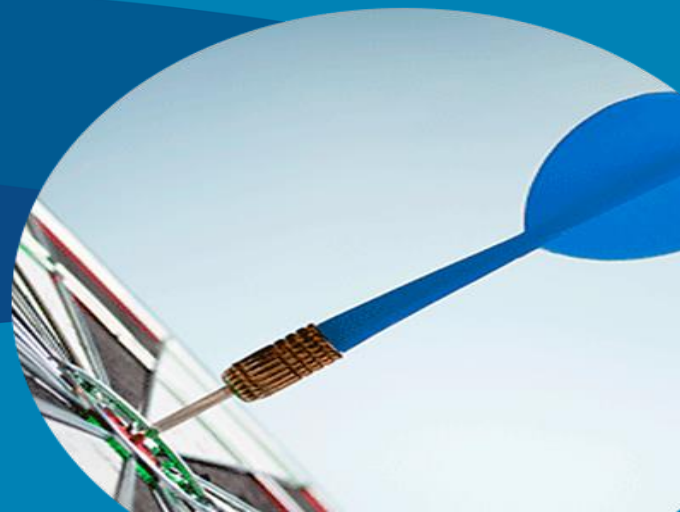


Kentucky Retirement Systems

Summary of 2018 Experience Study
April 22, 2019

Danny White, FSA, EA, MAAA



Recent KRS Board Actions

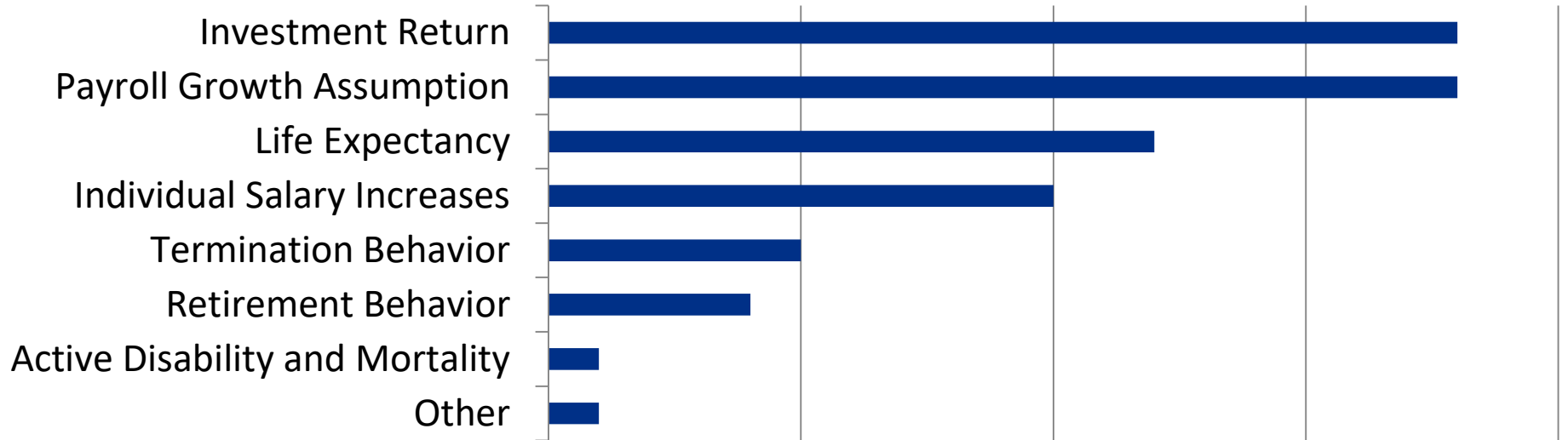
- GRS conducted an experience study for the five-year period ending June 30, 2018
- KRS Board adopted the actuarial assumptions recommended by GRS as a result of that investigation
- These assumptions will be used to perform the 2019 actuarial valuation
 - Determines the contribution for fiscal years 2020/2021 and 2021/2022 for KERS and SPRS
 - Determines the contribution for fiscal year 2020/2021 for CERS

Importance of Experience Study

- Assumptions are not static; they should occasionally change to reflect
 - New information
 - Mortality improvement
 - Changing patterns of retirements, terminations, etc.
 - Changing knowledge
 - Changes in best practices
- Recent experience provides strong guidance for some assumptions (for example, mortality) and weak guidance for others (for example, the investment return rate)

Magnitude of Actuarial Assumptions

Importance in Determination of Contribution Rates



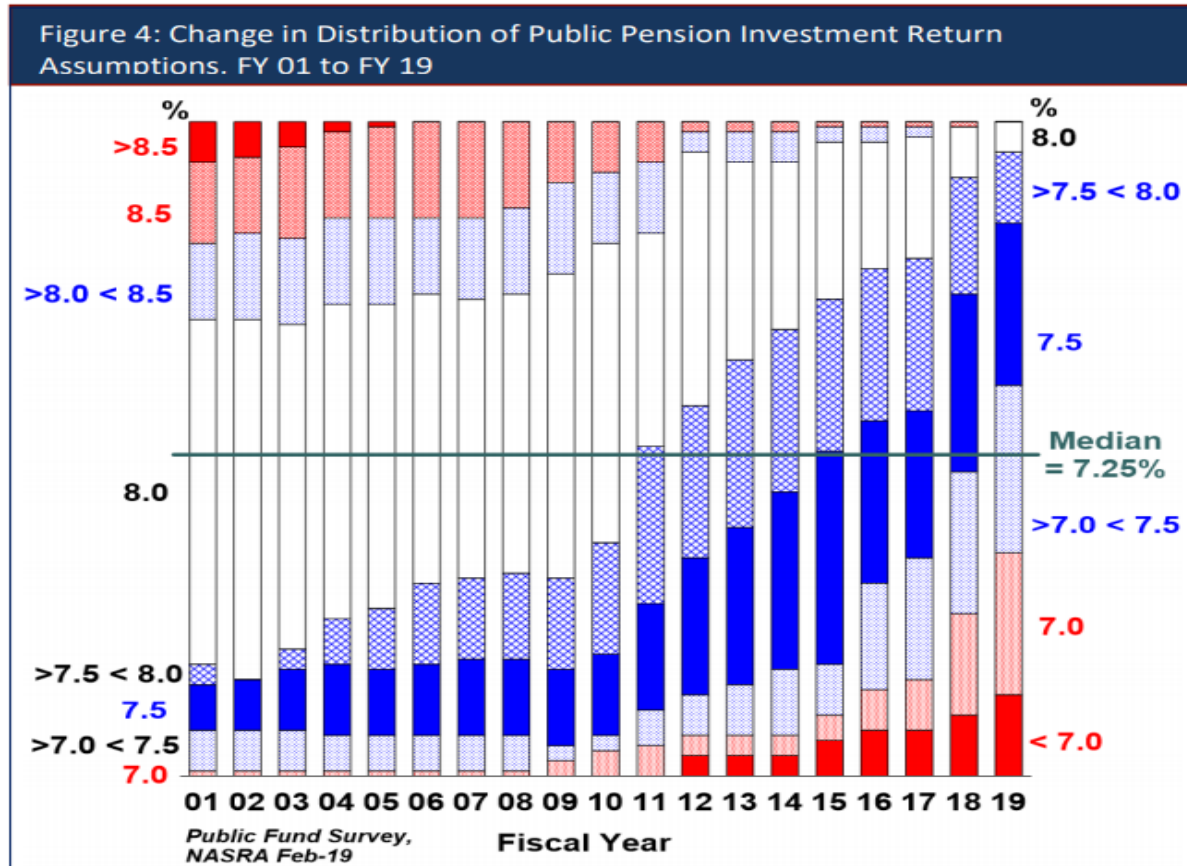
Principle Assumptions reviewed

- Economic
 - Price inflation
 - Investment return
 - Individual salary increase
 - Payroll growth
- Demographic
 - Mortality
 - Non-Disabled Retirees
 - Pre-Retirement,
 - Disability Retirees,
 - Turnover
 - Disability incidence
 - Participation in the Retiree health insurance plan
 - Other

Summary of Recommendations to KRS

- **Material Recommendations:**
 - All Systems: Update mortality assumption include an explicit assumption for improvement in life expectancy
 - CERS Haz: Reduce rate of turnover before retirement
- **Other meaningful recommendations:**
 - Update expected salary increase assumption for individuals
 - Increase the rate of salary change for CERS Haz and SPRS, minor change for others
 - Increase rates of disability incidence for KERS and CERS (Non-Haz and Haz)
- Their were several other minor recommendations
- Full detail in the experience study report

Investment Return Assumption: National Trends

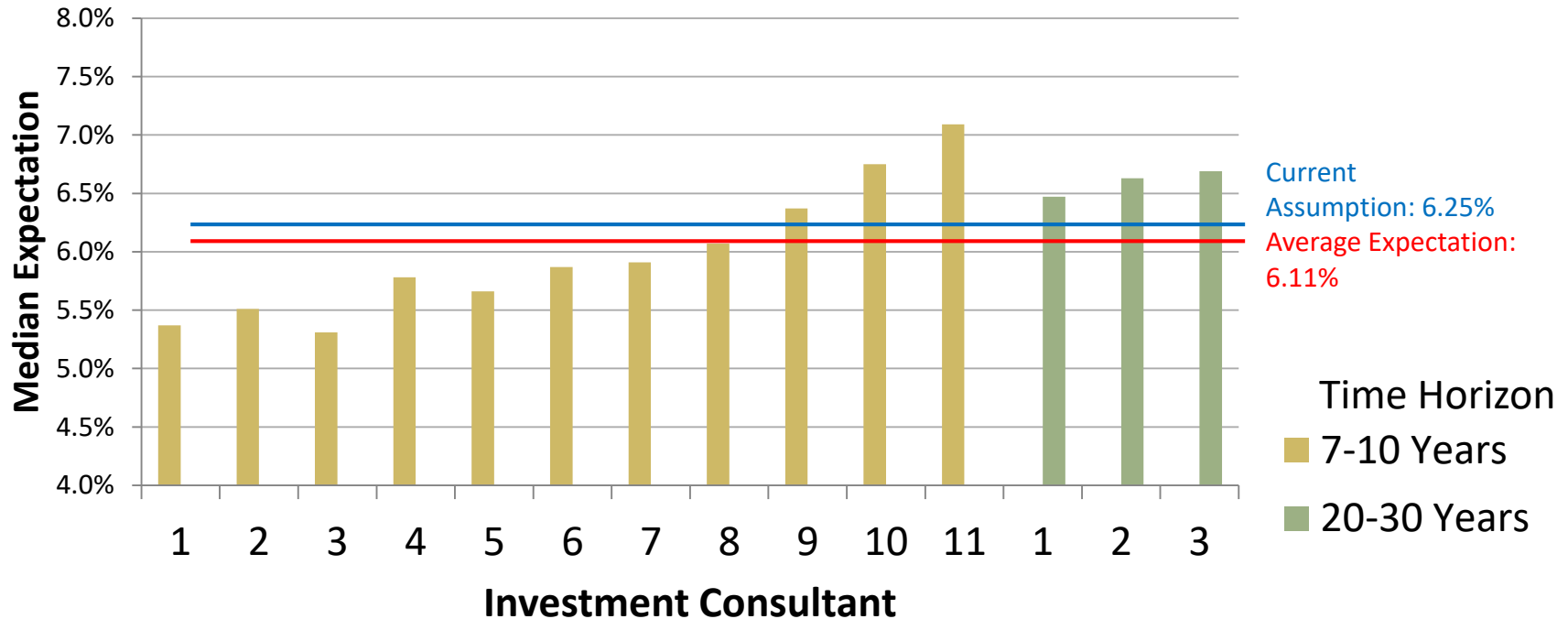


GRS Comment:
 “The median return assumption decreased from 7.46% to 7.25% from NASRA’s Survey in 2018 to 2019.”

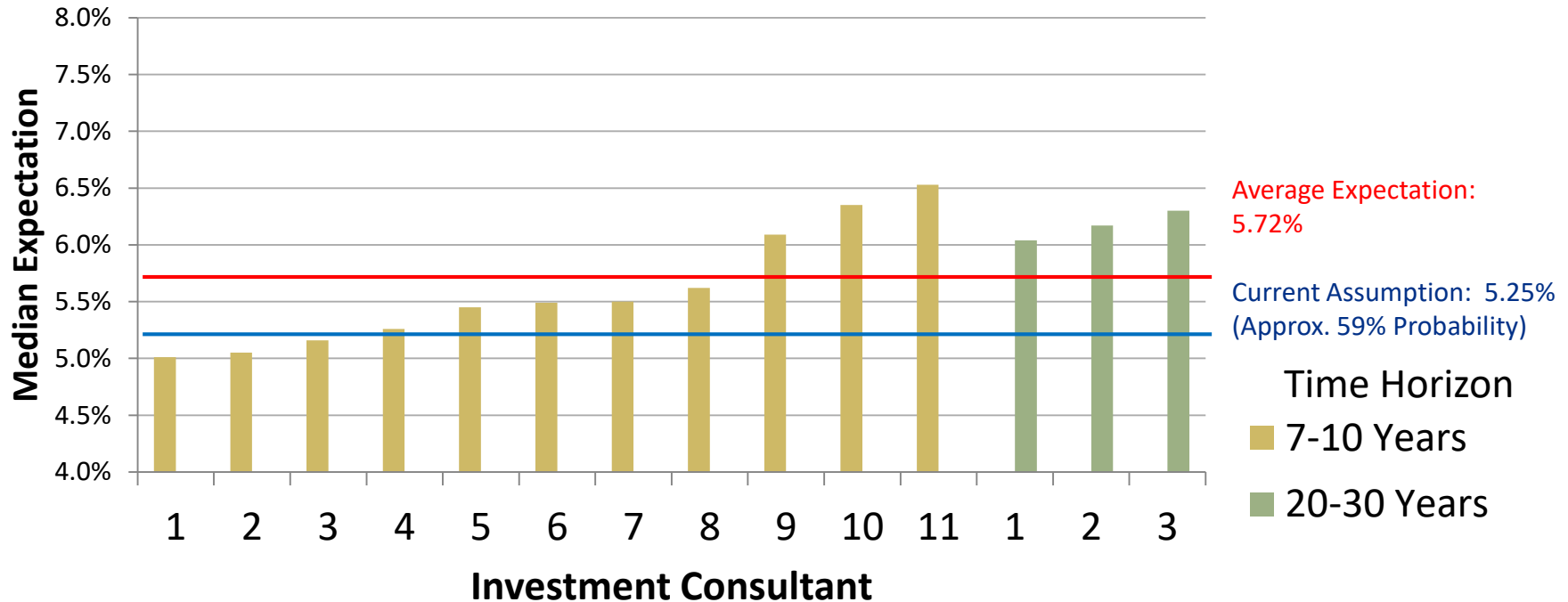
Investment Return Assumption

- Used to discount future benefit payments to determine liabilities
- Currently 6.25% for KERS Haz, CERS, and all health plans
 - Wilshire’s June 7, 2018 Board Materials: “Current allocation has an approximate 50% likelihood of achieving the 6.25%”
- Currently 5.25% for KERS Non-Haz and SPRS
 - Wilshire’s June 7, 2018 Board Materials: “Current allocation has an approximate 60% likelihood of achieving the 5.25%”

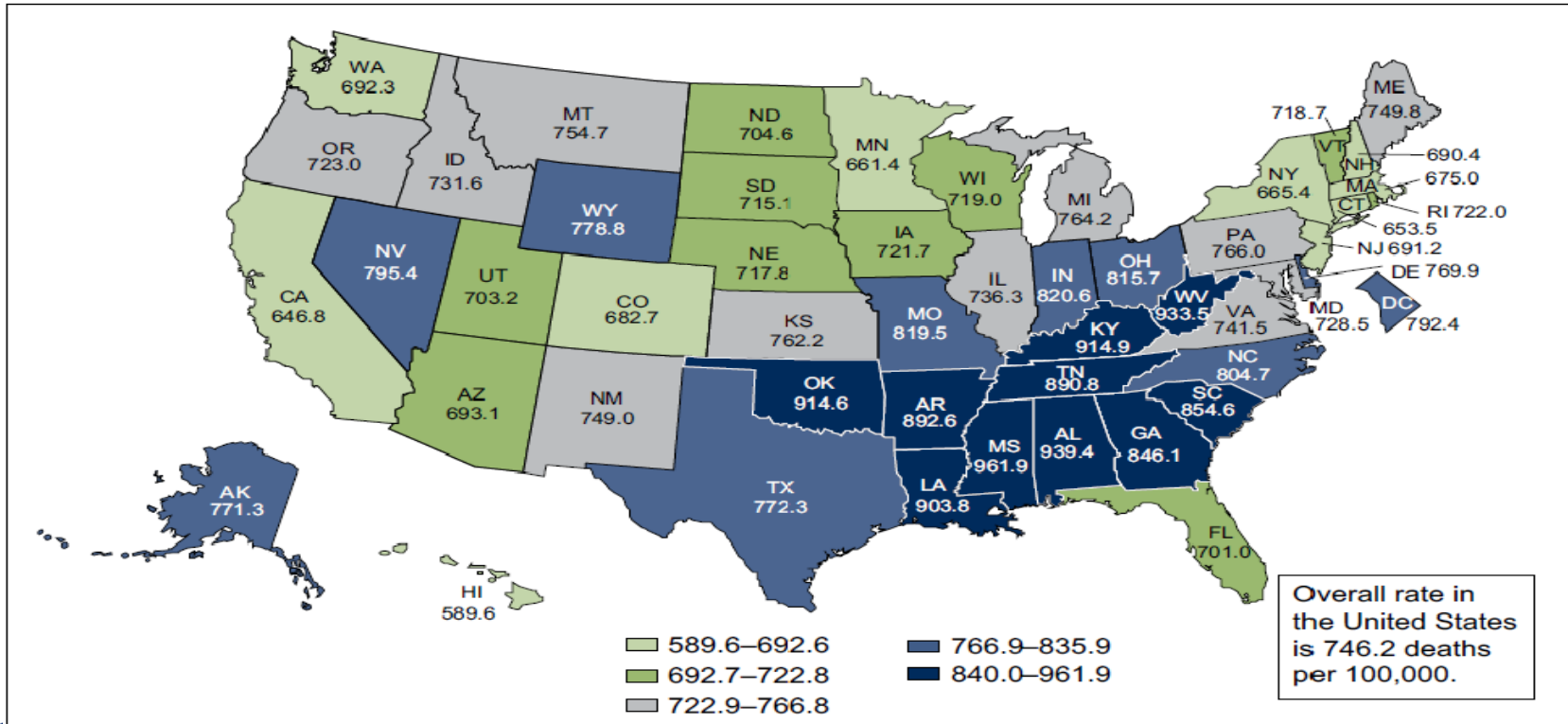
GRS Survey: Distribution of Forward-Looking Returns Expectations: CERS, KERS Haz, and Insurance Plans



GRS Survey: Distribution of Forward-Looking Returns Expectations: KERS Non-Haz and SPRS



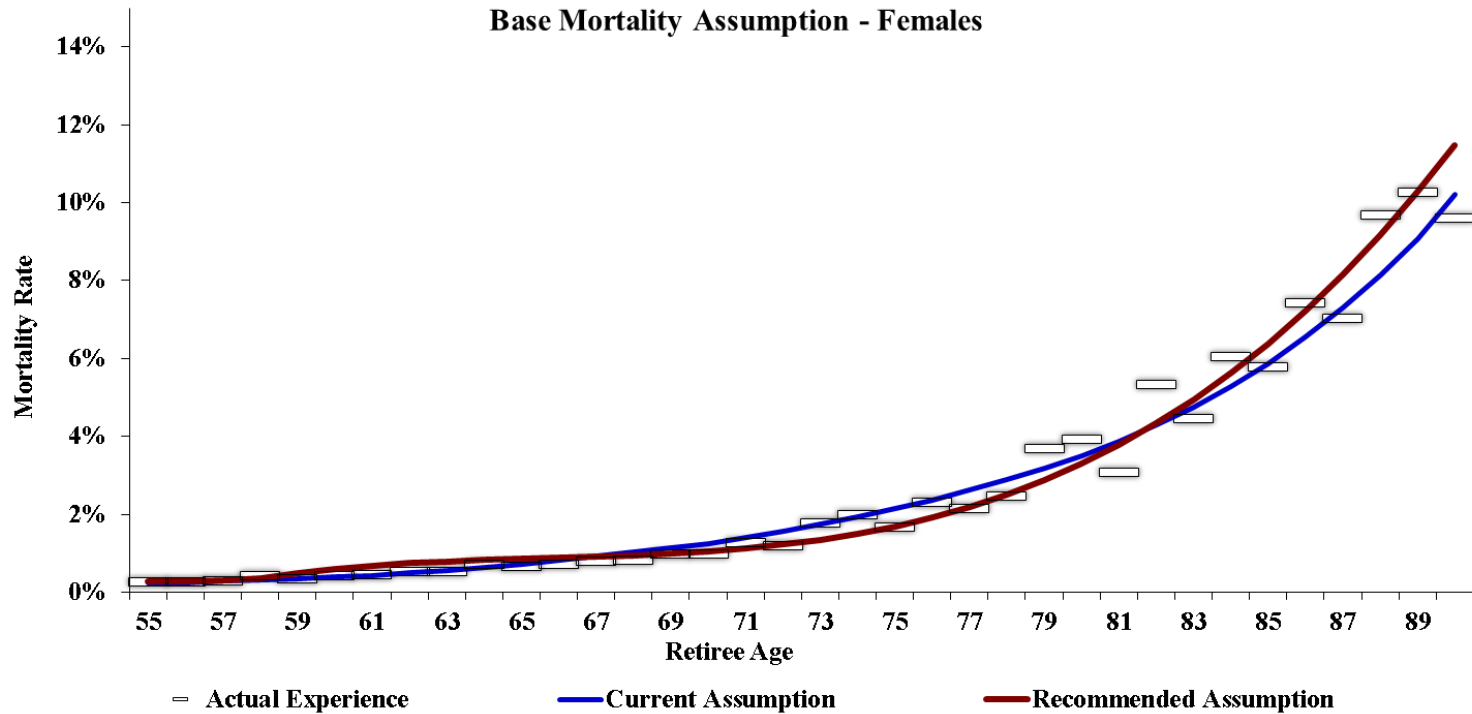
Mortality Rates by Geographic Location



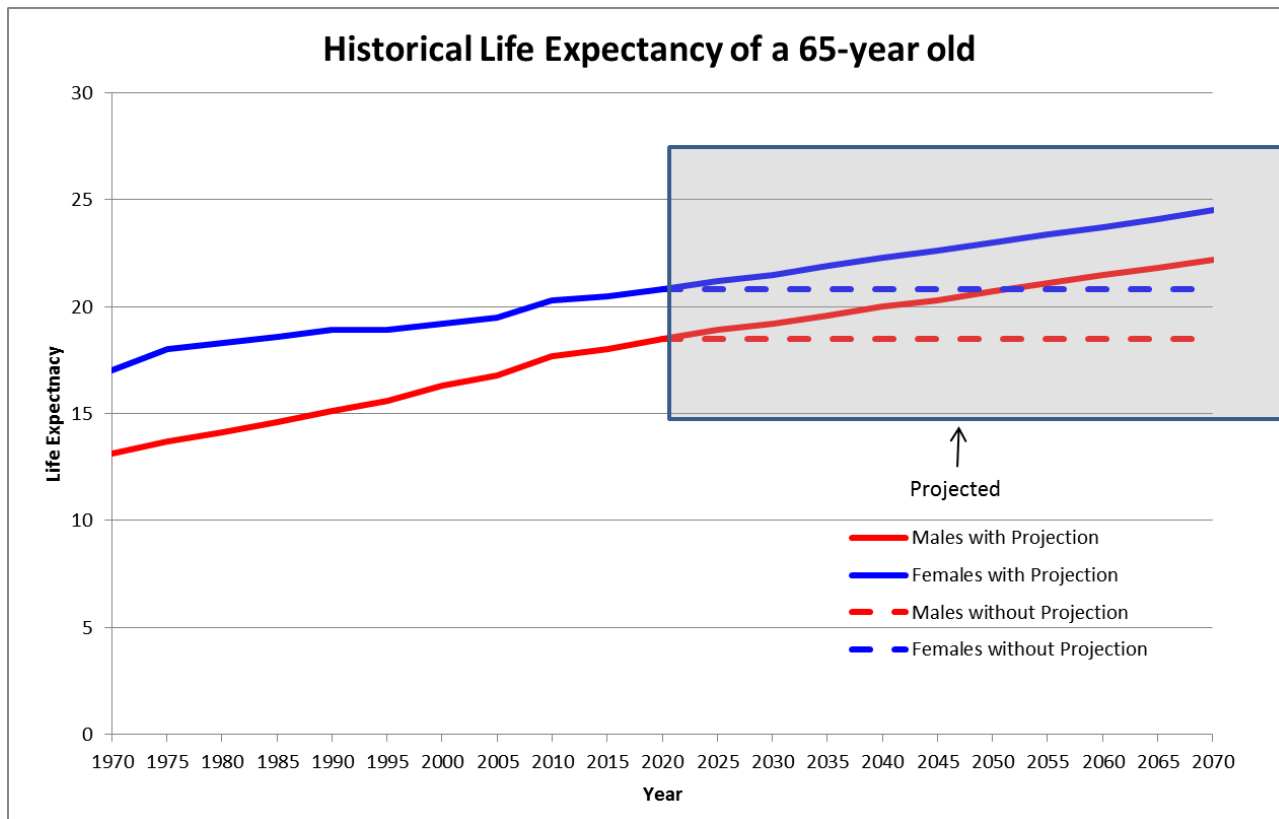
Post-Retirement Mortality

- Post-age 65 life expectancies continue to improve nationally
- The experience of a specific group will be correlated with the mix of job classification, geographic bias, economic status, and disability provisions
- An actuary makes two considerations in recommending a mortality assumption:
 - Identify the current life expectancy (data dependent)
 - Make an assumption about the rate of improvement in life expectancy (anticipated trends)
- For current life expectancy, KRS has enough experience to provide full credibility to an analysis based on its own experience
 - Developed a custom base mortality table using KRS retiree experience

2019 Public Retirees of Kentucky Mortality Table



Historical and Projected Future Improvement – National Data

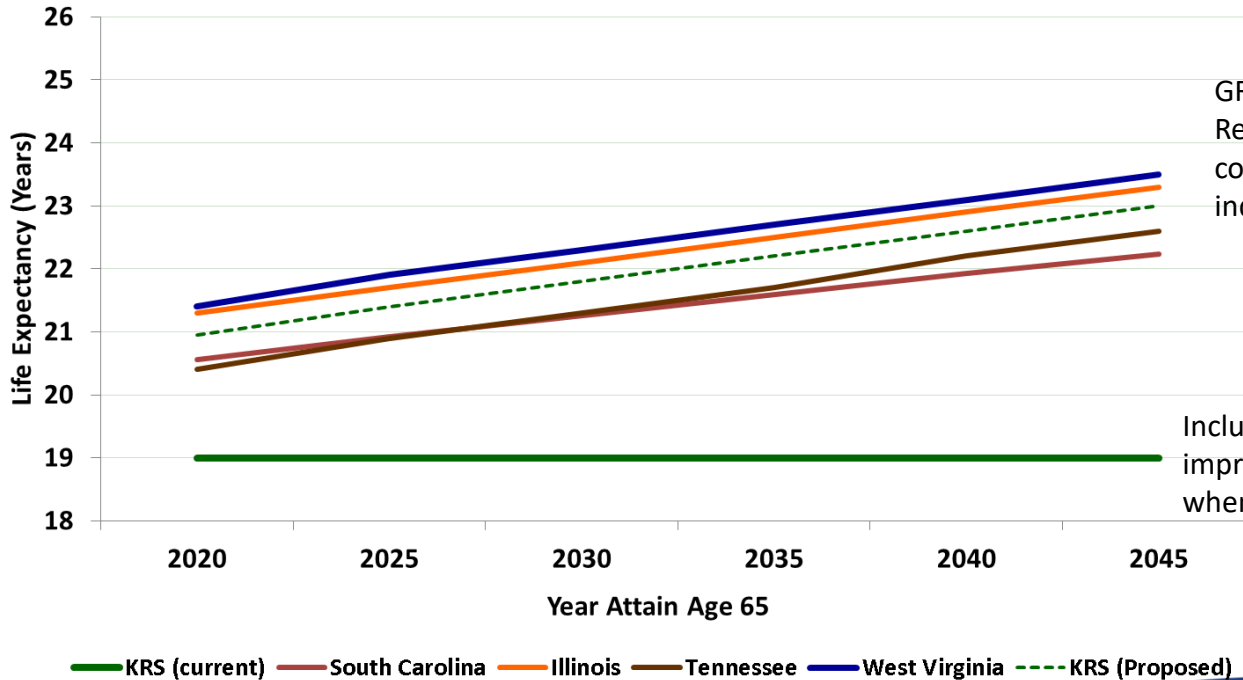


Source: historical data from social security reports.

Life Expectancy Assumption Peer Comparison

Life Expectancy Assumption for Males - from Age 65

Life Expectancy will be projected to improve into the future using the ultimate rates of the latest MP projection scales issued by the SOA.

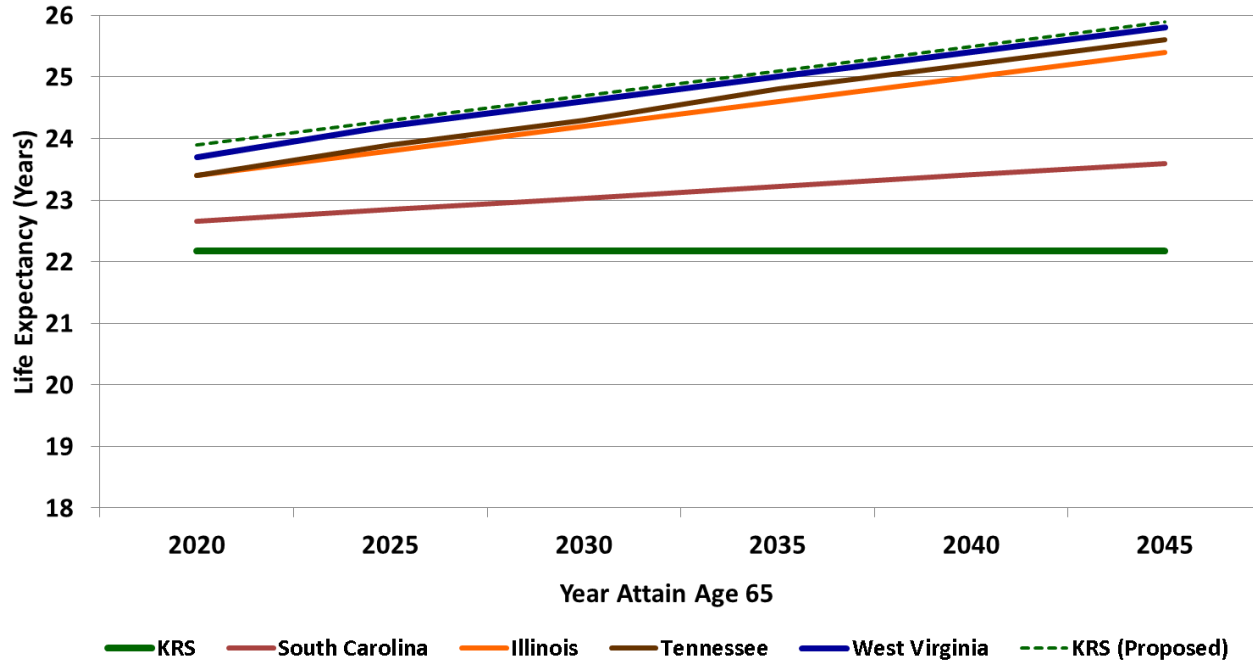


GRS Comment:
Recommended assumption is consistent with current industry practices.

Included some margin for improvement in life expectancy when recommended in 2014.

Life Expectancy Assumption Peer Comparison

Life Expectancy Assumption for Females - from Age 65

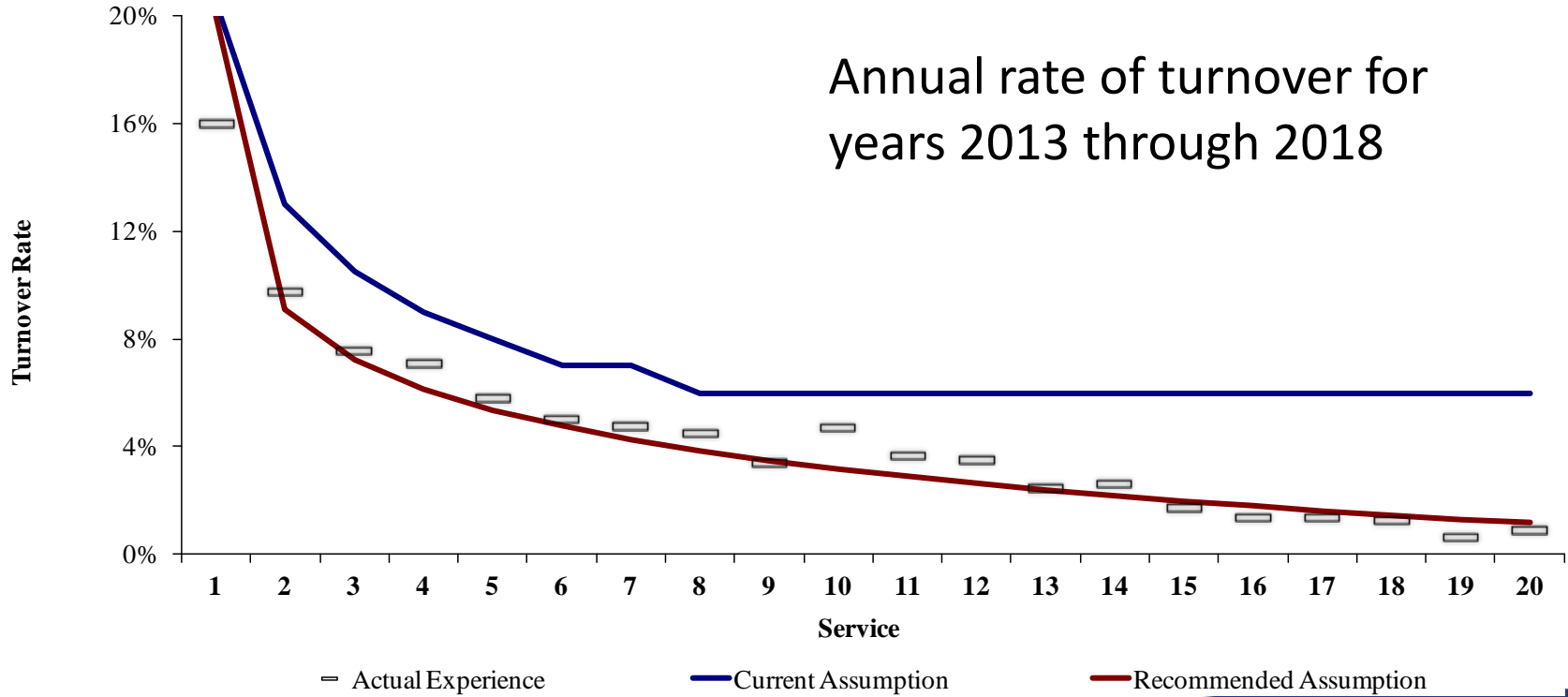


Summary of Mortality Recommendations

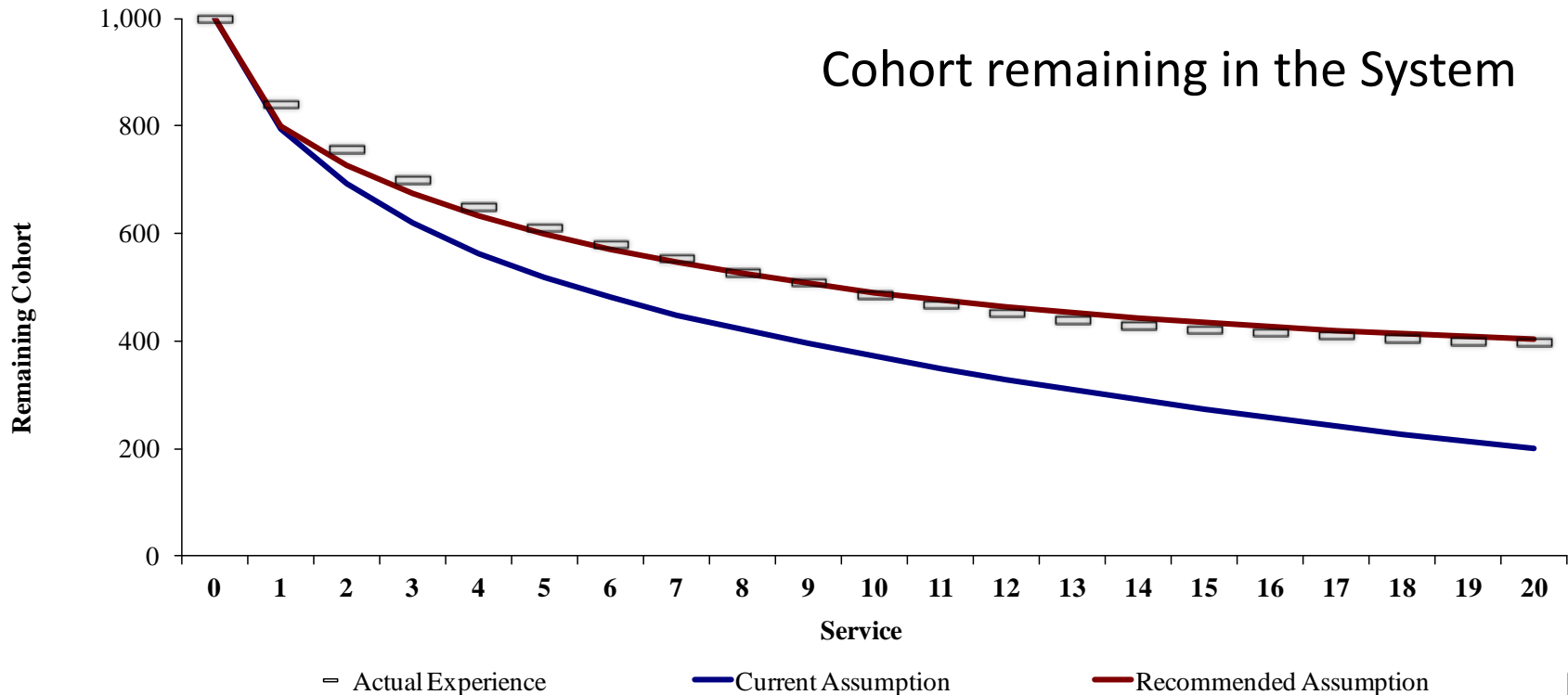
- Recommendation base mortality for Healthy Retirees: 2019 Public Retirees of Kentucky Mortality Table with improvement assumption “MP-Ultimate” to project future improvement mortality (i.e. longer life expectancy).
 - Will increase the liability and contribution requirements of all plans
 - However, this change should substantially lower the probability of having a material change in this assumption in future years because mortality improvement is now explicitly built into the assumption.
- Updated mortality assumption for pre-retirement and disabled retirees using published mortality tables

Turnover Probabilities: CERS Hazardous

Annual rate of turnover for years 2013 through 2018



Turnover Probabilities: CERS Hazardous



Overall Payroll Growth Assumption

- Used for Determining Amortization Payments

	Current Assumption	Actual Average Annual Change	
		Payroll	Membership
KERS Non-Haz	0.00%	-2.20%	-3.09%
KERS Haz	0.00%	0.62%	-1.11%
CERS Non-Haz	2.00%	1.31%	-0.41%
CERS Haz	2.00%	1.19%	-0.93%
SPRS	0.00%	-0.87%	-1.13%

Last 10 Years of Experience.

Recommend legislation action to change from an payroll based contribution effort to a fixed allocation of amortization cost.

Fiscal Impact of Recommendations

Employer Contribution Requirement

	Contribution Rate (% of Covered Payroll)			Contribution Requirement (\$ in Millions)		
	Current	Recommended	Increase	Current	Recommended	Increase
KERS Non-Haz	85.2%	89.2%	4.0%	\$1,254	\$1,313	\$59
KERS Haz	34.4%	37.2%	2.8%	54	59	4
CERS Non-Haz ¹	27.3%	30.8%	3.5%	673	760	86
CERS Haz ¹	46.5%	57.6%	11.1%	248	307	59
SPRS	140.0%	153.0%	13.0%	68	75	6

¹ Without regard to 12% phase-in of contribution rates.

Impact of Recommendations

System	Pension		Insurance	
	Before Change	After Change	Before Change	After Change
KERS Non-Hazardous				
UAL	\$ 13,655,954	\$ 14,321,191	\$ 1,548,384	\$ 1,658,097
Funded Ratio	12.9%	12.4%	36.4%	34.9%
Employer Rate	74.5%	78.0%	10.7%	11.2%
KERS Hazardous				
UAL	\$ 512,661	\$ 559,986	\$ (117,960)	\$ (102,741)
Funded Ratio	55.5%	53.3%	130.0%	125.1%
Employer Rate	34.4%	37.2%	0.0%	0.0%
CERS Non-Hazardous				
UAL	\$ 6,241,280	\$ 6,902,382	\$ 721,194	\$ 882,018
Funded Ratio	52.7%	50.2%	76.7%	72.9%
Employer Rate	22.5%	25.4%	4.8%	5.4%
CERS Hazardous				
UAL	\$ 2,470,827	\$ 2,702,563	\$ 427,722	\$ 458,277
Funded Ratio	48.4%	46.2%	74.6%	73.3%
Employer Rate	37.0%	45.9%	9.5%	11.7%
SPRS				
UAL	\$ 721,269	\$ 761,380	\$ 74,553	\$ 79,973
Funded Ratio	27.1%	26.1%	71.6%	70.1%
Employer Rate	120.5%	131.7%	19.5%	21.3%

Note: Contribution rates shown for CERS are without regard to the phase-in provision.

Closing Comments

- The actual cost of a retirement system is based on the plan provisions and actual experience (investment and demographic), not the actuarial assumptions
 - The actuarial assumptions provide stakeholders the expect cost
- Summary of material assumption changes adopted by KRS
 - Post-retirement mortality now includes an explicit allowance for improvement in life expectancy
 - Decrease in the expected turnover rate for the CERS Hazardous System

Disclaimers

- This presentation is intended to be used in conjunction with the 2018 Actuarial Experience Study. This presentation should not be relied on for any purpose other than the purpose described in the report.
- Readers are cautioned to examine original source materials and to consult with subject matter experts before making decisions related to the subject matter of this presentation.
- This presentation shall not be construed to provide tax advice, legal advice or investment advice.