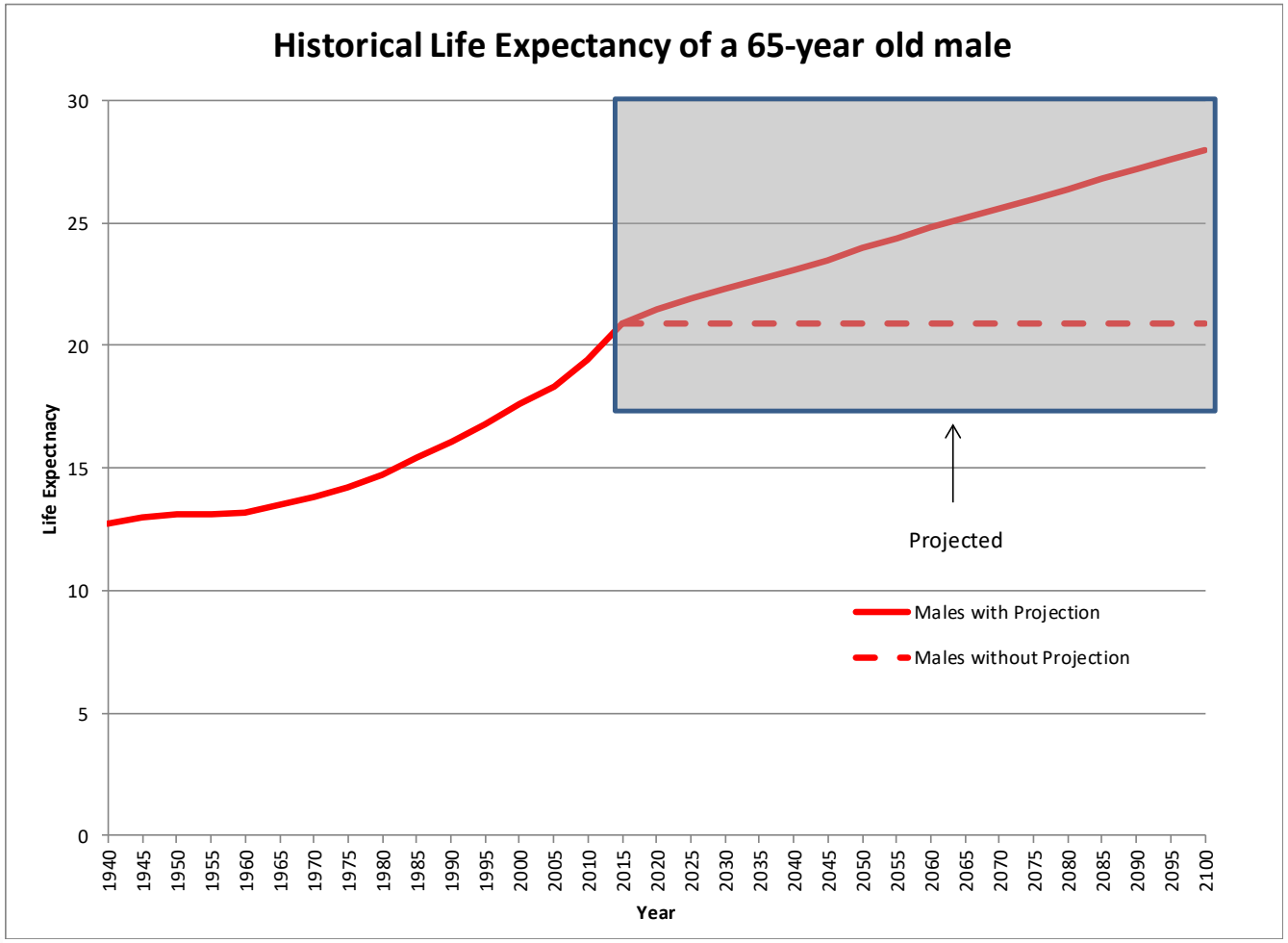
- For years, actuaries used static mortality tables
  - Life expectancy of a person turning 65 in 10 or 20 years was assumed to be the same as that of a person who is 65 years old today
  - Since mortality consistently improved over the last 50 years, this usually resulted in increases to liabilities and costs each time an experience study was conducted

Generational Mortality

Mortality

- Generational mortality was introduced about 10 years ago
  - Life expectancy of someone who turns 65 in the future will be different than life expectancy of a 65 year old today
  - Assumed life expectancy depends on year of birth in addition to age
  - Future retirees will live longer → mortality improvement
  - Designed to reduce future losses due to mortality
  - Complicated for WRS since this directly impacts the dividend

Mortality Improvement - Males



Mortality Experience
Mortality Improvement Illustration

		Life Expectancy*	
Year of Birth	Year Turn Age 65	Male	Female
1960	2025	22.1	24.1
1970	2035	22.8	24.7
1980	2045	23.5	25.3
1990	2055	24.1	25.9
2000	2065	24.7	26.5

* Based on the proposed 2020 WRS Experience Table for Healthy Retirees and projected with mortality improvements using the fully generational MP-2021 projection scale from a base year of 2010.

Mortality Experience
Projection Scale Comparison

Year of Retirement	Projection Scale	Age	Life Expectancy*	
			Male	Female
2021	None	65	20.5	22.5
2021	MP-2015	65	22.9	24.9
2021	MP-2016	65	22.5	24.5
2021	MP-2017	65	22.3	24.3
2021	MP-2018	65	22.2	24.2
2021	MP-2019	65	22.1	24.1
2021	MP-2020	65	21.8	23.8
2021	MP-2021	65	21.9	23.9

* Based on the proposed 2020 WRS Experience Table for Healthy Retirees and projected with mortality improvements using the specified fully generational projection scale from a base year of 2010.

Mortality Experience - Recommendations

Base Table

Current Mortality Rates

- Adopt mortality rates halfway between population and benefit weighted rates
- Review again in 3 years to determine if COVID experience persists

Projection Scale Table

Future Mortality Rates

- Adopt 100% of MP-2021 projection scale
- Typically would update the projection scale every 3 years

Similar adjustments for Disabled and Pre-retirement mortality tables

Mortality Experience - Impact

Active Lives Valuation

- Slight upward pressure on contribution rates

Retired Lives Valuation

- Approximately cost neutral
- No phase-in of mortality reserve adjustment needed

Historical Mortality Improvement Impact on Dividends

Year	Decrease
2006	0.5%
2007	0.5%
2008	0.5%
2009	0.3%
2010	0.3%
2011	0.4%
2012	0.3%
2013	0.3%
2014	0.4%
2015	0.5%
2016	0.5%
2017	0.5%
2018	0.2%
2019	0.2%
2020	0.2%

2021-2023 =
No adjustment

Benefit Option Factors

- Option factors for benefit calculations are typically updated whenever mortality changes
- Overall impact is very small

Age		Joint and 75%		Joint and 100%	
Retiree	Beneficiary	Current	Proposed	Current	Proposed
50	45	0.929	0.936	0.908	0.916
55	50	0.912	0.919	0.886	0.895
60	55	0.894	0.900	0.863	0.872
65	60	0.870	0.877	0.834	0.842
75	70	0.805	0.810	0.756	0.761


ECONOMIC
ASSUMPTIONS

Current Economic Assumptions

Price Inflation	2.50%
Wage Inflation	3.00%
Investment Return	7.00%

Comments on Economic Assumption Selection

- We are not investment experts, we look at the following items:
  - Historical trends
  - Forward expectations of Investment Consultants
  - Comparison to other Systems
- Typically a Board decision with input from Investment Experts and Actuary
- But Actuary must comply with Actuarial Standards of Practice and certify the assumption as reasonable

Economic Assumptions

ASOP No. 27

Guidance regarding the selection of economic assumptions is governed by Actuarial Statement of Practice (ASOP) No. 27

ASOP No. 27 requires that the selected economic assumptions be consistent with one another

That is, the selection of the investment return assumption should be consistent with the selection of the wage inflation and price inflation assumptions

- Lowering the price inflation assumption but not the investment return assumption implies expected real return is increasing

Economic Assumptions

ASOP No. 27

Actuary must select reasonable assumptions

- Appropriate for purposes of measurement
- Reflects actuary's professional judgment
- Takes into account historical and current data
- Has no significant bias except when provision for adverse deviation
- Reflects actuary's estimate of future experience

Historical Prices and Wages

Year	Annual Increase in		
	Prices (CPI-U)	Wages (NAE)	Difference
1961-1970	2.9%	4.4%	1.5%
1971-1980	8.1%	7.3%	-0.8%
1981-1990	4.5%	5.3%	0.8%
1991-2000	2.7%	4.3%	1.6%
2001-2010	2.3%	2.6%	0.3%
2011-2020	1.7%	2.9%	1.2%
3-Year Avg	1.9%	3.4%	1.5%
5-Year Avg	1.9%	3.0%	1.1%
10-Year Avg	1.7%	2.9%	1.2%
20-Year Avg	2.0%	2.8%	0.8%
30-Year Avg	2.2%	3.3%	1.1%
50-Year Avg	3.8%	4.5%	0.7%

Forward-Looking Price

Forward-Looking Price Inflation Forecasts	
Congressional Budget Office	
5-Year Annual Average	2.18%
10-Year Annual Average	2.29%
Federal Reserve Bank of Philadelphia	
5-Year Annual Average	2.40%
10-Year Annual Average	2.30%
Federal Reserve Bank of Cleveland	
10-Year Expectation	1.60%
20-Year Expectation	1.82%
30-Year Expectation	2.00%
Federal Reserve Bank of St. Louis	
10-Year Breakeven Inflation	2.34%
20-Year Breakeven Inflation	2.43%
30-Year Breakeven Inflation	2.29%
U.S. Department of the Treasury	
10-Year Breakeven Inflation	2.36%
20-Year Breakeven Inflation	2.39%
30-Year Breakeven Inflation	2.41%
50-Year Breakeven Inflation	2.45%
100-Year Breakeven Inflation	2.48%
Social Security Trustees	
Ultimate Intermediate Assumption	2.40%

Wage Inflation for WRS

Period	Wage Inflation
Last 3 Years	2.7%
Last 5 Years	2.2%
Last 10 Years	2.0%
Last 15 Years	2.3%
Last 20 Years	2.5%

Inflation for WRS

Price Inflation

- Long-term averages approach 4%, short-term closer to 2%
- Investment consulting firm's expectations average 2.2%
- SWIB consultant (NEPC) forecasts 2.3%
- 2021 annual report of the Social Security Trustees uses 2.4% as the intermediate assumption
- Reasonable range is between 2.0% and 2.5%
- Recommend lowering price inflation from 2.5% to 2.4%
- No direct impact on liabilities

Inflation for WRS

Wage Inflation

- Long term averages result in spread over Price inflation of 0.5% to 1.5%
- Average Salaries for WRS have increased approximately 2.7% for the last 3 years and 2.5% over the last 20 years - statistic may be distorted by growth in population and other factors
- Given this, and current 60 basis spread between price and wage inflation, we recommend no change to the wage inflation assumption

Investment Return

Capital Markets

- GRS does not provide investment advice
- GRS maintains a database of capital market assumptions from twelve different investment firms
- GRS uses the capital market assumptions to estimate the return that each firm would expect the client's portfolio to produce
  - The intention is to avoid giving undue weight to the expectation of any particular consulting firm

Investment Return

Capital Markets

- Actuarial expected return may differ from Investment Firm's
  - Differences in time horizon (10 to 30 years)
  - Actuaries generally not allowed to include alpha
    - Assume that an active investment management strategy will produce superior investment performance compared to a passive management strategy
  - Actuaries are allowed to include margin for adverse deviation

Investment Return

Capital Markets

- Actuarial expected return may differ from Investment Firm's
  - Mapping Error – some asset classes may be difficult to map
  - Inflation – tend to vary by investment firm
  - Purpose of Measurement – may be different for actuary (measuring liability) versus investment managers (benchmark)
  - Current Year Expectation – year to year forecasts can vary by 50 to 100 basis points/year, actuary may want to apply smoothing to forecasts

Investment Firms/Institutions Surveyed

- Aon Hewitt
- Blackrock
- Bank of New York Mellon
- Callan
- Cambridge
- JP Morgan
- Meketa
- Mercer
- NEPC
- RVK
- Verus
- Wilshire

SWIB Target Core Asset Allocation

Asset Class	*Asset Allocation*
Global Equities	52.00%
Fixed Income	25.00%
Inflation Sensitive Assets	19.00%
Real Estate	7.00%
Private Equity/Debt	12.00%
Cash Equivalents	-15.00%
Total	100.00%

SWIB investment policy considers liquidity risk

Investment Return (Arithmetic Expectation)

GRS 2021 CMAM								
Capital Market Assumption Set (CMA)	CMA Expected Nominal Return	CMA Inflation Assumption	Expected Real Return (2)–(3)	Actuary Inflation Assumption	Expected Nominal Return (4)+(5)	Plan Incurred Administrative Expenses	Expected Nominal Return Net of Expenses (6)-(7)	Standard Deviation of Expected Return (1-Year)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	6.16%	2.15%	4.01%	2.40%	6.41%	0.05%	6.36%	13.82%
2	6.33%	2.21%	4.12%	2.40%	6.52%	0.05%	6.47%	14.42%
3	6.18%	2.00%	4.18%	2.40%	6.58%	0.05%	6.53%	12.86%
4	6.25%	2.01%	4.24%	2.40%	6.64%	0.05%	6.59%	12.53%
5	6.48%	2.00%	4.48%	2.40%	6.88%	0.05%	6.83%	13.72%
6	6.93%	2.34%	4.59%	2.40%	6.99%	0.05%	6.94%	14.44%
7	7.23%	2.40%	4.83%	2.40%	7.23%	0.05%	7.18%	14.15%
8	6.87%	2.00%	4.87%	2.40%	7.27%	0.05%	7.22%	14.29%
9	6.99%	2.01%	4.98%	2.40%	7.38%	0.05%	7.33%	14.27%
10	7.12%	2.11%	5.01%	2.40%	7.41%	0.05%	7.36%	13.74%
11	8.64%	3.10%	5.54%	2.40%	7.94%	0.05%	7.89%	15.65%
12	8.01%	1.92%	6.09%	2.40%	8.49%	0.05%	8.44%	13.93%
Average	**6.93%**	**2.19%**	**4.75%**	**2.40%**	**7.15%**	**0.05%**	**7.10%**	**13.99%**
					Average from last 3 CMAMs		**7.45%**	**13.71%**

Investment Return (Geometric Expectation)

GRS 2021 CMAM							
Capital Market Assumption Set (CMA)	Distribution of 10-Year Average Geometric Net Nominal Return			Probability of exceeding	Probability of exceeding	Probability of exceeding	Probability of exceeding
	40th	50th	60th	7.00%	6.75%	6.50%	6.25%
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	4.39%	5.47%	6.57%	36.28%	38.45%	40.65%	42.90%
2	4.37%	5.51%	6.65%	37.10%	39.19%	41.32%	43.48%
3	4.74%	5.76%	6.78%	37.96%	40.32%	42.72%	45.16%
4	4.88%	5.86%	6.86%	38.67%	41.11%	43.58%	46.09%
5	4.88%	5.96%	7.05%	40.48%	42.73%	45.02%	47.32%
6	4.85%	5.98%	7.13%	41.09%	43.24%	45.42%	47.62%
7	5.15%	6.26%	7.39%	43.37%	45.59%	47.84%	50.09%
8	5.15%	6.28%	7.41%	43.59%	45.79%	48.01%	50.25%
9	5.27%	6.39%	7.53%	44.60%	46.82%	49.05%	51.29%
10	5.41%	6.49%	7.59%	45.32%	47.63%	49.94%	52.27%
11	5.54%	6.77%	8.01%	48.13%	50.17%	52.22%	54.27%
12	6.46%	7.56%	8.67%	55.11%	57.39%	59.64%	61.88%
Average	**5.09%**	**6.19%**	**7.30%**	**42.64%**	**44.87%**	**47.12%**	**49.38%**
Average from last 3 CMAMs over 10-year horizon		**6.59%**					

Summary of Forward-Looking Geometric Returns -- WRS Portfolio

	GRS CMAM 2019 Survey	GRS CMAM 2020 Survey	GRS CMAM 2021 Survey	SWIB/ NEPC
10-Years	7.04%	6.54%	6.19%	5.40%
20-30 Years	8.11%	7.61%	7.26%	6.60%

- Based upon this data and the liability structure of the WRS, our preferred assumption would be at the 50% percentile of investment return over 10 years = 6.2% by our analysis and 5.4% per NEPC
- Other assumptions are also reasonable and a longer horizon can be considered
- To assist the Board with decision making, we have illustrated results ranging from 6.2% to 7.0% in 20 basis point increments on slide 61

Observations

- Although there are a wide range of opinions, the current assumption of 7.0% is significantly higher than NEPC's 10-year forecast and the results of our independent survey (CMAM)
- There is no universal method to setting this assumption, but generally based on future forecasts of investment experts (not historical averages)

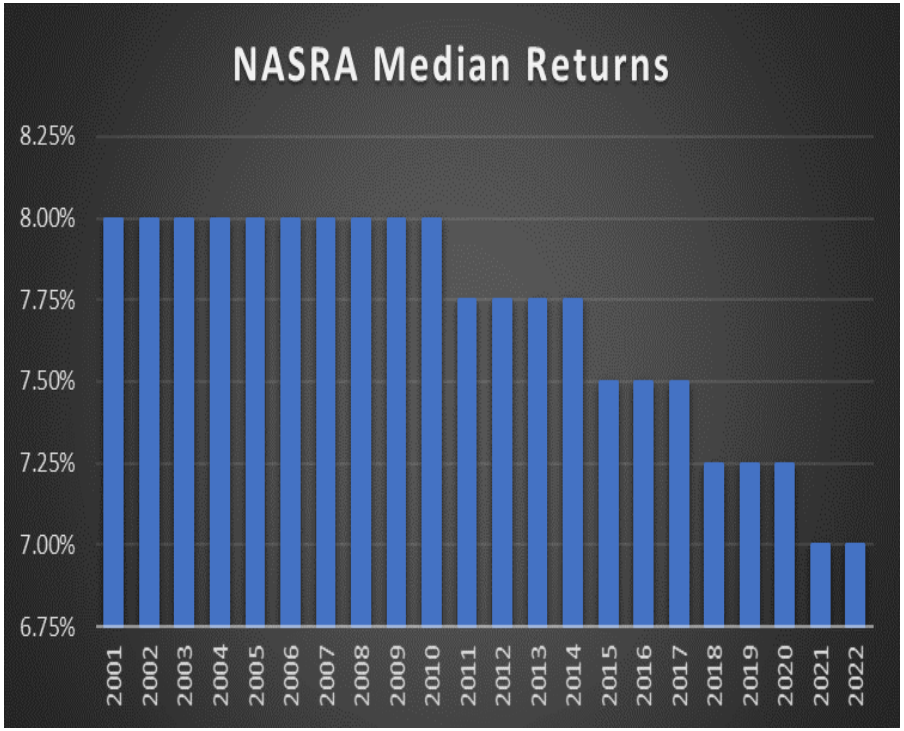
Observations

- There is no universal agreement on time horizon for this assumption, but generally between 10 and 20 years
  - Over half of liability is attributable to benefit payments being made in the next 10 years (what happens in next 10 years matters)
  - NEPC 10-year expectation of 5.4% implies years 11 through 30 would require return of ~ 8% to achieve 7% long term (puts a lot of pressure on future performance)
- Survey data is not an exact science (requires some judgement)
  - Based on average of averages
  - Does not take into account client specific strategies or knowledge
  - Due to potential for mapping error, more weight should be given to NEPC forecasts

National Trends

- Assumed rates of return are being reduced across the country
- NASRA study of public pension plan investment return assumptions
  - Median rate: 7.00%
  - Lowest rate: 5.25%
  - Highest rate: 8.00%

Change in Distribution of Public Pension Investment Return Assumptions, FY 01 to FY 22



Source: NASRA Issue Brief: Public Pension Plan Investment Return Assumptions, Updated November 2021

Recent Changes by Other Systems

Retirement System/Fund
- Mississippi PERS - 7.75% to 7.55%
- NY State Teachers - 7.10% to 6.95%
- Ohio PERS - 7.20% to 6.90%
- Maine PERS - 6.75% to 6.50%
- Arkansas State Highway - 8.00% to 7.50%
- New York State Common - 6.80% to 5.90%
- Maryland State - 7.40% to 6.80%
- Arizona State - 7.50% to 7.00%
- Oregon PERS - 7.20% to 6.90%
- Missouri Public Schools - 7.50% to 7.30%
- Ohio School Employees - 7.50% to 7.00%

Investment Return

Comments

- 7.0% assumption is currently near the upper end of the reasonable range
- Historically conservative, 7.0% is now closer to the median compared to peers (and trending downward)
- Most investment forecasts have decreased significantly over the last 3 years
- Many systems are using current gains to 'buy down' the interest rate assumption
- Consider reducing the investment return assumption from 7.0% to 6.6% or 6.2%

Investment Return Decrease – ETF Chart

Changing the assumed rate of return affects several WRS areas

Assumed Rate Decrease	Topic	Member Impact	Employer Impact	Plan Impact
↓	Initial recognition of gain/loss in Market Recognition Account (MRA)	N/A	N/A	Decrease ↓
↓	Present Value of Projected Benefit Payments	N/A	N/A	Increase ↑
↓	Plan Liability	N/A	N/A	Increase ↑
↓	Funded Status of Plan	N/A	N/A	Decrease ↓
↓	Required Contributions as % of Pay	Increase ↑	Increase ↑	N/A
↓	Cost to Purchase OGS Creditable Service	Increase ↑	N/A	N/A
↓	Cost to Purchase Prior Service	N/A	Increase ↑	N/A
↓	Interest Charged to Accounts Receivable	Decrease ↓	Decrease ↓	N/A

**Note: The opposite impact would occur if the assumed rate were to increase

Investment Return

Comments

- Changing the assumed return should not impact the asset allocation or what the fund will actually earn
  - Actuarial assumption is derived from current asset allocation (not vice-versa)
  - Reflects future expectation of current allocation
- Changing the assumed rate of return should not materially impact retiree dividends
  - Retiree Reserve is valued at 5%
  - Dividends are granted based on what is actually earned, not what the actuary assumes
  - However, may shift a portion of dividends into the future

Investment Return

Comments

- Changing the assumed rate of return should not materially impact retiree dividends (continued)
  - Timing will be slightly affected due to the operation of the MRA
  - Example: Impact of lowering return from 7.2% to 7.0%

Impact of Lowering assumed ROR by 20 basis points on MRA							
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7+
Current Year	-0.16	-0.16	-0.16	-0.16	-0.16	-0.16	-0.16
First Prior Year		0.04	0.04	0.04	0.04	0.04	0.04
Second Prior Year			0.04	0.04	0.04	0.04	0.04
Third Prior Year				0.04	0.04	0.04	0.04
Fouth Prior Year					0.04	0.04	0.04
Change in ROR/Dividend	-0.16	-0.12	-0.08	-0.04	0	0	0

Investment Return

Comments

- Example (continued)
  - For any given year, the dividend is reduced by 16 basis points, but each of the next four years will be increased by 4 basis points (net impact is zero)
  - Over time this shifts small amounts of dividend to future cohorts of retirees
  - The reverse is true when the assumed interest rate is increased

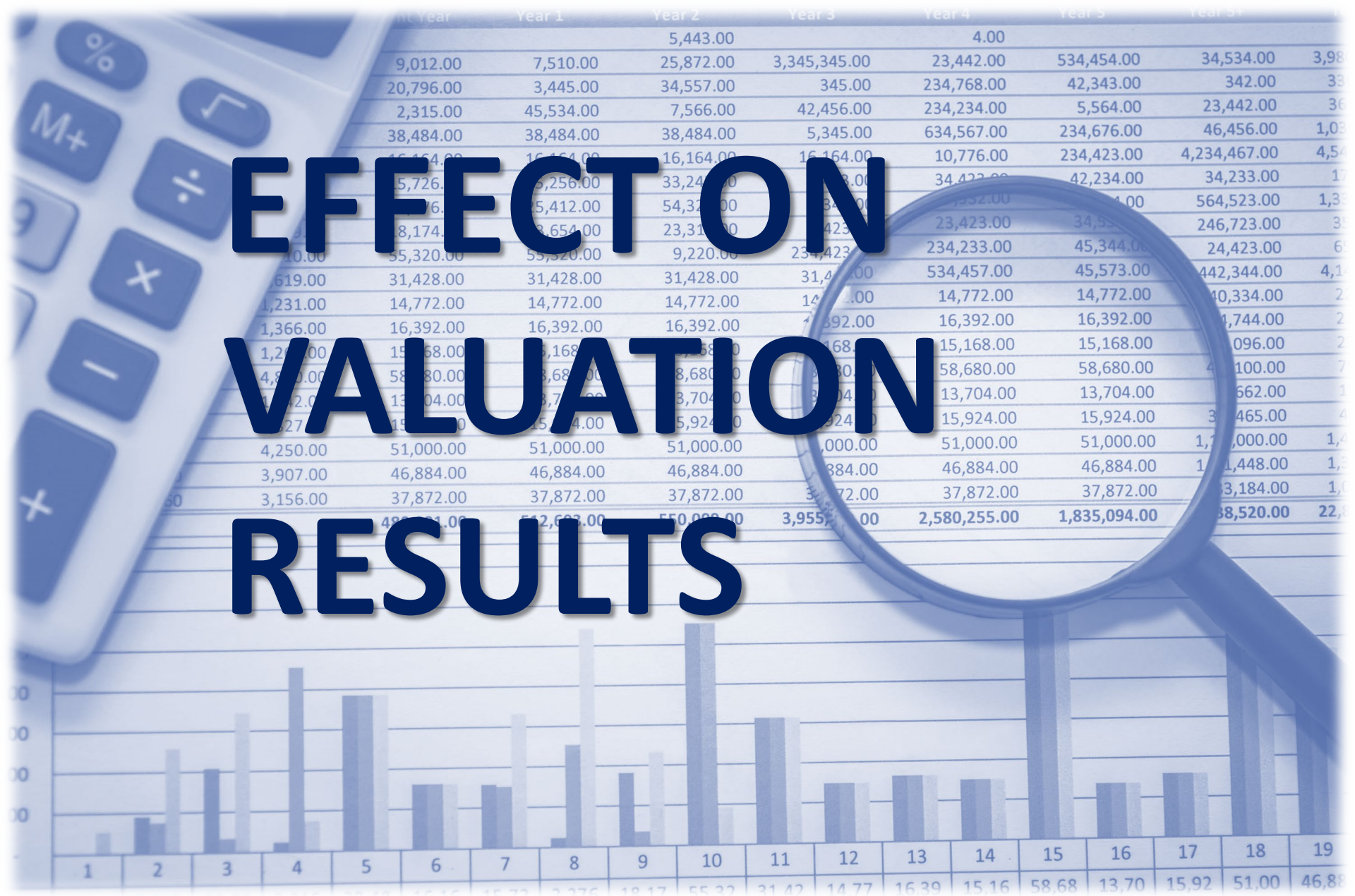
Investment Return

Comments

- Example (continued)
  - The same concept is true for the impact on employee contributions, however, the impact is much much smaller
    - Small portion of gains are pushed to future years
    - Portion of MRA impacting actives is small (retirees are approximately 65% of total liability)
    - Gains and losses for actives flow through to the EAR and amortized over 20 years

Summary of Economic Scenarios

Measure	Current Assumption	Reasonable Range	Recommended Assumption
Price Inflation	2.5%	2.0%-2.5%	2.4%
Wage Inflation	3.0%	2.7%-3.2%	3.0%
Investment Return	7.0%	5.4%-7.0%	6.2%-6.8%


EFFECT ON
VALUATION
RESULTS

Effect on Valuation Results

- Results include proposed:
  - Demographic assumptions
    - Withdrawal, retirement, disability and mortality rates
  - Economic assumptions
    - Investment return
- Results incorporate estimated impact of asset gains in the Market Recognition Account (MRA) for 2021 (see “Baseline – No Changes”)
- Participant data at 12/31/2020 was used for calculating liabilities, without adjustment or roll forward

Effect on Valuation Results
Market Recognition Account (MRA) - $ Millions

	2020	2021	2022	2023	2024
Actual Investment Return	$ 15,868				
Assumed Investment Return	7,000				
Gain/(Loss) to be phased-in	8,868				
Phased-in recognition					
• Current year	$ 1,774	?	?	?	?
• First prior year	2,204	$ 1,774	?	?	?
• Second prior year	(2,049)	2,204	$ 1,774	?	?
• Third prior year	1,461	(2,049)	2,204	$ 1,774	?
• Fourth prior year	120	1,461	(2,049)	2,204	$ 1,774
Total recognized Gain/(Loss)	$ 3,510	$ 3,390	$ 1,929	$ 3,978	$ 1,774

2021-2024: Expect $11.1 billion in deferred asset *GAINS*
-- Shared by annuitants, actives and employers

Summary of Results – Active Lives Valuation

	12/31/2020 Actual Results	Hypothetical results as of 12/31/2021*					
		Baseline (no changes)	Demographic Changes Only	Alternate Economic 1	Alternate Economic 2	Alternate Economic 3	Alternate Economic 4
Price Inflation	2.50%	2.50%	2.50%	2.40%	2.40%	2.40%	2.40%
Wage Inflation	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
Investment Return	7.00%	7.00%	7.00%	6.80%	6.60%	6.40%	6.20%
General and Executive & Elected	**13.0%**	**12.4%**	**12.9%**	**13.4%**	**13.8%**	**14.3%**	**14.8%**
Protective With Social Security	**18.5%**	**17.7%**	**19.6%**	**20.3%**	**21.0%**	**21.7%**	**22.5%**
Protective Without Social Security	**22.9%**	**21.7%**	**23.7%**	**24.7%**	**25.8%**	**26.8%**	**27.8%**

*New assumptions would be first be used in the December 31, 2021 valuation which would first impact rates in 2023.

Implementation Schedule

- If the assumed investment return is changed from 7.0% to 6.x%, recommend development of the Market Recognition Account in the 2021 valuations using a 7.0% rate, since the new 6.x% rate is not effective until 12/31/2021
- Said another way, the fund expected:
  - 7.0% investment return during the period 1/1/2021 through 12/31/2021, and
  - 6.x% investment return during the period 1/1/2022 through 12/31/2022 (and forward)
- This is the traditional asset smoothing approach used by actuaries when changing the investment return assumption
  - As always, liabilities as of 12/31/2021 will be valued at 6.x%

Implementation Schedule

- We recommend that the assumption changes be effective for the December 31, 2021 and following valuation EXCEPT for those changes that directly impact plan participants.
  - Various factors used in benefit administration.
- We recommend that changes affecting plan participants be effective January 1, 2023 in order to allow time for communication and for staff to update computer systems.

Other Audit Recommendations

- Actuarial audits recommended the following:

Recommendation	Considered?	Changed?
Withdrawal decrement 10-year period	Yes	No
Withdrawal assumptions to fit particular groups	Yes	No
Analyze combined disability experience for Public School, University and Executive & Elected members	Yes	No
Review male & female retirement experience separately for Protective & Executive & Elected groups	Yes	No
Separate decrement assumptions for State vs. Non-State employees	Yes	Yes
Review miscellaneous & technical assumptions every so often	Yes	Yes
Change Market Recognition Account implementation	Yes	Yes

Disclaimers

- This presentation is intended to be used in conjunction with the 2018-2020 Experience Study report issued on November 12, 2021. This presentation should not be relied on for any purpose other than the purpose described in the valuation report.
- This presentation shall not be construed to provide tax advice, legal advice or investment advice.
- If you need additional information in order to make an informed decision, please contact the authors.