

Audit of Experience Study

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- Overview
- Economic Assumptions
- Demographic Assumptions
- Conclusions
- Appendix

Overview – Primary Conclusions



- **Assumptions proposed by Segal are reasonable**
- We matched the observed experience over the last three years within reasonable tolerances
 - Differences do not affect assumptions
- Observations on the report and the following assumptions
 - Inflation
 - Investment return
 - Retirement
 - Mortality
 - Disability



- Economic Assumptions
 - Independent analysis
 - Methodology differs from Segal
 - Confirms that Segal's assumptions fall within a reasonable range
- Demographic Assumptions
 - Independent analysis of three years of experience
 - Many assumptions based on six or nine years of experience
 - Supplemented data for analysis with actual decrement counts and exposures for prior periods provided by Segal



Economic Assumptions

Inflation

Investment Return

Cost-of-Living Increases

Wage Inflation

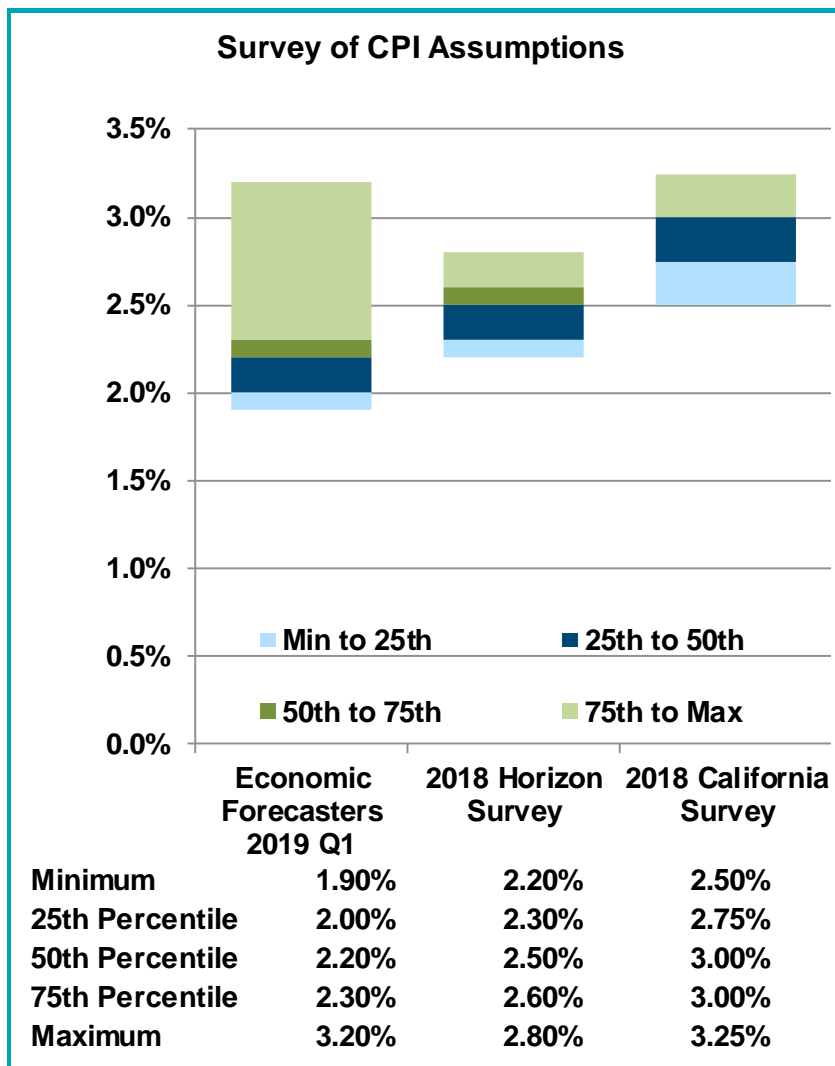
Merit Salary Increases

Active Member Payroll



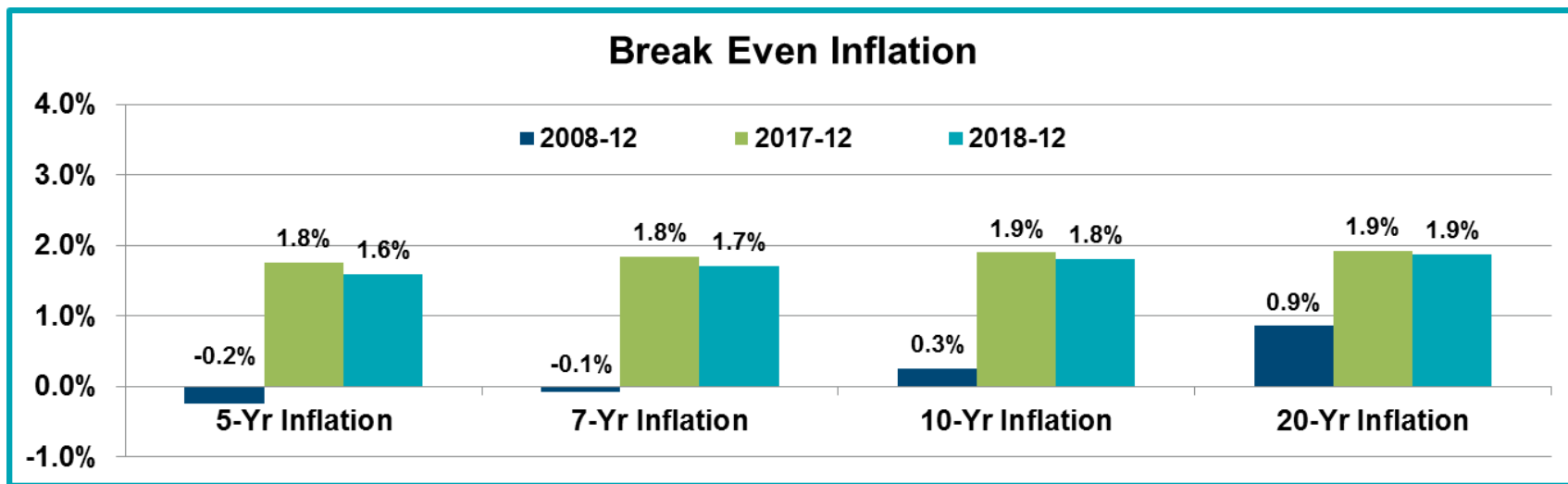
- Current assumption = 2.75%
- Segal proposed assumption = 2.75%
- Our independent analysis finds 2.75% to be at the high end of the reasonable range
- Segal cited the following data supporting a higher assumption
 - Moving historical averages
 - Assumptions used by other public plans

Price Inflation – Independent Analysis



- Federal Reserve informal target = 2.0%
- The Federal Reserve survey of professional economic forecasters shows 10-year forecasts
 - Range = 1.9% to 3.2%
 - Median = 2.2%
 - 75th percentile = 2.3%
- Horizon survey of over a 20-year forecasts
 - Range = 2.2% to 2.8%
 - Median = 2.5%
- California public pension plans
 - Range = 2.5% to 3.25%
 - Median = 3.0%

Price Inflation – Independent Analysis



- 20-year breakeven inflation (Yield on Treasury securities minus TIPS) is 1.9%
- Verus assumes 2.0% over 10 years and 1.8% over 30 years
- The current assumption of 2.75% is reasonable, but forward-looking market indicators are lower and most economic forecasts are lower

Investment Return



- 7.0% is current and Segal's proposed assumption
- Our independent analysis also supports 7.0%
- Represents approximately the 50th percentile expected return
- Could reduce assumption to 6.75% to increase likelihood of achieving the return (55% confidence)
 - If so, reduce the inflation assumption by 25 basis points, as well, to 2.5%

Expected Distribution of Average Annual Passive Returns Versus' Capital Market Assumptions

Percentile	Time Horizon	
	10 Years	30 Years
95th	12.52%	10.11%
75th	9.27%	8.26%
60th	7.89%	7.47%
55th	7.47%	7.23%
50th	7.06%	6.99%
45th	6.66%	6.76%
40th	6.25%	6.52%
25th	4.91%	5.74%
5th	1.88%	3.97%

Other Economic Assumptions



- Cost-of-Living Increases – Proposed assumptions are reasonable
- Wage Inflation – Proposed assumption is reasonable
- Merit Salary Increases – Proposed assumptions are reasonable
- Active member payroll growth – Proposed assumption is reasonable



Demographic Assumptions

Retirement
Mortality
Disability
Termination
Leave Cash Outs
Unused Sick Leave

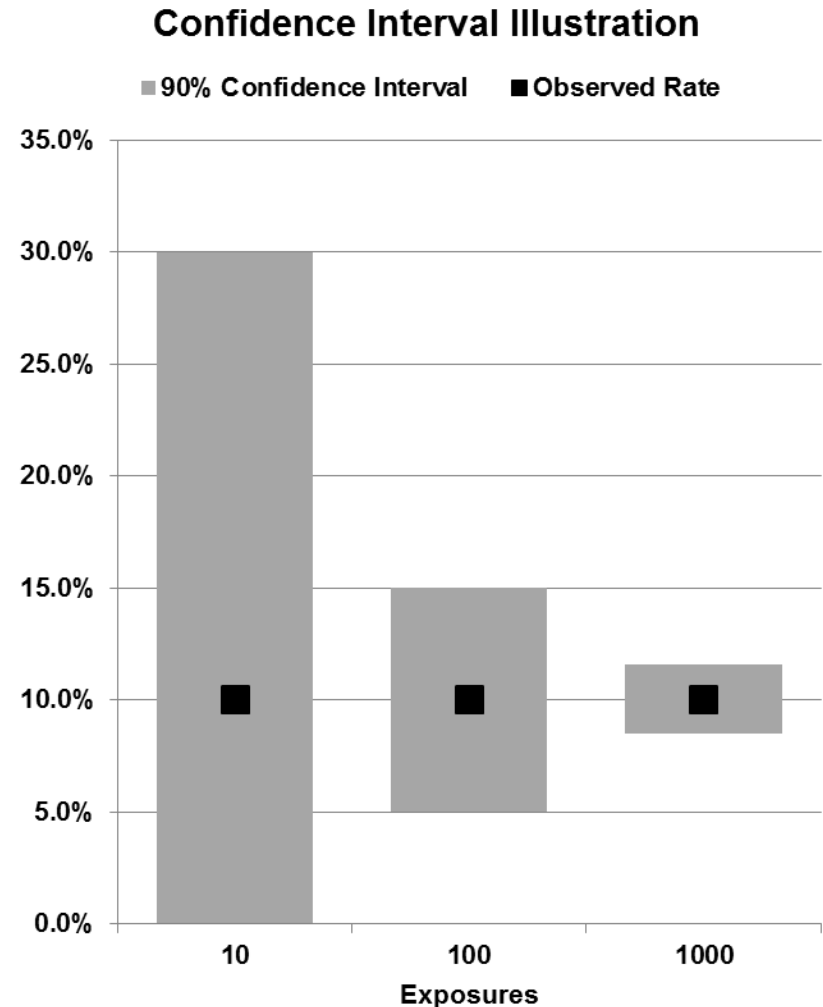


- For each assumption studied, Segal typically reports:
 - Actual rate observed
 - Current assumed rate
 - Proposed assumed rate
- Other key statistics should also be reported to better enable the reader to assess the assumptions
 - Actual decrements
 - Actual exposures
 - Actual-to-expected ratio (A/E ratio)

Assessing Assumptions



- The number of actual decrements and exposures is critical in determining how much credibility to assign to the experience
 - 1 actual decrement out of 10 exposures implies that the rate is somewhere between 0% and 30%
 - 100 actual decrements out of 1000 exposures implies that the rate is somewhere between 8.5% and 11.5%





- A/E Ratios provide an assessment of the assumption across all ages or years of service
- Ideal ratio is 1.0 and proposed changes should generally move the ratio closer to 1.0
- Segal provides this information for the mortality assumptions, but not for the other demographic assumptions
- For example, the A/E Ratio for the retirement assumption for General Tier 3 Enhanced members with 30 or more years of service improves from:
 - 1.12 under the current assumption, to
 - 1.00 under Segal's proposed assumption

Retirement Assumptions



- Segal separated retirement assumptions for the primary tiers into two service groups
 - Less than 30 years of service
 - 30 or more years of service
- Results in a significant improvement in assumptions
- Data suggests three service groups would be better
 - Less than 20 years of service
 - 20 to 29 years of service
 - 30 or more years of service
- Pattern based on service is relatively consistent across tiers for which there is sufficient data
 - Pattern is also likely to persist for smaller tiers that do not have sufficient experience data for a full analysis
 - Consider applying service groups to all tiers

Retirement – Service Groupings



Retirement Assumption – Current Actual-to-Expected Ratios

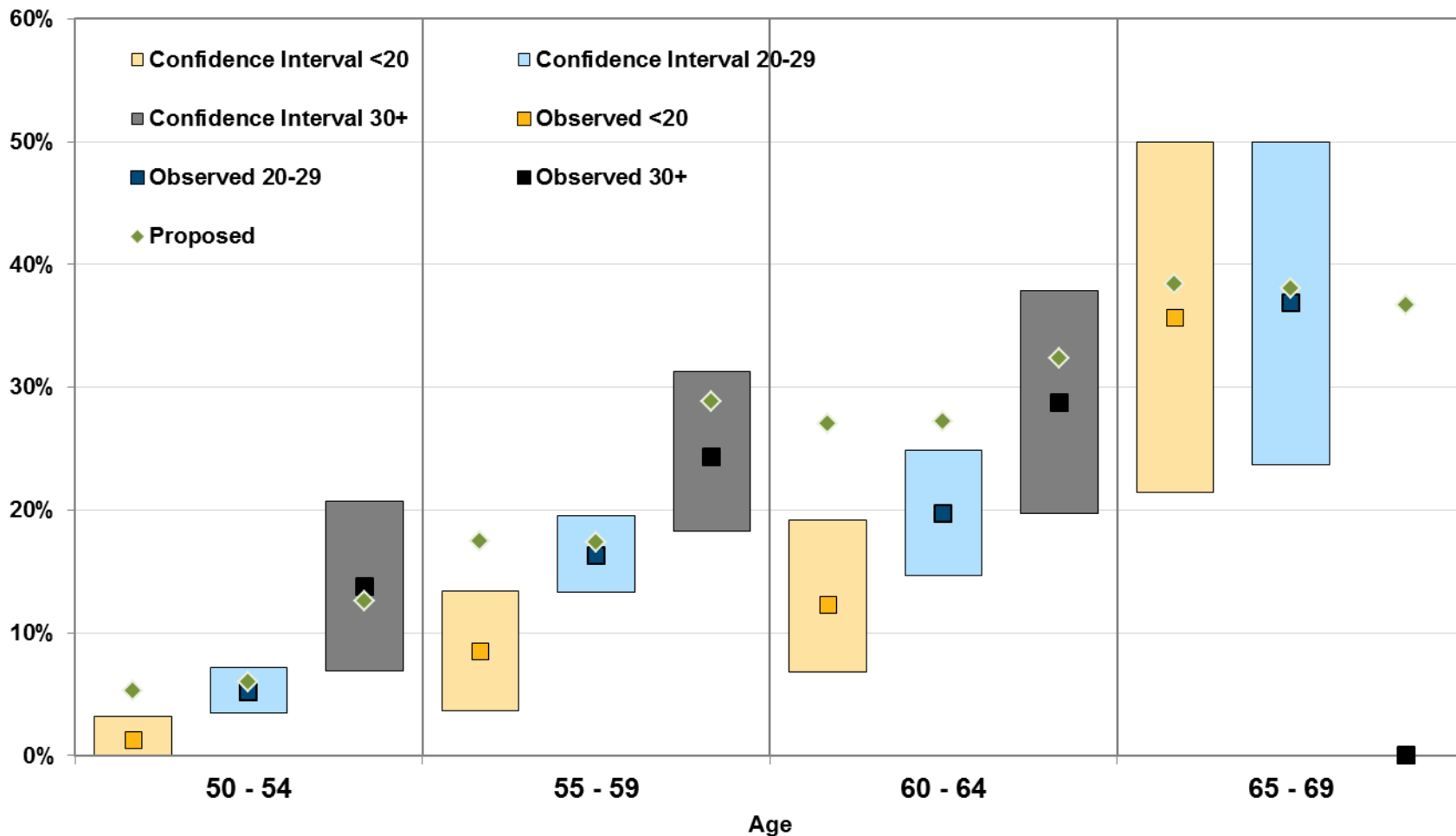
Service	General Tier 1 Enhanced	General Tier 3 Enhanced	Safety Tier A Enhanced
< 20	0.47	0.55	0.16
20 – 29	0.74	0.89	0.77
30 +	1.07	1.12	0.88

- There are three distinct service groupings for retirement rates
 - Members with less than 20 years of service have significantly lower rates of retirement
 - Members with more than 30 years of service have higher retirement rates
- Significance of difference between service groups varies by age and tier

General Tier 1 Enhanced Retirement Rates



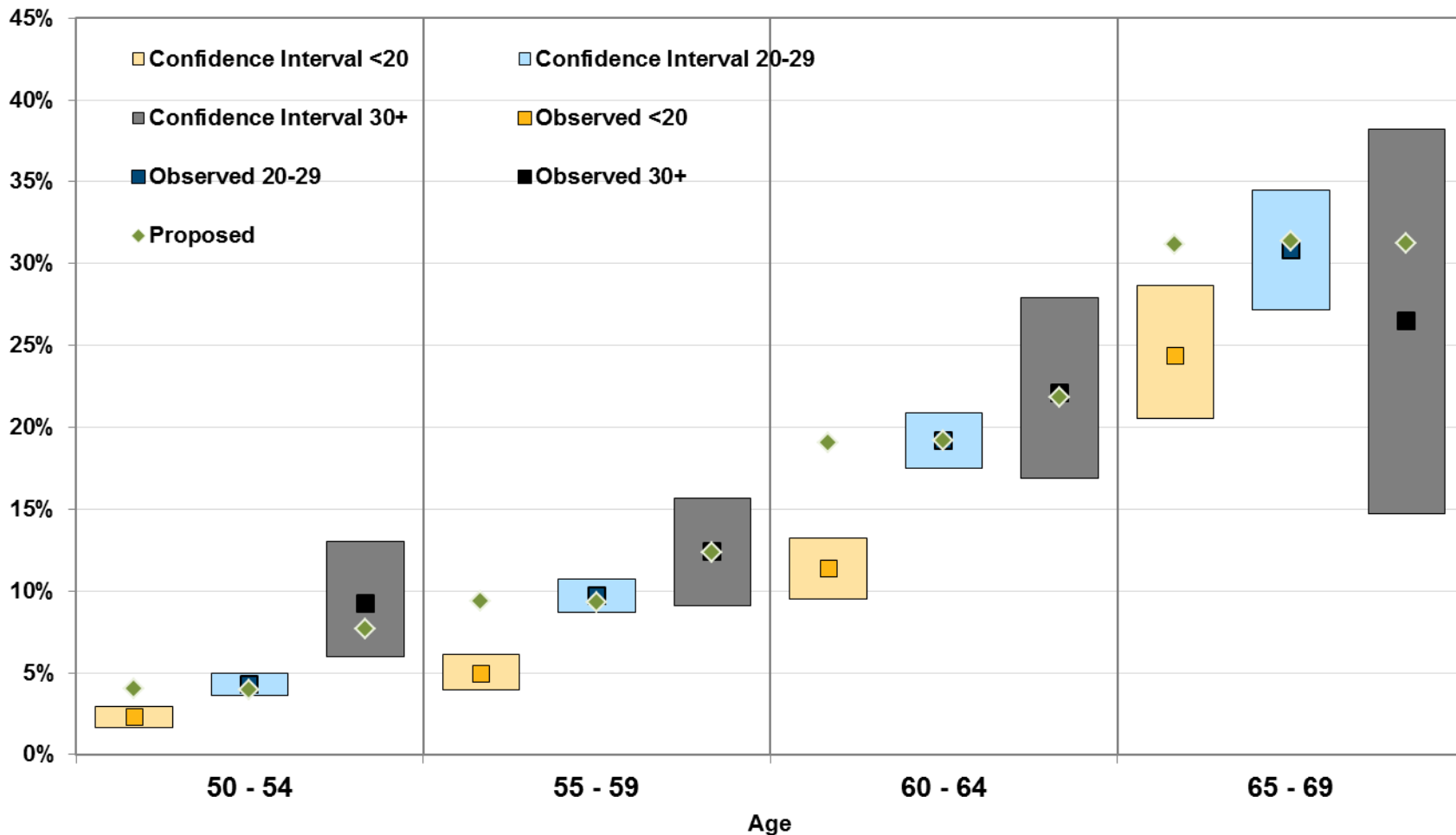
Service Retirement Rates - General Tier 1 Enhanced



General Tier 3 Enhanced Retirement Rates



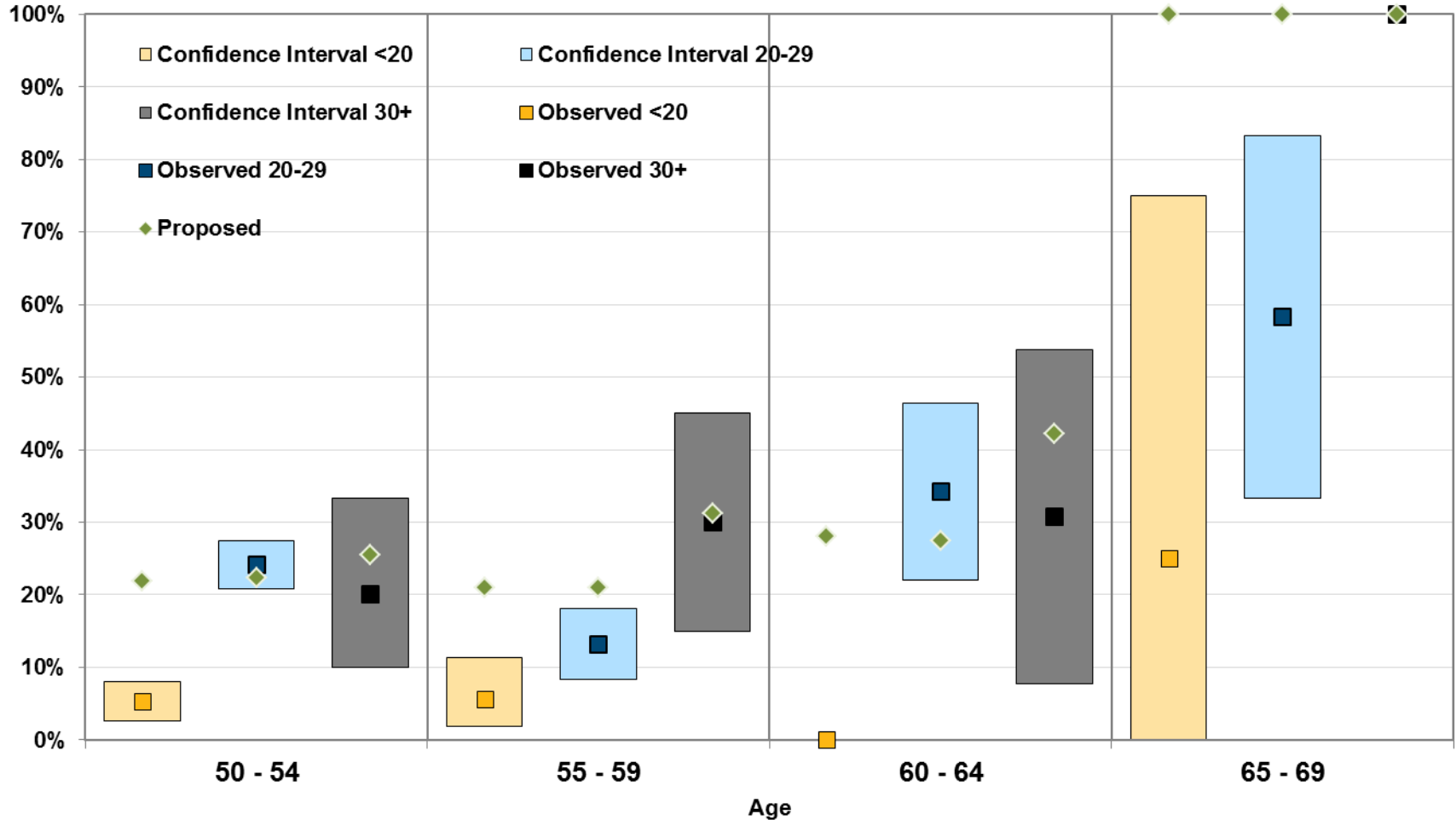
Service Retirement Rates - General Tier 3 Enhanced



Safety Tier A Enhanced Retirement Rates



Service Retirement Rates - Safety Tier A Enhanced





- Segal moved to a benefit-weighted analysis of mortality which is a best practice
- All of the base mortality table assumptions are reasonable
- The mortality projection scale is reasonable and applying it on a generational basis is a best practice

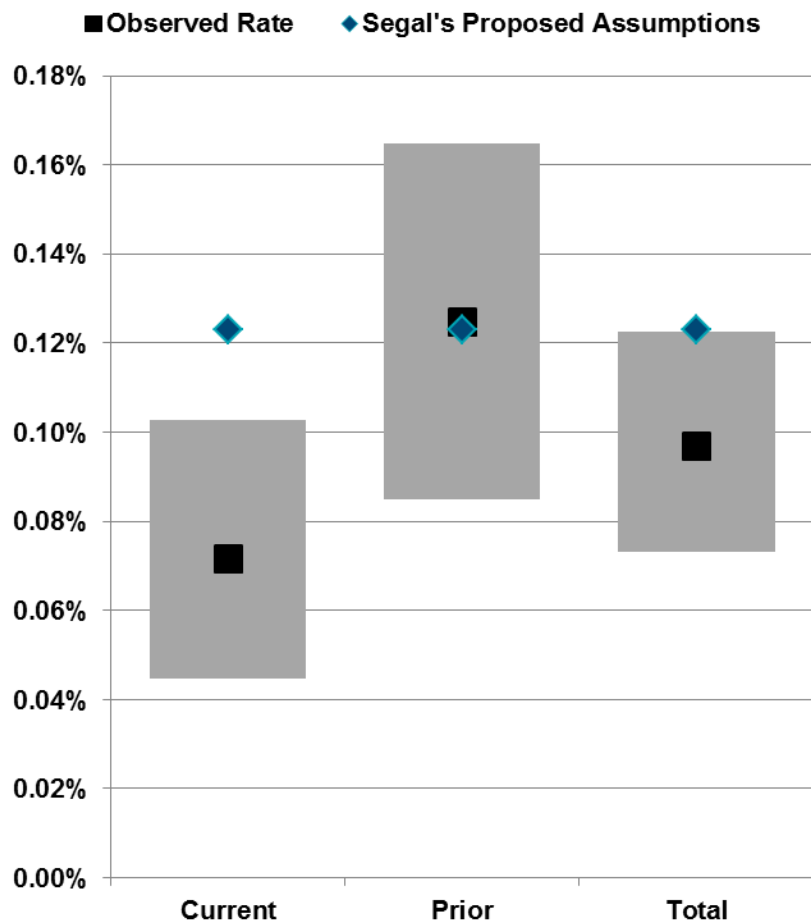


- Segal's analysis is based on 3 years of data
 - Only 55 disability retirements across all general and safety tiers during this period
 - Data shows significantly lower disability rates for General Tiers 3 and 5 and Safety than current or proposed assumptions
- Consider using 6 or more years of data instead of 3
 - Prior study data shows significantly higher disability rates than the current study
 - Combining more years of data provides a better indication of actual rates of disability unless there has been a change in the definition or administrative process for determining disabilities
 - May minimize the impact of timing delays with processing applications where actual disability retirements could be temporarily considered a service retirement or termination
- Segal's proposed assumptions are reasonable
 - Assumptions for General Tiers 3 and 5 are relatively high compared to the last 6 years of data, so the assumption should be monitored for potential reduction in the next experience study

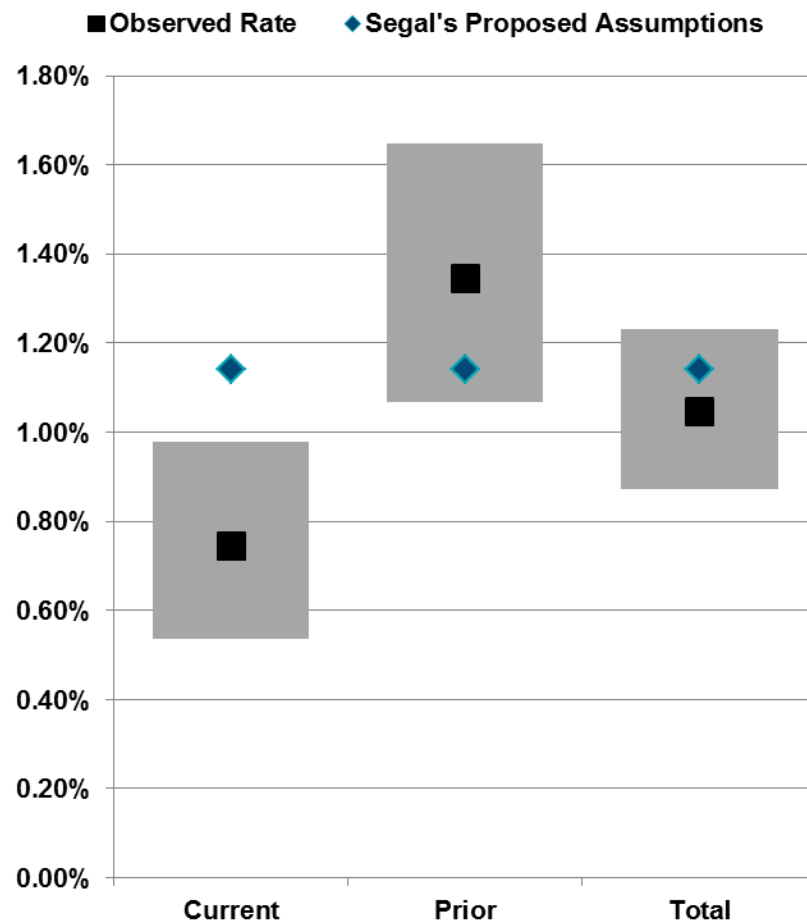
Disability Incidence



Disability Incidence - All Ages
General Tiers 3 and 5



Disability Incidence - All Ages
Safety





- Termination Rates – Proposed assumptions are reasonable
- Leave Cash Out – Proposed assumptions are reasonable
- Unused Sick Leave – Proposed assumptions are reasonable



Conclusions



Assumptions proposed by Segal are reasonable

Potential Considerations

- Reducing price inflation assumption
- Splitting retirement assumptions into 3 service groups
 - Less than 20 years of service
 - 20 to 29 years of service
 - 30 or more years of service
- Using at least 6 years of data for analysis of all demographic assumptions, especially for disability retirements
- For each demographic assumption, including the following in the experience study report:
 - Number of actual decrements
 - Number of exposures
 - Actual-to-expected ratios



Appendix



- The purpose of this presentation is to review Segal's economic and demographic experience study for the Contra Costa County Employees' Retirement Association (CCCERA).
- In preparing our presentation, we relied on information (some oral and some written) supplied by CCCERA and by Segal. This information includes, but is not limited to, the plan provisions, employee data, and financial information. We performed an informal examination of the obvious characteristics of the data for reasonableness and consistency in accordance with Actuarial Standard of Practice No. 23.
- This presentation and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices and our understanding of the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board as well as applicable laws and regulations. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this presentation. This presentation does not address any contractual or legal issues. We are not attorneys and our firm does not provide any legal services or advice.
- This presentation was prepared exclusively for CCCERA for the purpose described herein. Other users of this presentation are not intended users as defined in the Actuarial Standards of Practice, and Cheiron assumes no duty or liability to any other user.

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Consulting Actuary

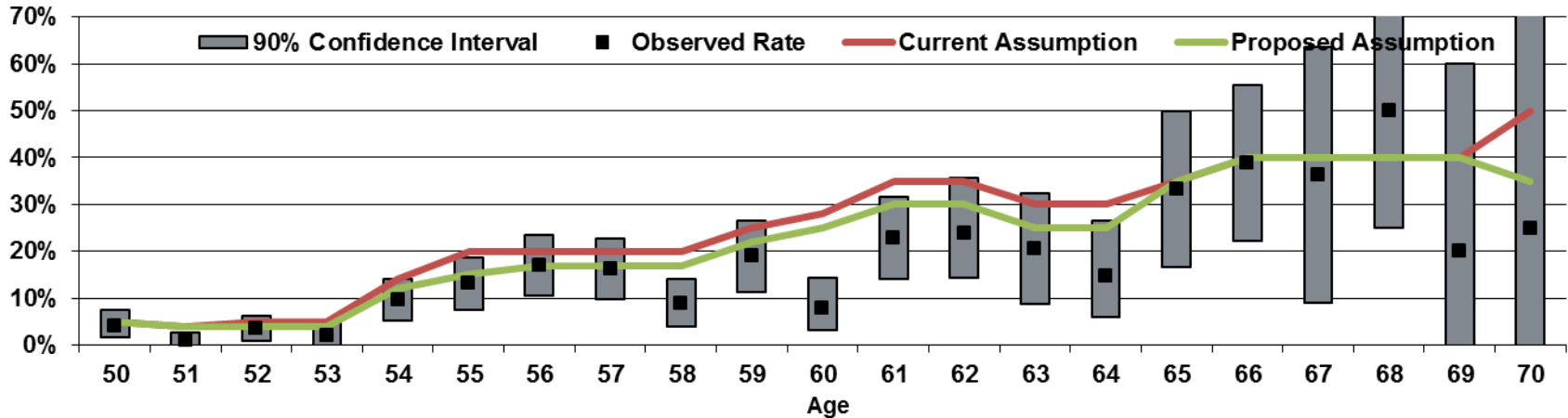
Anne. D. Harper, FSA, EA, MAAA
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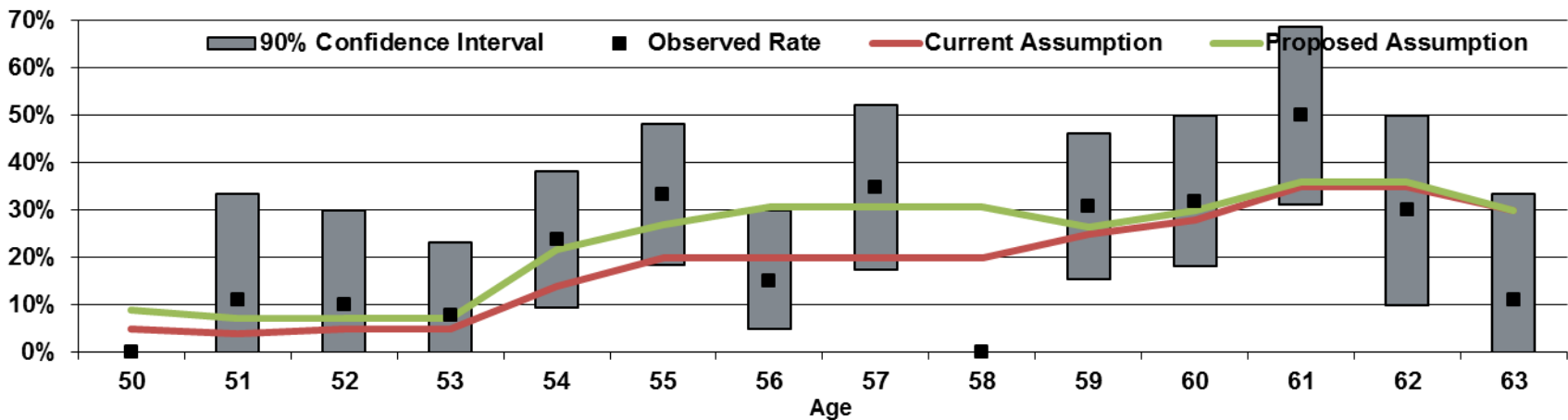
Appendix: Retirement – General Tier 1 Enhanced



Service Retirement Rates - General T1 Enhanced: 0 to 29 Years of Service



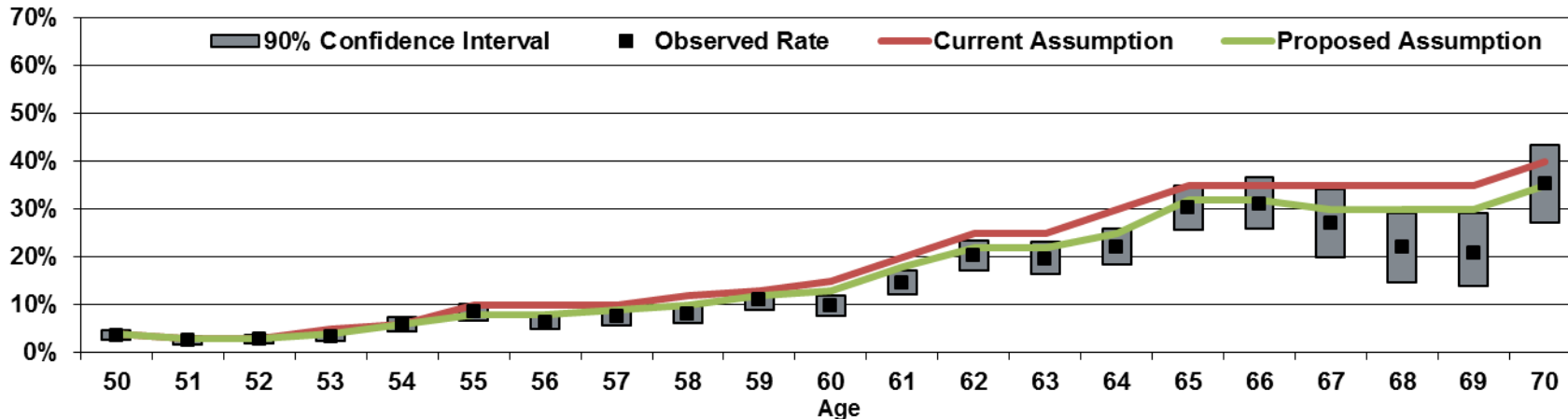
Service Retirement Rates - General T1 Enhanced: 30 or More Years of Service



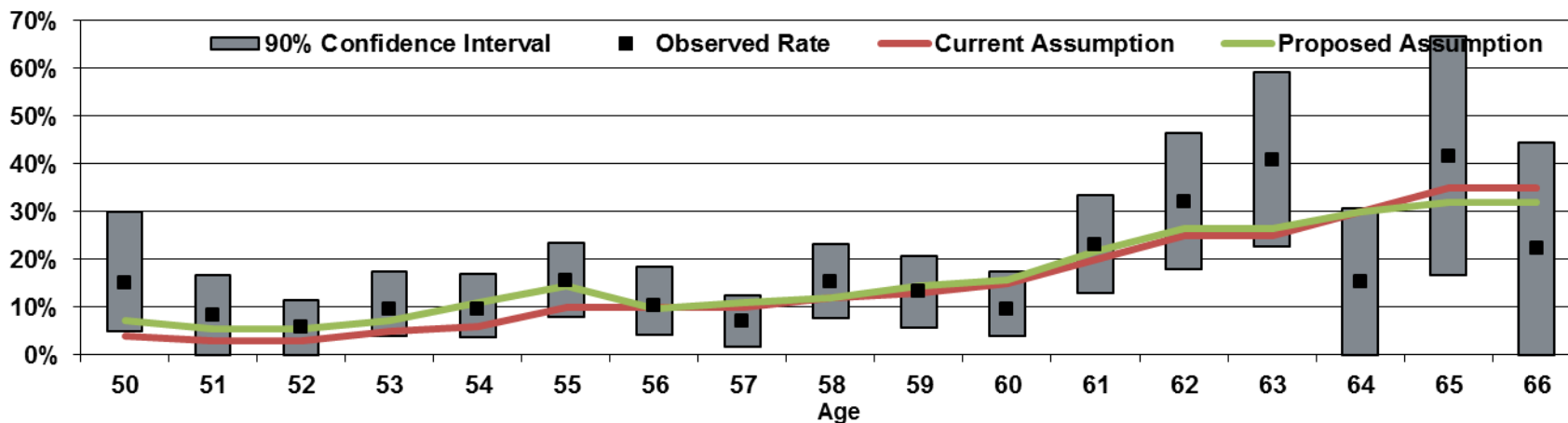
Appendix: Retirement – General Tier 3 Enhanced



Service Retirement Rates - General T3 Enhanced: 0 to 29 Years of Service



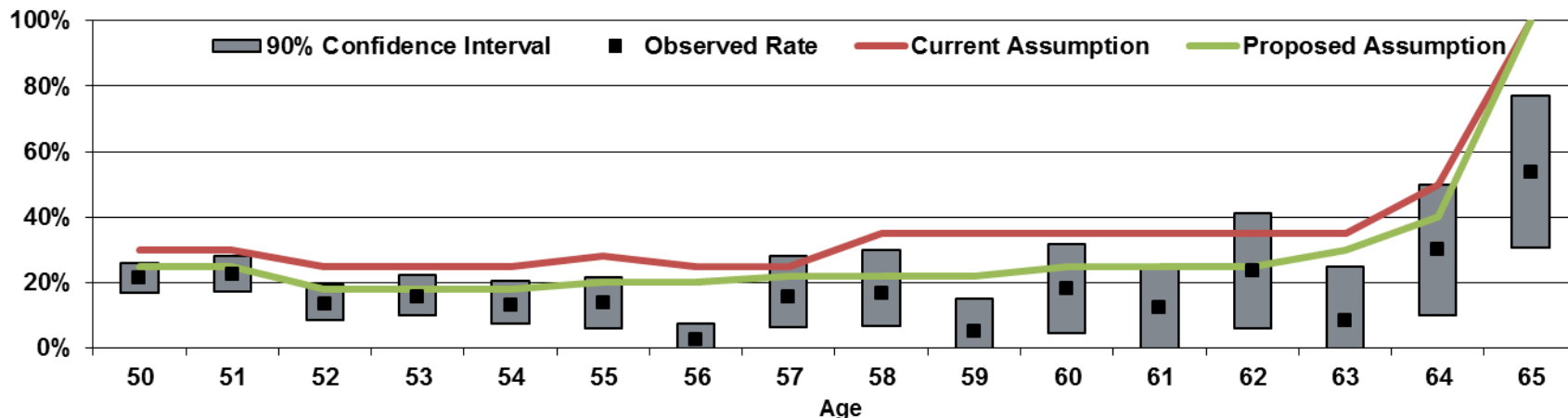
Service Retirement Rates - General T3 Enhanced: 30 or More Years of Service



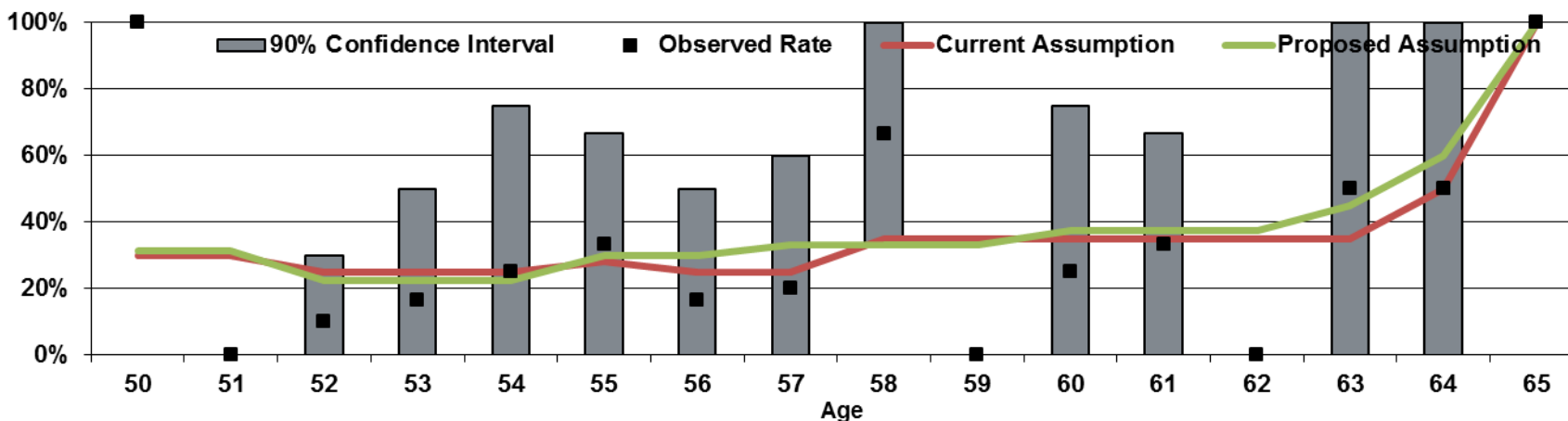
Appendix: Retirement – Safety Tier A Enhanced



Service Retirement Rates - Safety TA Enhanced: 0 to 29 Years of Service



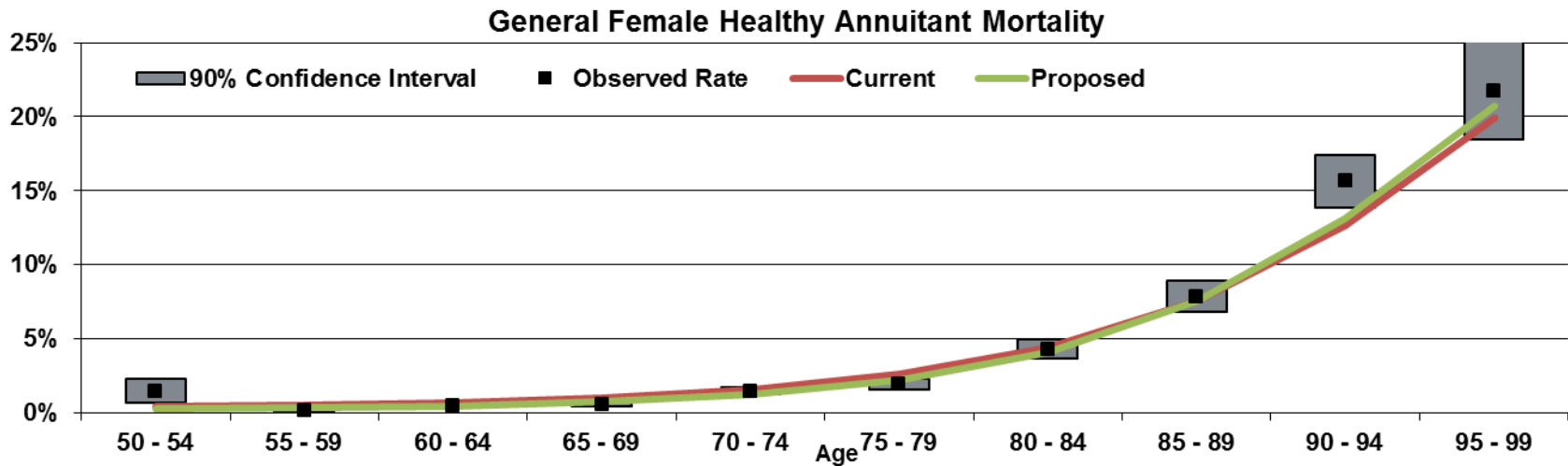
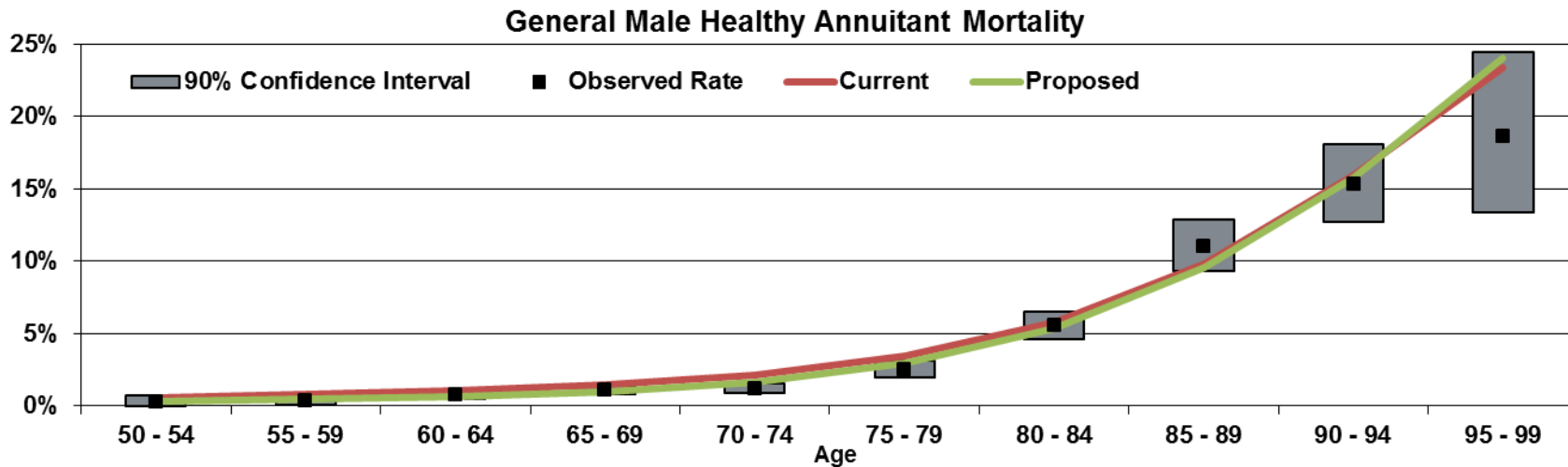
Service Retirement Rates - Safety TA Enhanced: 30 or More Years of Service



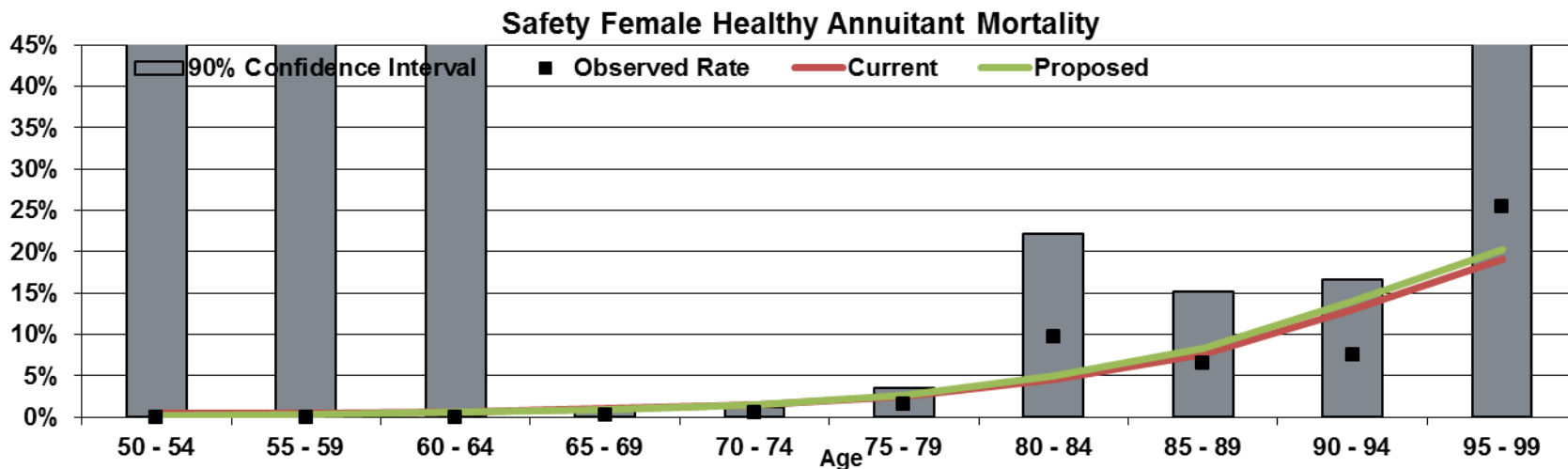
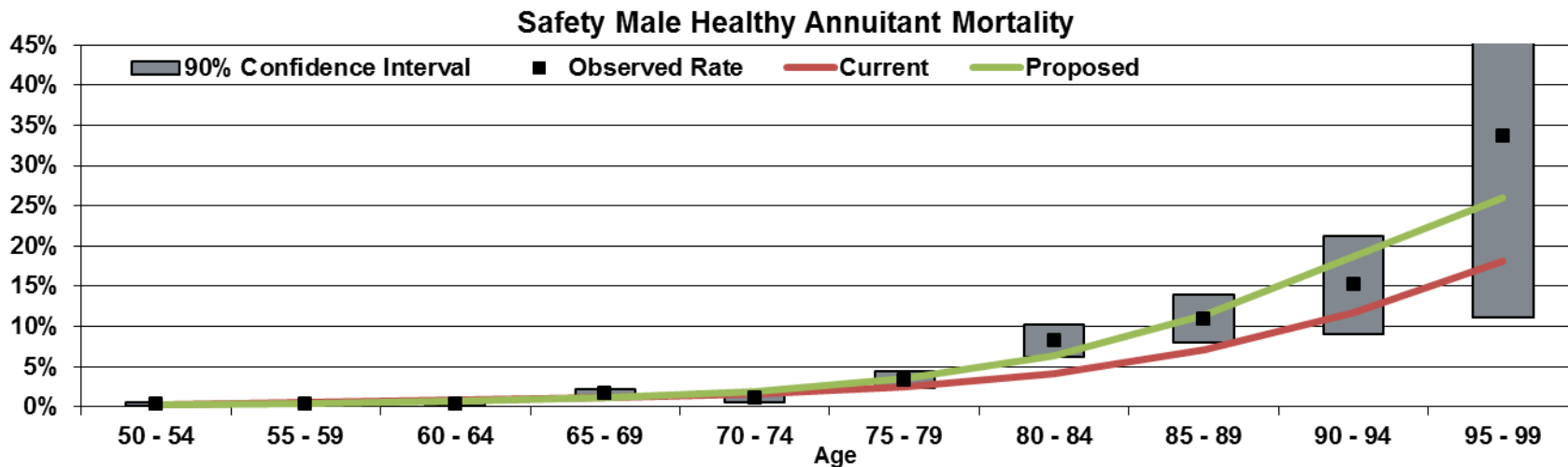


- Other Tiers
 - Proposed assumptions are reasonable
 - Consider applying similar adjustments based on service
- Deferred vested – Proposed assumptions are reasonable
- Reciprocity – Proposed assumptions are reasonable
- Family composition – Proposed assumptions are reasonable

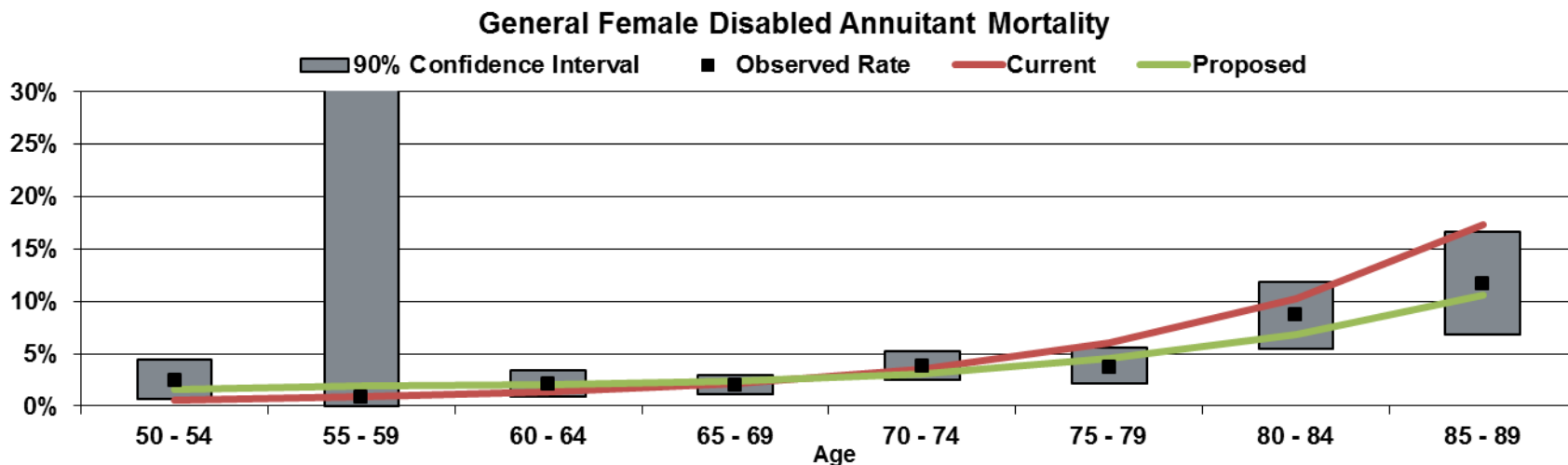
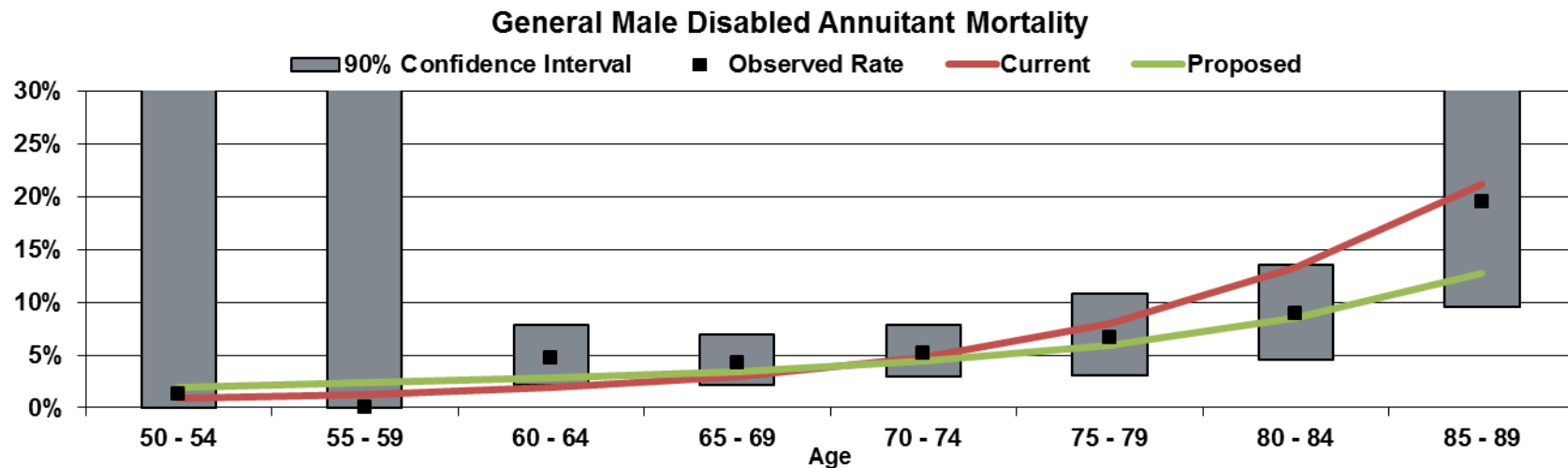
Appendix: Mortality – General Retirees



Appendix: Mortality – Safety Retirees



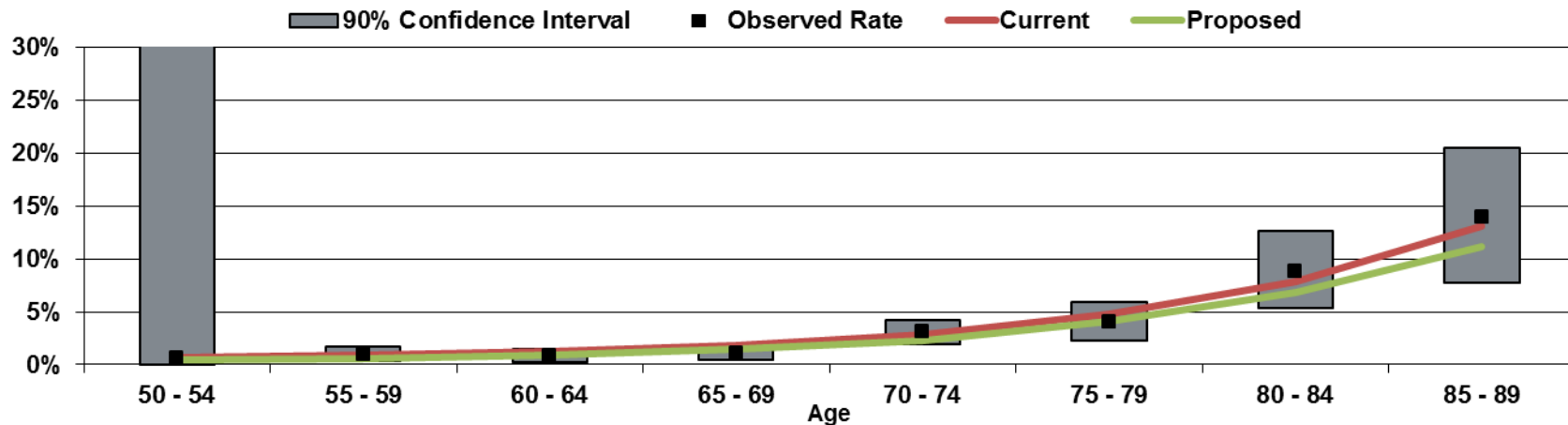
Appendix: Mortality – General Disabled



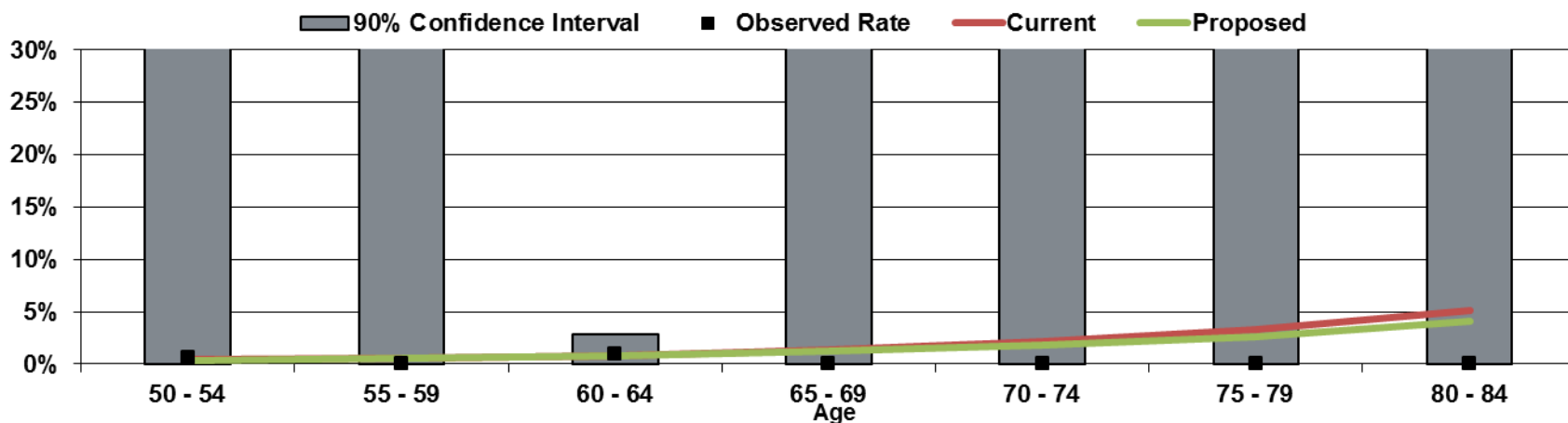
Appendix: Mortality – Safety Disabled



Safety Male Disabled Annuitant Mortality



Safety Female Disabled Annuitant Mortality





- Segal proposed using the Pub-2010 Contingent Survivors Table for all beneficiaries
- Table is based on beneficiary mortality experience after the retiree has died and shows higher rates of mortality than for general retirees
- SOA describes two practical approaches to beneficiary mortality before and after retiree dies
 - Use general retiree mortality if you believe the higher contingent survivor mortality represents the grieving widow(er) effect
 - Use contingent survivor mortality if you believe the higher mortality rates are “due to a number of factors correlated with beneficiary status, apart from a grieving widow(er) effect.”
- Use of the higher contingent survivor mortality rates makes joint and survivor annuities marginally less expensive

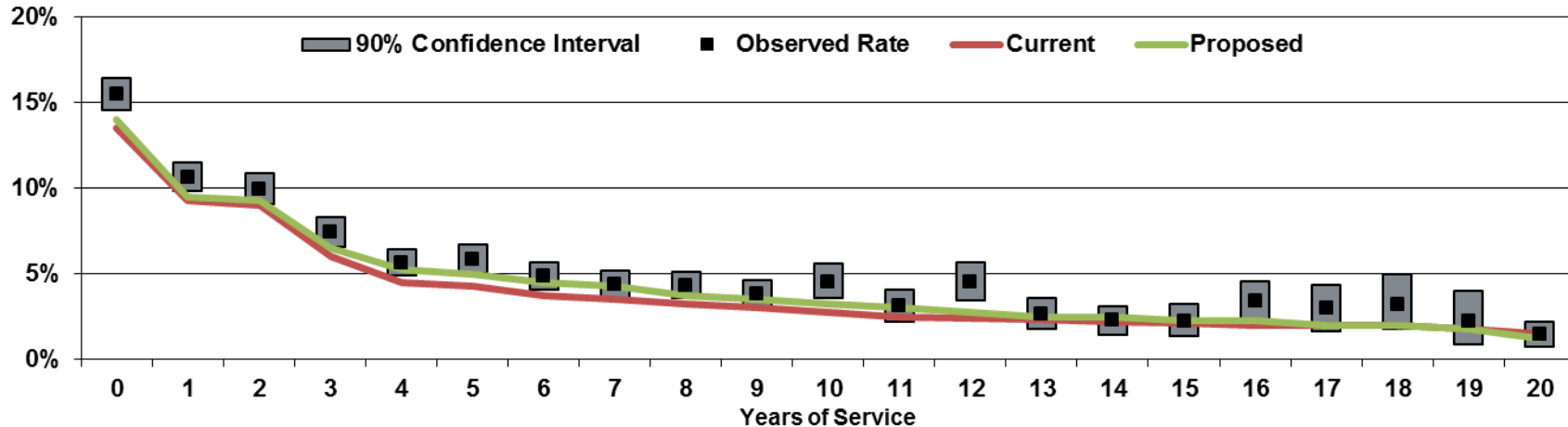


- Due to the complexity of generational tables, Segal has proposed using a static mortality table projected 20 years as the basis for Optional Form Factors
 - Appropriate projection period depends on the ages of the member and beneficiary
- We have generally taken a different approach
 - Fully generational tables – effectively a different static table for each year of birth
 - Conversion factors are based on age attained in a specific year
- Example
 - Conversion factors to be used for 2019 – 2021
 - Mortality tables based on attained age in 2020 – the central year for which the factors are used
 - Mortality for factor at member's age 60 is the mortality table for a member who attains age 60 in 2020 (born in 1960)
 - Mortality for factor at beneficiary's age 55 is the mortality table for a beneficiary who attains age 55 in 2020 (born in 1965)

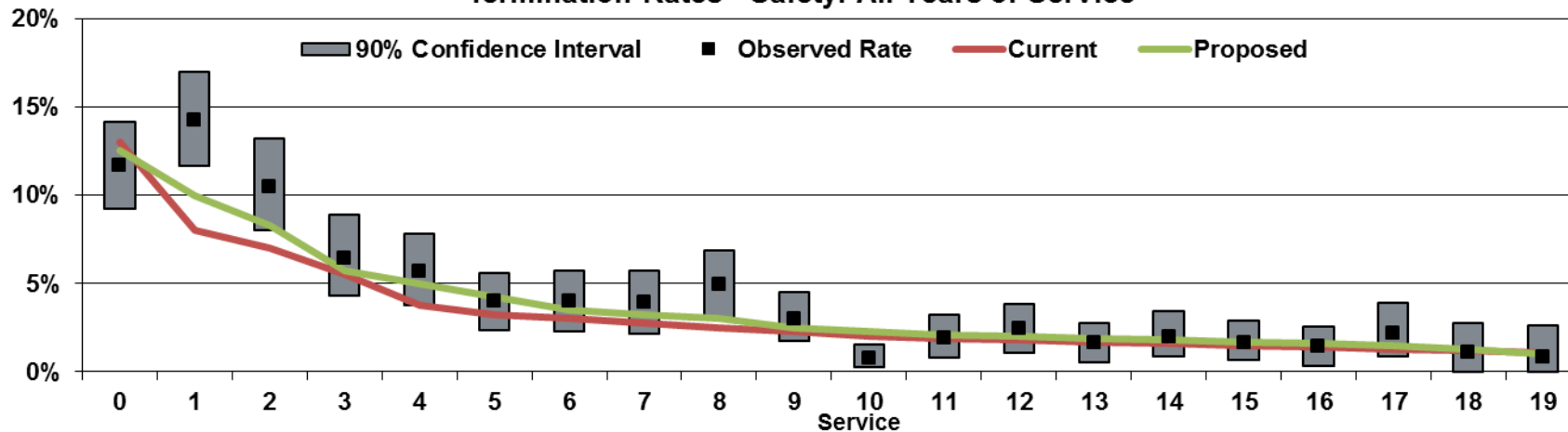
Appendix: Termination Rates



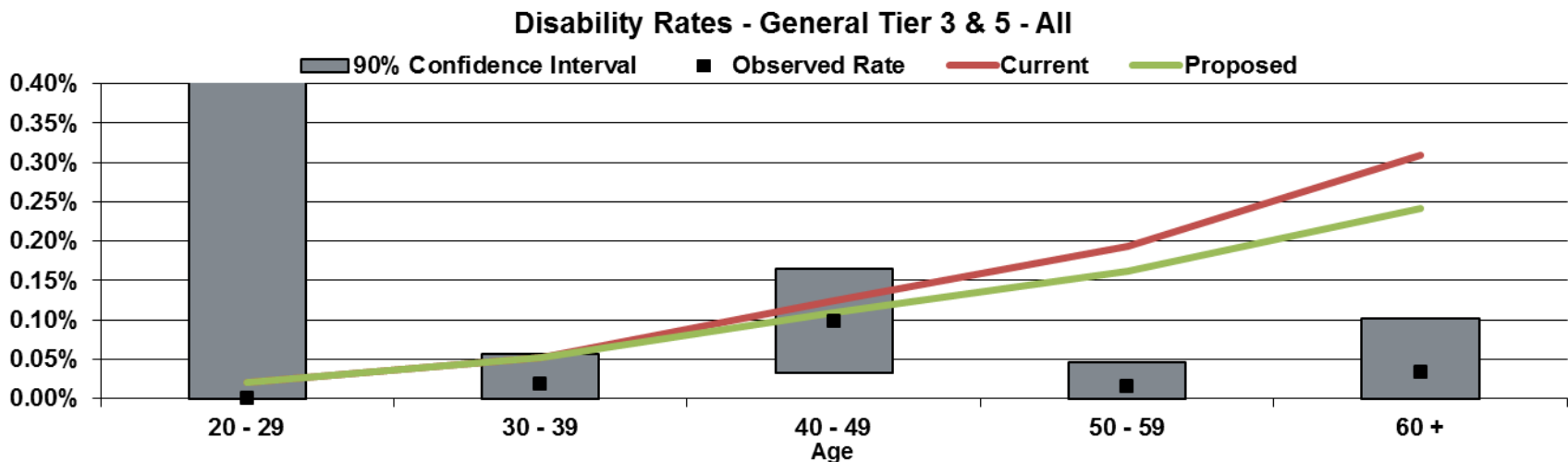
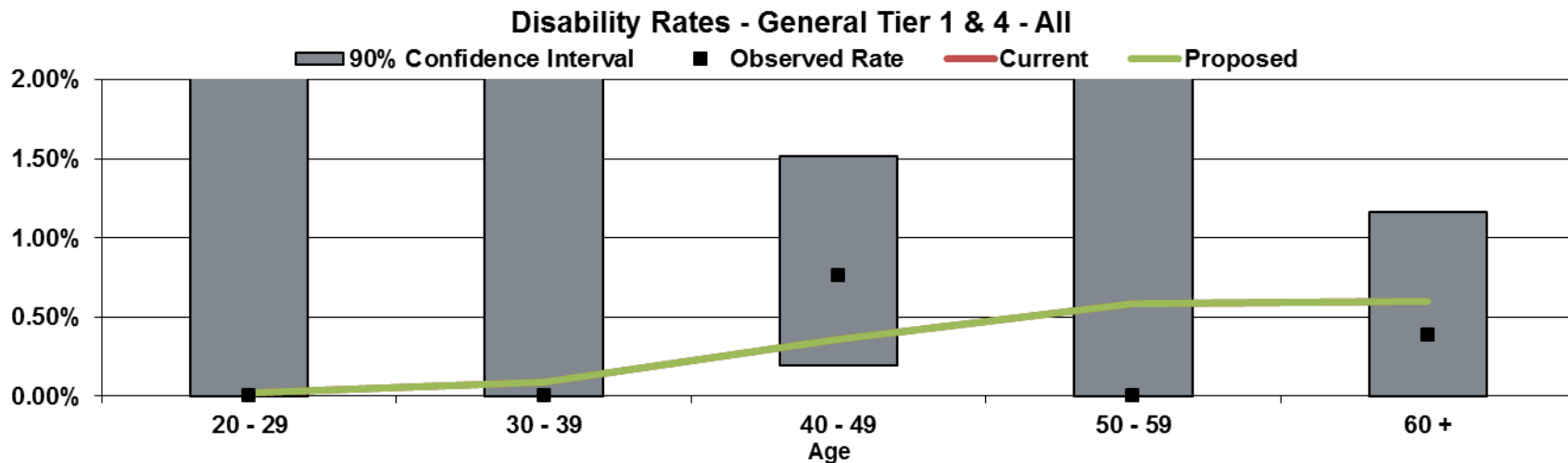
Termination Rates - General: All Years of Service



Termination Rates - Safety: All Years of Service



Appendix: Disability Retirement Rates



Appendix: Disability Retirement Rates

