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North Carolina Retirement Systems

Experience Study Supplement

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December 9, 2020

Agenda

- Discuss the Experience Review Process
- Review Key Takeaways/Cost Impact of Recommendations
- Review recommendations for:
  - Economic Assumptions
  - Demographic Assumptions
  - Funding Methods
  - Administrative Factors
- No Board decisions today
  - Boards to review today
  - Provide direction on additional analysis if needed
  - Board scheduled to adopt recommendations at the January Board meeting

The Actuarial Valuation Process

- Over the short term, employer contributions are determined by the annual actuarial valuation based on estimated benefits, expenses and investment return using Assumptions and Funding Methods recommended by the actuary and adopted by the Board through the Experience Review process
- Over the long term, employer contributions are adjusted to reflect actual benefits, expenses and investment return.

Inputs

Member Data
Asset Data
Benefit Provisions
Assumptions
Funding Methods

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Results

Actuarial Value of Assets
Actuarial Accrued Liability
Net Actuarial Gain or Loss
Funded Ratio
Benefit Enhancement
Additional Disclosures
Projections

Purpose of the Experience Study

- From GFOA Best Practice **Enhancing Reliability of Actuarial Valuations for Pension Plans:**
  - **Actuarial Experience Study.** While an actuarial gain/loss analysis helps provide a better understanding of a plan's assumed and actual experience during the year, this timeframe is not long enough to identify trends. An actuarial experience study reviews the differences between a plan's assumed and actual experience over multiple years (typically 3 to 5), with the goal of examining the trends related to actual experience and recommending changes to assumptions, if needed.
- The assumptions and funding methodology of the North Carolina Retirement Systems are reviewed every five years and documented in the Experience Study.
  - The last experience study was reviewed and adopted in January 2016 and first used in the December 31, 2015 valuations.
  - The results of this experience study will be used for the December 31, 2020 through 2024 actuarial valuations.

Experience Study Process

- Based on five-year period from January 1, 2015 – December 31, 2019
  - Compare Experience ("Actual") with Assumptions ("Expected")
  - Consider trends observed during the previous Experience Study
- Make Judgments About Future Trends:
  - Plan-Specific Experience vs. National Trends
  - Long-Term vs. Short-Term Factors
- Recommend changes in assumptions and funding methodology as needed based on Actuarial Standards of Practice
  - ASOP 4 - Measuring Pension Obligations and Determining Pension Plan Costs or Contributions
  - ASOP 27 - Selection of Economic Assumptions for Measuring Pension Obligations
  - ASOP 35 – Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations
  - ASOP 44 - Selection and Use of Asset Valuation Methods for Pension Valuations
- Implement effective with the December 31, 2020 Actuarial Valuation, which determines contribution rates effective July 1, 2022
- Next Experience Review is scheduled to be implemented effective with the December 31, 2025 Actuarial Valuation.

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Key Takeaways/Financial Impact

Key Takeaways

Teachers' and State Employees' Retirement System

Valuation Component Reviewed	Observation	Recommendation	Financial Impact
Demographic Assumptions			
1 Post-Retirement Mortality Rates	Fewer deaths	Decrease rates	Increase
2 Active Mortality	Limited exposures	Decrease rates	Increase
3 Mortality improvement	SOA projects lower improvement	Update from MP-2015 to MP-2019	Decrease
4 Service retirement	Fewer retirements	Decrease rates	Decrease
5 Disability retirement	Limited exposures	Decrease rates	Immaterial
6 Termination from active employment	More terminations	Increase rates	Decrease
Economic Assumptions			
7 Investment return	Lower projected returns	Reduce 0.50% (Alt 1)/ 0.25% (Alt 2)	Increase
8 Inflation	SSA predicts lower	Lower by 0.50%	Increase
9 Individual pay increases	Mixed increases	Adjust closer to experience	Increase
10 Productivity growth	Decrease not as much as inflation	Increase by 0.25%	Increase
Funding Method			
11 Amortization Method	Current method reasonable	No change	No change
12 Actuarial Cost method	Current method reasonable	Refine method - see below	Decrease
13 Asset valuation method	Current method reasonable	No change	No change
14 Administrative expenses	Expenses lower than assumed	Keep at 0.10% of payroll	No change

Notes:

1. The Pub-2010 Public Retirement Plans Mortality Tables published by the Society of Actuaries in January 2019 provided a closer fit than the previous table which were based on corproate plan expereince, resulting in less modifications.
3. For the fifth consecutive year, the SOA has reduced its projection of mortality improvement, resultings in lower liabilities.
7. Lower investment returns are the largest single source of liability and cost increases
12. The load on normal cost to account for new entrants was increased.
12. The method for calculating terminated vested liability was refined, resulting in a large liability reduction.

Financial Impact

Teachers' and State Employees' Retirement System

Had the proposed assumptions and methods been reflected for the December 31, 2019 Actuarial Valuation, the financial impact would have been as follows:

- The AAL would increase by 2.9% from $84.87 billion to $87.32 billion under Alternative 1; under Alternative 2, it would increase by 0.1% to $84.94 billion.
- The ADEC would increase by 3.01% of payroll from 15.74% to 18.75% under Alternative 1; under Alternative 2, it would increase by 0.63% of payroll to 16.37%.
- The Employer Contribution would increase by 0.60% of payroll from 15.74% to 16.34% under Alternative 1; under Alternative 2 it would increase by 0.13% of payroll to 15.87%.

	Current Valuation	Reflect Alternative 1 Economic Assumptions	Reflect Demographic Assumptions	Reflect Funding Method	Alternative 1 w/ Five-year Direct Rate Smoothing	Alternative 2 w/ Five-year Direct Rate Smoothing
Employer Contribution						
Employer Normal Cost	5.16%	6.49%	5.96%	6.40%	6.40%	5.78%
Payment for UAAL	10.58%	13.96%	13.62%	12.35%	12.35%	10.59%
Preliminary ADEC*	15.74%	20.45%	19.58%	18.75%	18.75%	16.37%
Impact of Direct Rate Smoothing	0.00%	0.00%	0.00%	0.00%	-2.41%	-0.50%
Impact of Rate Stabilization Policy	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Employer Contribution	15.74%	20.45%	19.58%	18.75%	16.34%	15.87%
Cumulative Δ in Employer Contribution		4.71%	3.84%	3.01%	0.60%	0.13%
Actuarial Accrued Liability (AAL)	$ 84,873,315,272	$ 89,361,980,053	$ 88,935,609,166	$ 87,319,940,006	$ 87,319,940,006	$ 84,941,027,914
Actuarial Value of Assets (AVA)	73,353,759,963	73,353,759,963	73,353,759,963	73,353,759,963	73,353,759,963	73,353,759,963
Unfunded Accrued Liability (UAAL)	11,519,555,309	16,008,220,090	15,581,849,203	13,966,180,043	13,966,180,043	11,587,267,951
Funded Ratio (AVA / AAL)	86.4%	82.1%	82.5%	84.0%	84.0%	86.4%
Cumulative Δ in UAAL		$ 4,488,664,781	$ 4,062,293,894	$ 2,446,624,734	$ 2,446,624,734	$ 67,712,642

* Actuarially Determined Employer Contribution. Note that the employer normal cost includes administrative expenses.

Projections
TSERS

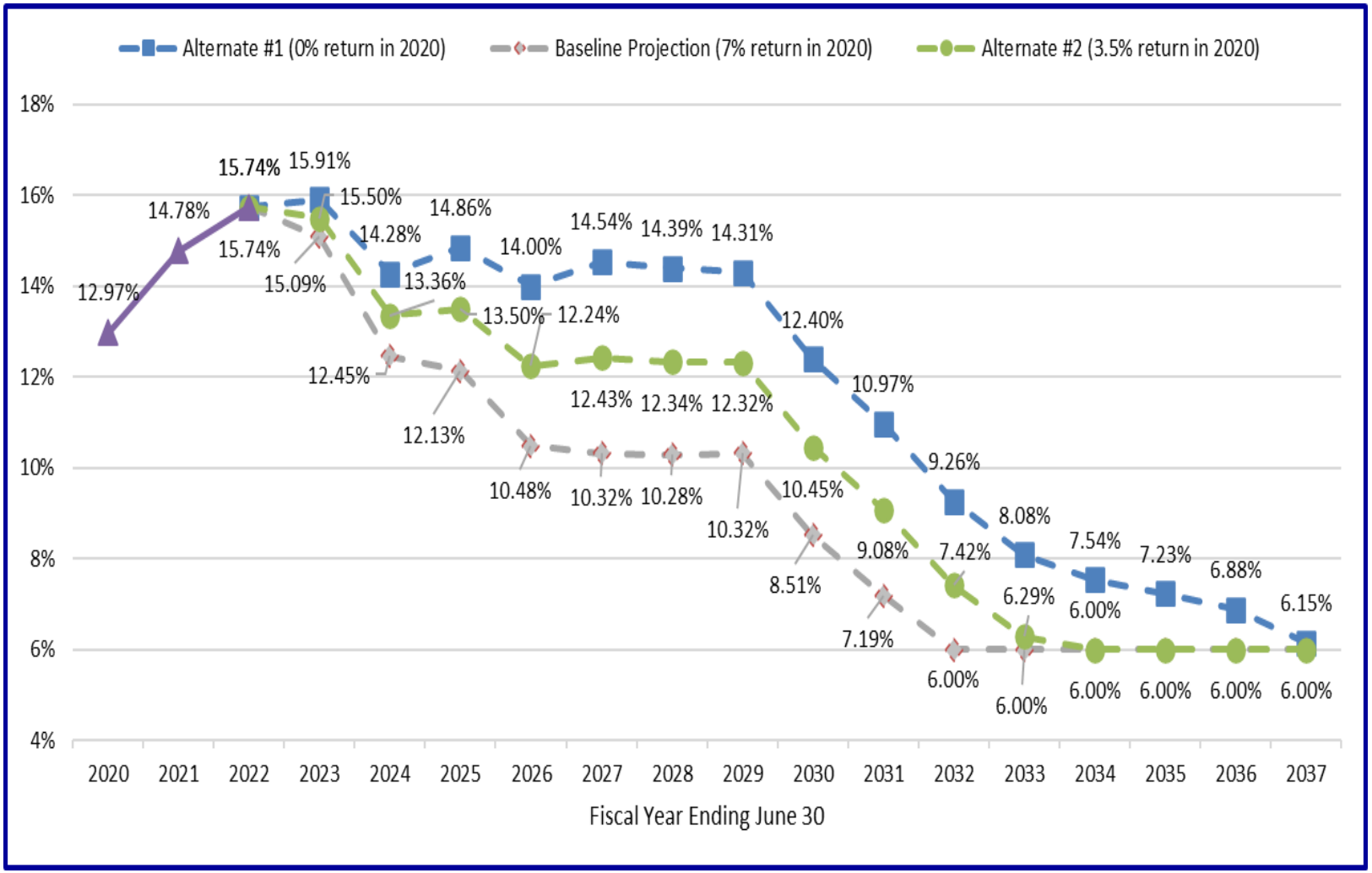
- Projections of contribution requirements and funded status into the future can be helpful planning tools for stakeholders. This section provides such projections. The projections of the actuarial valuation are known as deterministic projections. Deterministic projections are based on one scenario in the future. The baseline deterministic projection is based on December 31, 2019 valuation results.

- Key Projection Assumptions
  - Baseline valuation interest rate of 7.00% for all years for current assumptions and 7.00% for 2020 and 6.5% for all remaining years in conjunction with direct rate smoothing of the employer contribution rate over a 5-year period beginning July 1, 2022.
  - Actuarial assumptions and methods as described in Appendix D of the 12/31/2019 valuation report for current assumptions. Proposed assumptions as described in the 2014-2019 experience study from 12/31/2020 forward for new assumptions. All future demographic experience is assumed to be exactly realized.
  - The contribution rate under the Employer Contribution Rate Stabilization Policy (ECRSP) is contributed until fiscal year ending 2022.
  - The actuarially determined employer contribution rate is contributed for fiscal years ending 2023 and beyond.
  - 0% increase in the total active member population
  - No cost-of-living adjustments granted
  - Future pay increases based on long-term salary increase assumptions

- In addition, we have provided alternate deterministic projections:
  - Estimated 2020 asset return of 0.00%, and 3.50%
  - 6.50% investment return assumption based on:
    - Valuation interest rate of 6.50% for all years in conjunction with direct rate smoothing of the employer contribution rate over a 5-year period beginning July 1, 2022; includes 2.50% inflation.
    - Investment return on market value of assets of 6.50% beginning December 31, 2020.
    - Direct rate smoothing of employer contribution rate over a 5-year period beginning July 1, 2022 through June 30, 2027.

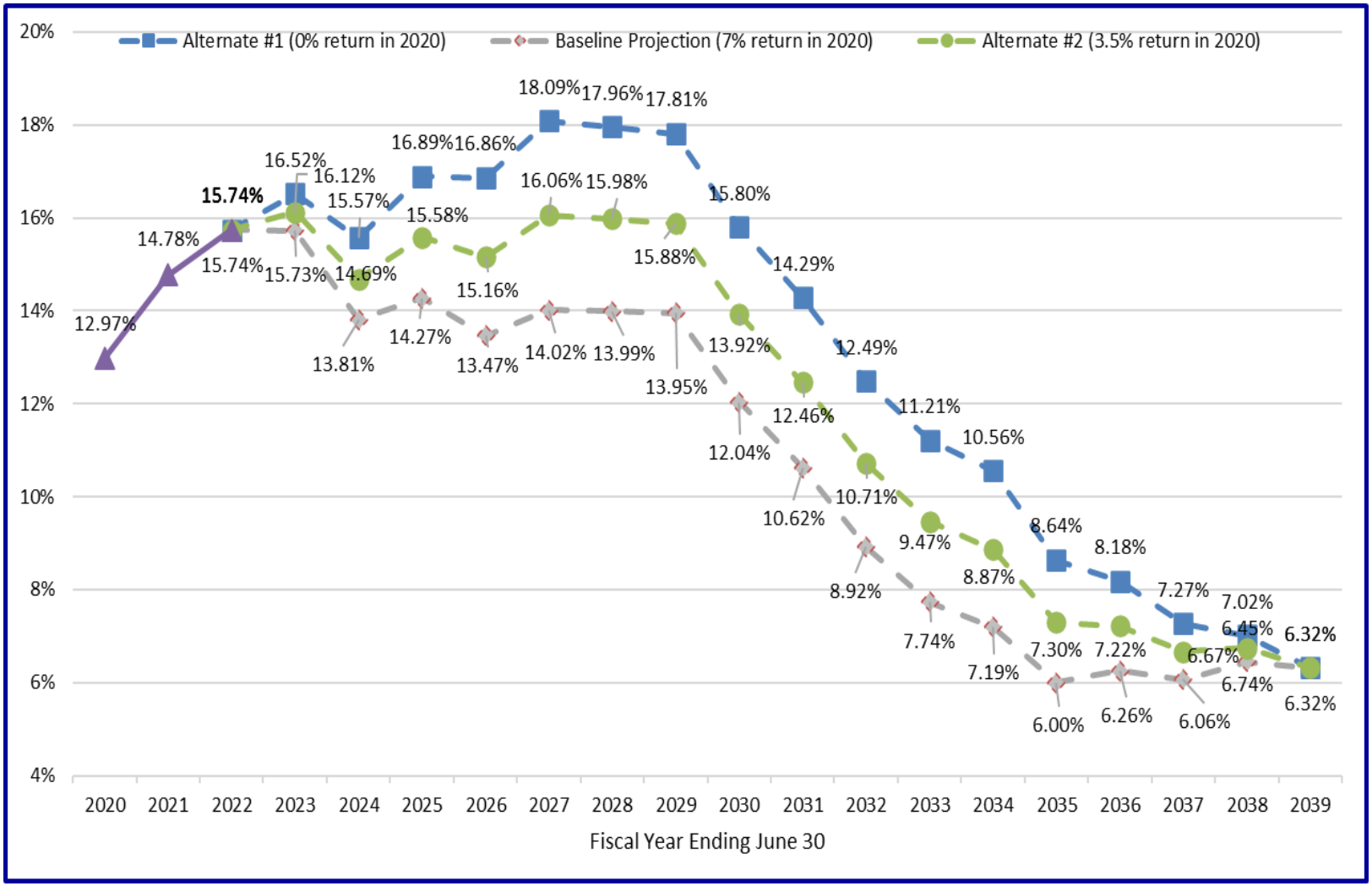
North Carolina
Total Retirement Plans

Contribution Rate Projection - Current Assumptions

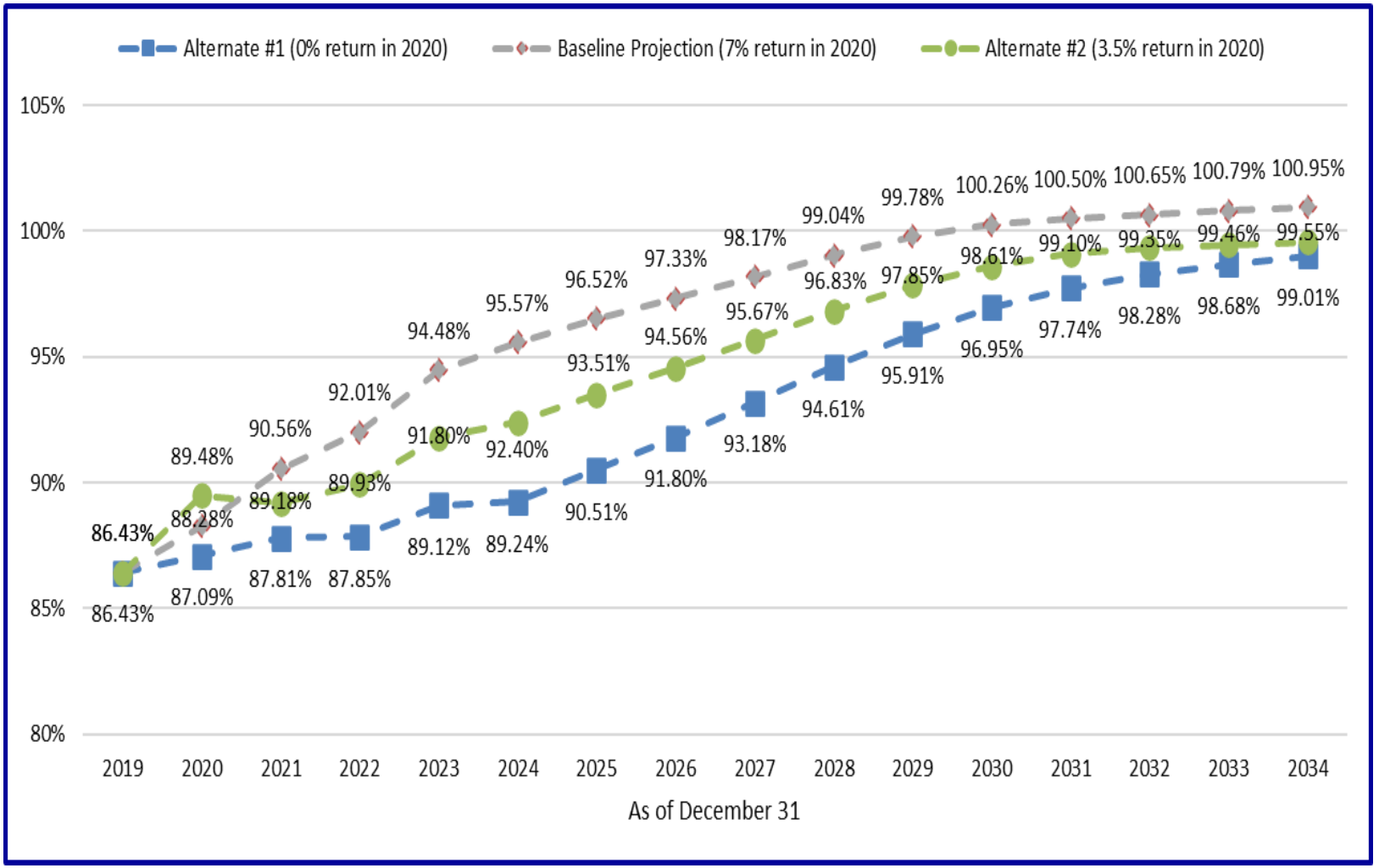


North Carolina
Total Retirement Plans

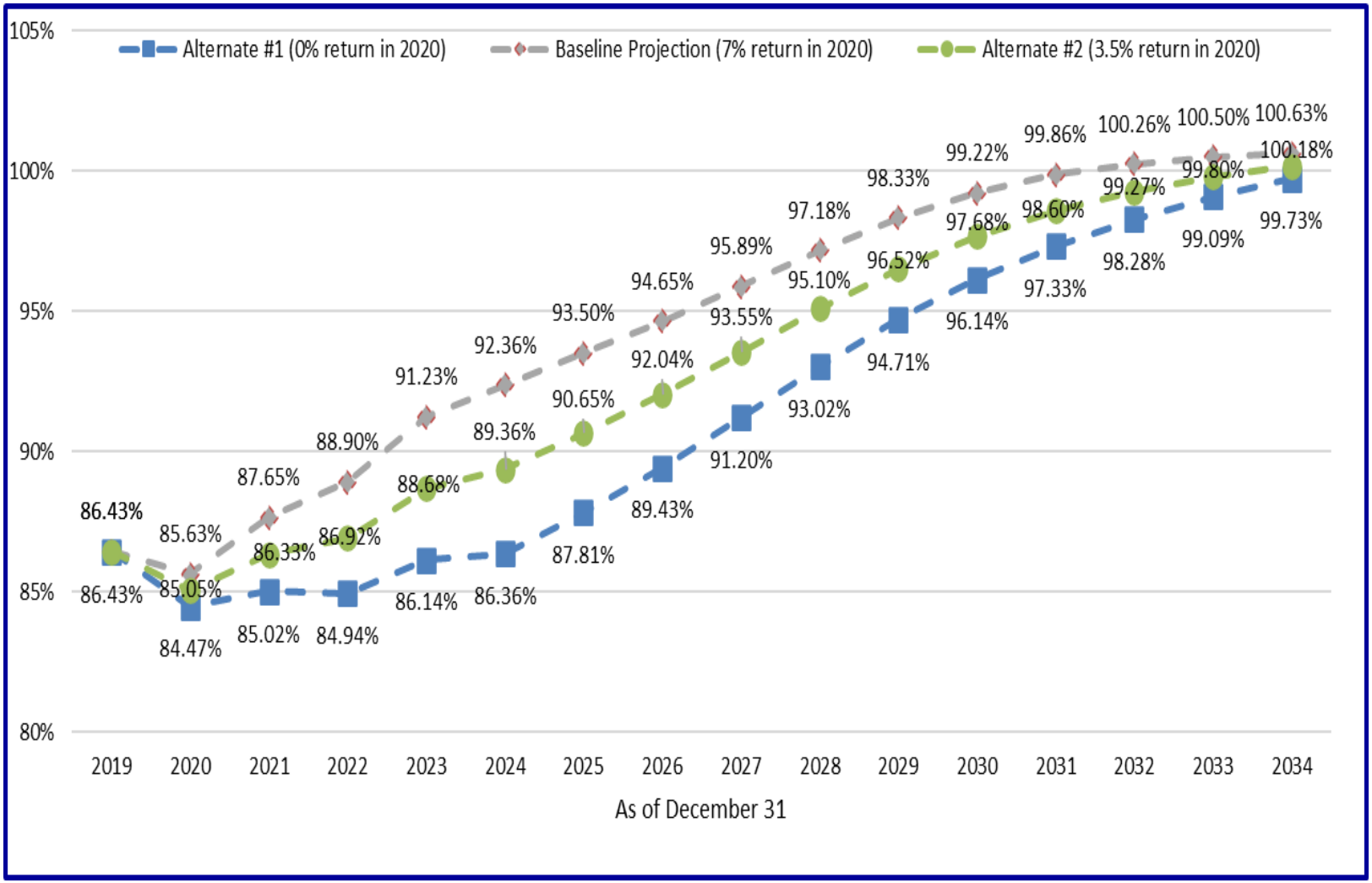
Contribution Rate Projection - Proposed Assumptions



Funded Ratio
Projection - Current Assumptions



Funded Ratio
Projection - Proposed Assumptions



Key Takeaways

Consolidated Judicial Retirement System

Valuation Component Reviewed	Observation	Recommendation	Financial Impact
Demographic Assumptions			
1 Post-Retirement Mortality Rates	Fewer deaths	Decrease rates	Increase
2 Active Mortality	Limited exposures	Decrease rates	Increase
3 Mortality improvement	SOA projects lower improvement	Update from MP-2015 to MP-2019	Decrease
4 Service retirement	Fewer retirements	Decrease rates	Decrease
5 Disability retirement	Fewer disabilities	Decrease rates	Immaterial
6 Termination from active employment	More terminations	Increase rates	Decrease
Economic Assumptions			
7 Investment return	Lower projected returns	Reduce 0.50% (Alt 1)/ 0.25% (Alt 2)	Increase
8 Inflation	SSA predicts lower	Lower by 0.50%	Increase
9 Individual pay increases	Lower Increases	Decrease rates	Increase
10 Productivity growth	Decrease not as much as inflation	Increase by 0.25%	Increase
Funding Method			
11 Amortization Method	Current method reasonable	No change	No change
12 Actuarial Cost method	Current method reasonable	Refine method - see below	Increase
13 Asset valuation method	Current method reasonable	No change	No change
14 Administrative expenses	Expenses lower than assumed	Reduce to 0.05% of payroll	Decrease

Notes:

1. The Pub-2010 Public Retirement Plans Mortality Tables published by the Society of Actuaries in January 2019 provided a closer fit than the previous table which were based on corproate plan expereince, resulting in less modifications.
3. For the fifth consecutive year, the SOA has reduced its projection of mortality improvement, resultings in lower liabilities.
7. Lower investment returns are the largest single source of liability and cost increases
12. The load on normal cost to account for new entrants was increased.
12. Revised for eligibility service which increased AAL and reduced normal cost.

Financial Impact

Consolidated Judicial Retirement System

Had the proposed assumptions and methods been reflected for the December 31, 2019 Actuarial Valuation, the financial impact would have been as follows:

- The AAL would increase by 6.6% from $725.45 million to $773.26 million under Alternative 1; under Alternative 2, it would increase by 4.0% to $754.7 million.
- The ADEC would increase by 3.03% of payroll from 38.70% to 41.73% under Alternative 1; under Alternative 2, it would decrease by 0.68% of payroll to 38.02%.
- The Employer Contribution would increase by 0.61% of payroll from 38.70% to 39.31% under Alternative 1; under Alternative 2 it would decrease by 0.14% of payroll to 38.56%.

	Current Valuation	Reflect Alternative 1 Economic Assumptions	Reflect Demographic Assumptions	Reflect Funding Method	Alternative 1 w/ Five-year Direct Rate Smoothing	Alternative 2 w/ Five-year Direct Rate Smoothing
Employer Contribution						
Employer Normal Cost	17.59%	18.17%	12.60%	13.16%	13.16%	12.18%
Payment for UAAL	21.11%	25.80%	28.57%	28.57%	28.57%	25.84%
Preliminary ADEC*	38.70%	43.97%	41.17%	41.73%	41.73%	38.02%
Impact of Direct Rate Smoothing	0.00%	0.00%	0.00%	0.00%	-2.42%	0.54%
Impact of Rate Stabilization Policy	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Employer Contribution	38.70%	43.97%	41.17%	41.73%	39.31%	38.56%
Cumulative Δ in Employer Contribution		5.27%	2.47%	3.03%	0.61%	-0.14%
Actuarial Accrued Liability (AAL)	$ 725,452,544	$ 756,085,704	$ 773,258,310	$ 773,258,310	$ 773,258,310	$ 754,695,935
Actuarial Value of Assets (AVA)	621,547,192	621,547,192	621,547,192	621,547,192	621,547,192	621,547,192
Unfunded Accrued Liability (UAAL)	103,905,352	134,538,512	151,711,118	151,711,118	151,711,118	133,148,743
Funded Ratio (AVA / AAL)	85.7%	82.2%	80.4%	80.4%	80.4%	82.4%
Cumulative Δ in UAAL		$ 30,633,160	$ 47,805,766	$ 47,805,766	$ 47,805,766	$ 29,243,391

* Actuarially Determined Employer Contribution. Note that the employer normal cost includes administrative expenses.

Key Takeaways

Legislative Retirement System

Valuation Component Reviewed	Observation	Recommendation	Financial Impact
Demographic Assumptions			
1 Post-Retirement Mortality Rates	Fewer deaths	Decrease rates	Increase
2 Active Mortality	Limited exposures	Decrease rates	Increase
3 Mortality improvement	SOA projects lower improvement	Update from MP-2015 to MP-2019	Decrease
4 Service retirement	Fewer retirements	Decrease rates	Decrease
5 Disability retirement	Fewer disabilities	Decrease rates	Immaterial
6 Termination from active employment	More terminations	Increase rates	Decrease
Economic Assumptions			
7 Investment return	Lower projected returns	Reduce 0.50% (Alt 1)/ 0.25% (Alt 2)	Increase
8 Inflation	SSA predicts lower	Lower by 0.50%	Increase
9 Individual pay increases	Lower Increases	Increase rates	Increase
10 Productivity growth	Decrease not as much as inflation	Increase by 0.25%	Increase
Funding Method			
11 Amortization Method	Current method reasonable	No change	No change
12 Actuarial Cost method	Current method reasonable	Refine method - see below	Increase
13 Asset valuation method	Current method reasonable	No change	No change
14 Administrative expenses	Expenses lower than assumed	No change	No change

Notes:

1. The Pub-2010 Public Retirement Plans Mortality Tables published by the Society of Actuaries in January 2019 provided a closer fit than the previous table which were based on corproate plan expereince, resulting in less modifications.
3. For the fifth consecutive year, the SOA has reduced its projection of mortality improvement, resultings in lower liabilities.
7. Lower investment returns are the largest single source of liability and cost increases
12. The load on normal cost to account for new entrants was increased.

Financial Impact

Legislative Retirement System

Had the proposed assumptions and methods been reflected for the December 31, 2019 Actuarial Valuation, the financial impact would have been as follows:

- The AAL would decrease by 0.4% from $30.27 million to $30.14 million under Alternative 1; under Alternative 2, it would decrease by 2.6% to $29.5 million..
- The ADEC would decrease by 2.98% of payroll from 27.15% to 24.17% under Alternative 1; under Alternative 2, it would decrease by 3.77% of payroll to 23.38%.
- The Employer Contribution would decrease by 0.60% of payroll from 27.15% to 26.55% under Alternative 1; under Alternative 2 it would decrease by 0.75% of payroll to 26.40%.

	Current Valuation	Reflect Alternative 1 Economic Assumptions	Reflect Demographic Assumptions	Reflect Funding Method	Alternative 1 w/ Five-year Direct Rate Smoothing	Alternative 2 w/ Five-year Direct Rate Smoothing
Employer Contribution						
Employer Normal Cost	19.77%	17.86%	15.95%	17.35%	17.35%	16.49%
Payment for UAAL	7.38%	9.91%	6.82%	6.82%	6.82%	6.89%
Preliminary ADEC*	27.15%	27.77%	22.77%	24.17%	24.17%	23.38%
Impact of Direct Rate Smoothing	0.00%	0.00%	0.00%	0.00%	2.38%	3.02%
Impact of Rate Stabilization Policy	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Employer Contribution	27.15%	27.77%	22.77%	24.17%	26.55%	26.40%
Cumulative Δ in Employer Contribution		0.62%	-4.38%	-2.98%	-0.60%	-0.75%
Actuarial Accrued Liability (AAL)	$ 30,269,003	$ 31,066,842	$ 30,136,751	$ 30,136,751	$ 30,136,751	$ 29,495,518
Actuarial Value of Assets (AVA)	28,028,978	28,028,978	28,028,978	28,028,978	28,028,978	28,028,978
Unfunded Accrued Liability (UAAL)	2,240,025	3,037,864	2,107,773	2,107,773	2,107,773	1,466,540
Funded Ratio (AVA / AAL)	92.6%	90.2%	93.0%	93.0%	93.0%	95.0%
Cumulative Δ in UAAL		$ 797,839	$ (132,252)	$ (132,252)	$ (132,252)	$ (773,485)

* Actuarially Determined Employer Contribution. Note that the employer normal cost includes administrative expenses.

Key Takeaways

National Guard Pension Fund

	Valuation Component Reviewed	Observation	Recommendation	Financial Impact
Demographic Assumptions				
1	Post-Retirement Mortality Rates	More deaths	Increase rates	Decrease
2	Active Mortality	Limited exposures	Decrease rates	Increase
3	Mortality improvement	SOA projects lower improvement	Update from MP-2015 to MP-2019	Decrease
4	Service retirement	More retirements	Increase rates	Increase
5	Disability retirement	N/A	Decrease rates	Immaterial
6	Termination from active employment	More terminations	Increase rates	Decrease
Economic Assumptions				
7	Investment return	Lower projected returns	Reduce 0.50% (Alt 1)/ 0.25% (Alt 2)	Increase
8	Inflation	SSA predicts lower	Lower by 0.50%	Increase
9	Individual pay increases	Not applicable	Not applicable	Not applicable
10	Productivity growth	Decrease not as much as inflation	Increase by 0.25%	Not applicable
Funding Method				
11	Amortization Method	Current method reasonable	No change	No change
12	Actuarial Cost method	Current method reasonable	Refine method - see below	Increase
13	Asset valuation method	Current method reasonable	No change	No change
14	Administrative expenses	Expenses volatile	Assume $150,000 per year	Immaterial

Notes:

1. The Pub-2010 Public Retirement Plans Mortality Tables published by the Society of Actuaries in January 2019 provided a closer fit than the previous table which were based on corproate plan expereince, resulting in less modifications.
3. For the fifth consecutive year, the SOA has reduced its projection of mortality improvement, resultings in lower liabilities.
7. Lower investment returns are the largest single source of liability and cost increases
12. The normal cost was increased by $725,000 to account for new hires with less than 7 years of service.

Financial Impact

National Guard Pension Fund

Had the proposed assumptions and methods been reflected for the December 31, 2019 Actuarial Valuation, the financial impact would have been as follows:

- The AAL would increase by 3.4% from $161.8 million to $167.24 million under Alternative 1; under Alternative 2, it would increase by 0.5% to $162.58 million.
- The ADEC would increase by $1,498,074 from $6,382,278 to $7,880,352 under Alternative 1; under Alternative 2, it would increase by $176,633 to $6,558,911.
- The Employer Contribution would remain unchanged at $11,031,715 under Alternative 1; under Alternative 2 it would remain unchanged at $11,031,715.

	Current Valuation	Reflect Alternative 1 Economic Assumptions	Reflect Demographic Assumptions	Reflect Funding Method	Alternative 1 w/ Five-year Direct Rate Smoothing	Alternative 2 w/ Five-year Direct Rate Smoothing
Employer Contribution						
Employer Normal Cost	329,704	388,825	321,745	1,149,734	1,149,734	1,124,904
Payment for UAAL	$ 6,052,574	$ 7,260,973	$ 6,730,608	$ 6,730,618	$ 6,730,618	$ 5,434,007
Preliminary ADEC*	6,382,278	7,649,798	7,052,353	7,880,352	7,880,352	6,558,911
Impact of Direct Rate Smoothing	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Impact of Rate Stabilization Policy	4,649,437	3,381,917	3,979,362	3,151,363	3,151,363	4,472,804
Employer Contribution	$ 11,031,715	$ 11,031,715	$ 11,031,715	$ 11,031,715	$ 11,031,715	$ 11,031,715
Cumulative Δ in Employer Contribution		$ 0	$ 0	$ 0	$ 0	$ 0
Actuarial Accrued Liability (AAL)	$ 161,797,526	$ 171,305,597	$ 166,092,709	$ 167,242,623	$ 167,242,623	$ 162,583,545
Actuarial Value of Assets (AVA)	142,486,044	142,486,044	142,486,044	142,486,044	142,486,044	142,486,044
Unfunded Accrued Liability (UAAL)	19,311,482	28,819,553	23,606,665	24,756,579	24,756,579	20,097,501
Funded Ratio (AVA / AAL)	88.1%	83.2%	85.8%	85.2%	85.2%	87.6%
Cumulative Δ in UAAL		$ 9,508,071	$ 4,295,183	$ 5,445,097	$ 5,445,097	$ 786,019

* Actuarially Determined Employer Contribution. Note that the employer normal cost includes administrative expenses.
Direct rate smoothing is not applicable due to Rate Stabilization Policy.

Key Takeaways

Disability Income Plan

Valuation Component Reviewed	Observation	Recommendation	Financial Impact
Demographic Assumptions			
1 Post-Retirement Mortality Rates	Fewer deaths	Decrease rates	Increase
2 Active Mortality	Limited exposures	Decrease rates	Increase
3 Mortality improvement	SOA projects lower improvement	Update from MP-2015 to MP-2019	Decrease
4 Service retirement	Fewer retirements	Decrease rates	Decrease
5 Disability retirement	Fewer disabilities	Decrease rates	Immaterial
6 Termination from active employment	More terminations	Increase rates	Decrease
Economic Assumptions			
7 Investment return	Lower projected returns	Reduce 0.75% (Alt 1)/ 0.50% (Alt 2)	Increase
8 Inflation	SSA predicts lower	Lower by 0.50%	Increase
9 Individual pay increases	Mixed increases	Adjust closer to experience	Increase
10 Productivity growth	Decrease not as much as inflation	Increase by 0.25%	Increase
Funding Method			
11 Amortization Method	Current method reasonable	No change	No change
12 Actuarial Cost method	Current method reasonable	Refine method - see below	Increase
13 Asset valuation method	Current method reasonable	No change	No change
14 Administrative expenses	Current assumption reasonable	No change	No change

Notes:

1. The Pub-2010 Public Retirement Plans Mortality Tables published by the Society of Actuaries in January 2019 provided a closer fit than the previous table which were based on corproate plan expereince, resulting in less modifications.
3. For the fifth consecutive year, the SOA has reduced its projection of mortality improvement, resultings in lower liabilities.
7. Lower investment returns are the largest single source of liability and cost increases
12. The load on normal cost to account for new entrants was increased.

Financial Impact

Disability Income Plan

Had the proposed assumptions and methods been reflected for the December 31, 2019 Actuarial Valuation, the financial impact would have been as follows:

- The AAL would decrease by 0.1% from $326.43 million to $326.08 million under Alternative 1; under Alternative 2, it would decrease by 0.6% to $324.31 million..
- The ADEC would increase by 0.02% of payroll from 0.09% to 0.11% under Alternative 1; under Alternative 2, it would increase by 0.02% of payroll to 0.11%.
- The Employer Contribution would remain unchanged at 0.09% under Alternative 1; under Alternative 2 it would remain unchanged at 0.09%.

	Current Valuation	Reflect Alternative 1 Economic Assumptions	Reflect Demographic Assumptions	Reflect Funding Method	Alternative 1 w/ Five-year Direct Rate Smoothing	Alternative 2 w/ Five-year Direct Rate Smoothing
Employer Contribution						
Employer Normal Cost	0.09%	0.10%	0.11%	0.11%	0.11%	0.11%
Payment for UAAL	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Preliminary ADEC*	0.09%	0.10%	0.11%	0.11%	0.11%	0.11%
Impact of Direct Rate Smoothing	0.00%	0.00%	0.00%	0.00%	-0.02%	-0.02%
Impact of Rate Stabilization Policy	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Employer Contribution	0.09%	0.10%	0.11%	0.11%	0.09%	0.09%
Cumulative Δ in Employer Contribution		0.01%	0.02%	0.02%	0.00%	0.00%
Actuarial Accrued Liability (AAL)	$ 326,431,066	$ 330,991,993	$ 326,079,778	$ 326,079,778	$ 326,079,778	$ 324,311,575
Actuarial Value of Assets (AVA)	361,335,426	361,335,426	361,335,426	361,335,426	361,335,426	361,335,426
Unfunded Accrued Liability (UAAL)	(34,904,360)	(30,343,433)	(35,255,648)	(35,255,648)	(35,255,648)	(37,023,851)
Funded Ratio (AVA / AAL)	110.7%	109.2%	110.8%	110.8%	110.8%	111.4%
Cumulative Δ in UAAL		$ 4,560,927	$ (351,288)	$ (351,288)	$ (351,288)	$ (2,119,491)

* Actuarially Determined Employer Contribution. Note that the employer normal cost includes administrative expenses.

Key Takeaways

Fire and Rescue Squad Workers Pension Fund

	Valuation Component Reviewed	Observation	Recommendation	Financial Impact
Demographic Assumptions				
1	Post-Retirement Mortality Rates	More deaths	Increase rates	Decrease
2	Active Mortality	Limited exposures	Decrease rates	Increase
3	Mortality improvement	SOA projects lower improvement	Update from MP-2015 to MP-2019	Decrease
4	Service retirement	Fewer retirements	Decrease rates	Decrease
5	Disability retirement	Small group	Decrease rates	Immaterial
6	Termination from active employment	Fewer terminations	Decrease rates	Increase
Economic Assumptions				
7	Investment return	Lower projected returns	Reduce 0.50% (Alt 1)/ 0.25% (Alt 2)	Increase
8	Inflation	SSA predicts lower	Lower by 0.50%	Increase
9	Individual pay increases	Not applicable	Not applicable	Not applicable
10	Productivity growth	Decrease not as much as inflation	Increase by 0.25%	Not applicable
Funding Method				
11	Amortization Method	Current method reasonable	No change	No change
12	Actuarial Cost method	Current method reasonable	Refine method - see below	Increase
13	Asset valuation method	Current method reasonable	No change	No change
14	Administrative expenses	Expenses somewhat consistent	no change	No change

Notes:

1. The Pub-2010 Public Retirement Plans Mortality Tables published by the Society of Actuaries in January 2019 provided a closer fit than the previous table which were based on corproate plan expereince, resulting in less modifications.
3. For the fifth consecutive year, the SOA has reduced its projection of mortality improvement, resultings in lower liabilities.
7. Lower investment returns are the largest single source of liability and cost increases
12. The load on normal cost to account for new entrants was increased.

Financial Impact

Fire and Rescue Squad Workers Pension Fund

Had the proposed assumptions and methods been reflected for the December 31, 2019 Actuarial Valuation, the financial impact would have been as follows:

- The AAL would increase by 1.7% from $482.82 million to $490.81 million under Alternative 1; under Alternative 2, it would decrease by 1.2% to $476.87 million..
- The ADEC would increase by $960,533 from $15,182,523 to $16,143,056 under Alternative 1; under Alternative 2, it would decrease by $1,335,686 to $13,846,837.
- The Employer Contribution would remain unchanged at $19,352,208 under Alternative 1; under Alternative 2 it would remain unchanged at $19,352,208.

	Current Valuation	Reflect Alternative 1 Economic Assumptions	Reflect Demographic Assumptions	Reflect Funding Method	Alternative 1 w/ Five-year Direct Rate Smoothing	Alternative 2 w/ Five-year Direct Rate Smoothing
Employer Contribution						
Employer Normal Cost	5,899,243	6,891,433	5,842,163	5,842,163	5,842,163	5,365,284
Payment for UAAL	$ 9,283,280	$ 12,990,298	$ 10,300,893	$ 10,300,893	$ 10,300,893	$ 8,481,553
Preliminary ADEC*	15,182,523	19,881,731	16,143,056	16,143,056	16,143,056	13,846,837
Impact of Direct Rate Smoothing	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Impact of Rate Stabilization Policy	4,169,685	(529,523)	3,209,152	3,209,152	3,209,152	5,505,371
Employer Contribution	$ 19,352,208	$ 19,352,208	$ 19,352,208	$ 19,352,208	$ 19,352,208	$ 19,352,208
Cumulative Δ in Employer Contribution		$ 0	$ 0	$ 0	$ 0	$ 0
Actuarial Accrued Liability (AAL)	$ 482,816,865	$ 511,409,026	$ 490,805,882	$ 490,805,882	$ 490,805,882	$ 476,866,566
Actuarial Value of Assets (AVA)	445,876,956	445,876,956	445,876,956	445,876,956	445,876,956	445,876,956
Unfunded Accrued Liability (UAAL)	36,939,909	65,532,070	44,928,926	44,928,926	44,928,926	30,989,610
Funded Ratio (AVA / AAL)	92.3%	87.2%	90.8%	90.8%	90.8%	93.5%
Cumulative Δ in UAAL		$ 28,592,161	$ 7,989,017	$ 7,989,017	$ 7,989,017	$ (5,950,299)

* Actuarially Determined Employer Contribution. Note that the employer normal cost includes administrative expenses.
Direct rate smoothing is not applicable due to Rate Stabilization Policy.

Key Takeaways

Local Governmental Employees Retirement System - General Employees and Firefighters

Valuation Component Reviewed	Observation	Recommendation	Financial Impact
Demographic Assumptions			
1 Post-Retirement Mortality Rates	Fewer deaths	Decrease rates	Increase
2 Active Mortality	Limited exposures	Decrease rates	Increase
3 Mortality improvement	SOA projects lower improvement	Update from MP-2015 to MP-2019	Decrease
4 Service retirement	Fewer retirements	Decrease rates	Decrease
5 Disability retirement	Fewer disabilities	Decrease rates	Immaterial
6 Termination from active employment	More terminations	Increase rates	Decrease
Economic Assumptions			
7 Investment return	Lower projected returns	Reduce 0.50% (Alt 1)/ 0.25% (Alt 2)	Increase
8 Inflation	SSA predicts lower	Lower by 0.50%	Increase
9 Individual pay increases	Higher Increases	Increase rates	Increase
10 Productivity growth	Decrease not as much as inflation	Increase by 0.25%	Increase
Funding Method			
11 Amortization Method	Current method reasonable	No change	No change
12 Actuarial Cost method	Current method reasonable	Refine method - see below	Decrease
13 Asset valuation method	Current method reasonable	No change	No change
14 Administrative expenses	Expenses lower than assumed	Decrease to 0.13% of payroll	Decrease

Notes:

1. The Pub-2010 Public Retirement Plans Mortality Tables published by the Society of Actuaries in January 2019 provided a closer fit than the previous table which were based on corproate plan expereince, resulting in less modifications.
3. For the fifth consecutive year, the SOA has reduced its projection of mortality improvement, resultings in lower liabilities.
7. Lower investment returns are the largest single source of liability and cost increases
12. The load on normal cost to account for new entrants was increased.
12. The method for calculating terminated vested liability was refined, resulting in a large liability reduction.

Financial Impact

Local Governmental Employees Retirement System - General Employees and Firefighters

Had the proposed assumptions and methods been reflected for the December 31, 2019 Actuarial Valuation, the financial impact would have been as follows:

- The AAL would increase by 3.8% from $30.7 billion to $31.85 billion under Alternative 1; under Alternative 2, it would increase by 0.8% to $30.94 billion.
- The ADEC would increase by 3.21% of payroll from 11.27% to 14.48% under Alternative 1; under Alternative 2, it would increase by 0.53% of payroll to 11.80%.
- The Employer Contribution would increase by 0.63% of payroll from 11.35% to 11.98% under Alternative 1; under Alternative 2 it would increase by 0.09% of payroll to 11.44%.

	Current Valuation	Reflect Alternative 1 Economic Assumptions	Reflect Demographic Assumptions	Reflect Funding Method	Alternative 1 w/ Five-year Direct Rate Smoothing	Alternative 2 w/ Five-year Direct Rate Smoothing
Employer Contribution						
Employer Normal Cost	5.44%	6.78%	6.15%	6.58%	6.58%	5.97%
Payment for UAAL	5.83%	9.25%	9.09%	7.90%	7.90%	5.83%
Preliminary ADEC*	11.27%	16.03%	15.24%	14.48%	14.48%	11.80%
Impact of Direct Rate Smoothing	0.08%	0.00%	0.00%	0.00%	-2.50%	-0.36%
Impact of Rate Stabilization Policy	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Employer Contribution	11.35%	16.03%	15.24%	14.48%	11.98%	11.44%
Cumulative Δ in Employer Contribution		4.68%	3.89%	3.13%	0.63%	0.09%
Actuarial Accrued Liability (AAL)	$ 30,700,921,303	$ 32,580,352,904	$ 32,495,359,213	$ 31,853,585,336	$ 31,853,585,336	$ 30,939,433,947
Actuarial Value of Assets (AVA)	27,435,046,235	27,435,046,235	27,435,046,235	27,435,046,235	27,435,046,235	27,435,046,235
Unfunded Accrued Liability (UAAL)	3,265,875,068	5,145,306,669	5,060,312,978	4,418,539,101	4,418,539,101	3,504,387,712
Funded Ratio (AVA / AAL)	89.4%	84.2%	84.4%	86.1%	86.1%	88.7%
Cumulative Δ in UAAL		$ 1,879,431,601	$ 1,794,437,910	$ 1,152,664,033	$ 1,152,664,033	$ 238,512,644

* Actuarially Determined Employer Contribution. Note that the employer normal cost includes administrative expenses.
Note that the AAL and AVA above is for all of LGERS.

Key Takeaways

Local Governmental Employees Retirement System - Law Enforcement Officers

	Valuation Component Reviewed	Observation	Recommendation	Financial Impact
Demographic Assumptions				
1	Post-Retirement Mortality Rates	More deaths	Increase rates	Decrease
2	Active Mortality	Limited exposures	Decrease rates	Increase
3	Mortality improvement	SOA projects lower improvement	Update from MP-2015 to MP-2019	Decrease
4	Service retirement	More retirements	Increase rates	Increase
5	Disability retirement	Fewer disabilities	Decrease rates	Immaterial
6	Termination from active employment	More terminations	Increase rates	Decrease
Economic Assumptions				
7	Investment return	Lower projected returns	Reduce 0.50% (Alt 1)/ 0.25% (Alt 2)	Increase
8	Inflation	SSA predicts lower	Lower by 0.50%	Increase
9	Individual pay increases	Higher Increases	Increase rates	Increase
10	Productivity growth	Decrease not as much as inflation	Increase by 0.25%	Increase
Funding Method				
11	Amortization Method	Current method reasonable	No change	No change
12	Actuarial Cost method	Current method reasonable	Refine method - see below	Decrease
13	Asset valuation method	Current method reasonable	No change	No change
14	Administrative expenses	Expenses lower than assumed	Keep at zero.	No change

Notes:

1. The Pub-2010 Public Retirement Plans Mortality Tables published by the Society of Actuaries in January 2019 provided a closer fit than the previous table which were based on corproate plan expereince, resulting in less modifications.
3. For the fifth consecutive year, the SOA has reduced its projection of mortality improvement, resultings in lower liabilities.
7. Lower investment returns are the largest single source of liability and cost increases
12. The load on normal cost to account for new entrants was increased.
12. The method for calculating terminated vested liability was refined, resulting in a large liability reduction.

Financial Impact

Local Governmental Employees Retirement System - Law Enforcement Officers

Had the proposed assumptions and methods been reflected for the December 31, 2019 Actuarial Valuation, the financial impact would have been as follows:

- The AAL would increase by 3.8% from $30.7 billion to $31.85 billion under Alternative 1; under Alternative 2, it would increase by 0.8% to $30.94 billion.
- The ADEC would increase by 3.99% of payroll from 12.94% to 16.93% under Alternative 1; under Alternative 2, it would increase by 1.09% of payroll to 14.03%.
- The Employer Contribution would increase by 0.97% of payroll from 12.10% to 13.07% under Alternative 1; under Alternative 2 it would increase by 0.39% of payroll to 12.49%.

	Current Valuation	Reflect Alternative 1 Economic Assumptions	Reflect Demographic Assumptions	Reflect Funding Method	Alternative 1 w/ Five-year Direct Rate Smoothing	Alternative 2 w/ Five-year Direct Rate Smoothing
Employer Contribution						
Employer Normal Cost	7.11%	8.84%	8.60%	9.03%	9.03%	8.20%
Payment for UAAL	5.83%	9.25%	9.09%	7.90%	7.90%	5.83%
Preliminary ADEC*	12.94%	18.09%	17.69%	16.93%	16.93%	14.03%
Impact of Direct Rate Smoothing	-0.84%	0.00%	0.00%	0.00%	-3.86%	-1.54%
Impact of Rate Stabilization Policy	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Employer Contribution	12.10%	18.09%	17.69%	16.93%	13.07%	12.49%
Cumulative Δ in Employer Contribution		5.99%	5.59%	4.83%	0.97%	0.39%
Actuarial Accrued Liability (AAL)	$ 30,700,921,303	$ 32,580,352,904	$ 32,495,359,213	$ 31,853,585,336	$ 31,853,585,336	$ 30,939,433,947
Actuarial Value of Assets (AVA)	27,435,046,235	27,435,046,235	27,435,046,235	27,435,046,235	27,435,046,235	27,435,046,235
Unfunded Accrued Liability (UAAL)	3,265,875,068	5,145,306,669	5,060,312,978	4,418,539,101	4,418,539,101	3,504,387,712
Funded Ratio (AVA / AAL)	89.4%	84.2%	84.4%	86.1%	86.1%	88.7%
Cumulative Δ in UAAL		$ 1,879,431,601	$ 1,794,437,910	$ 1,152,664,033	$ 1,152,664,033	$ 238,512,644

* Actuarially Determined Employer Contribution. Note that the employer normal cost includes administrative expenses.
Note that the AAL and AVA above is for all of LGERS.

Projections
LGERS

- Projections of contribution requirements and funded status into the future can be helpful planning tools for stakeholders. This section provides such projections. The projections of the actuarial valuation are known as deterministic projections. Deterministic projections are based on one scenario in the future. The baseline deterministic projection is based on December 31, 2018 valuation results and assumptions.

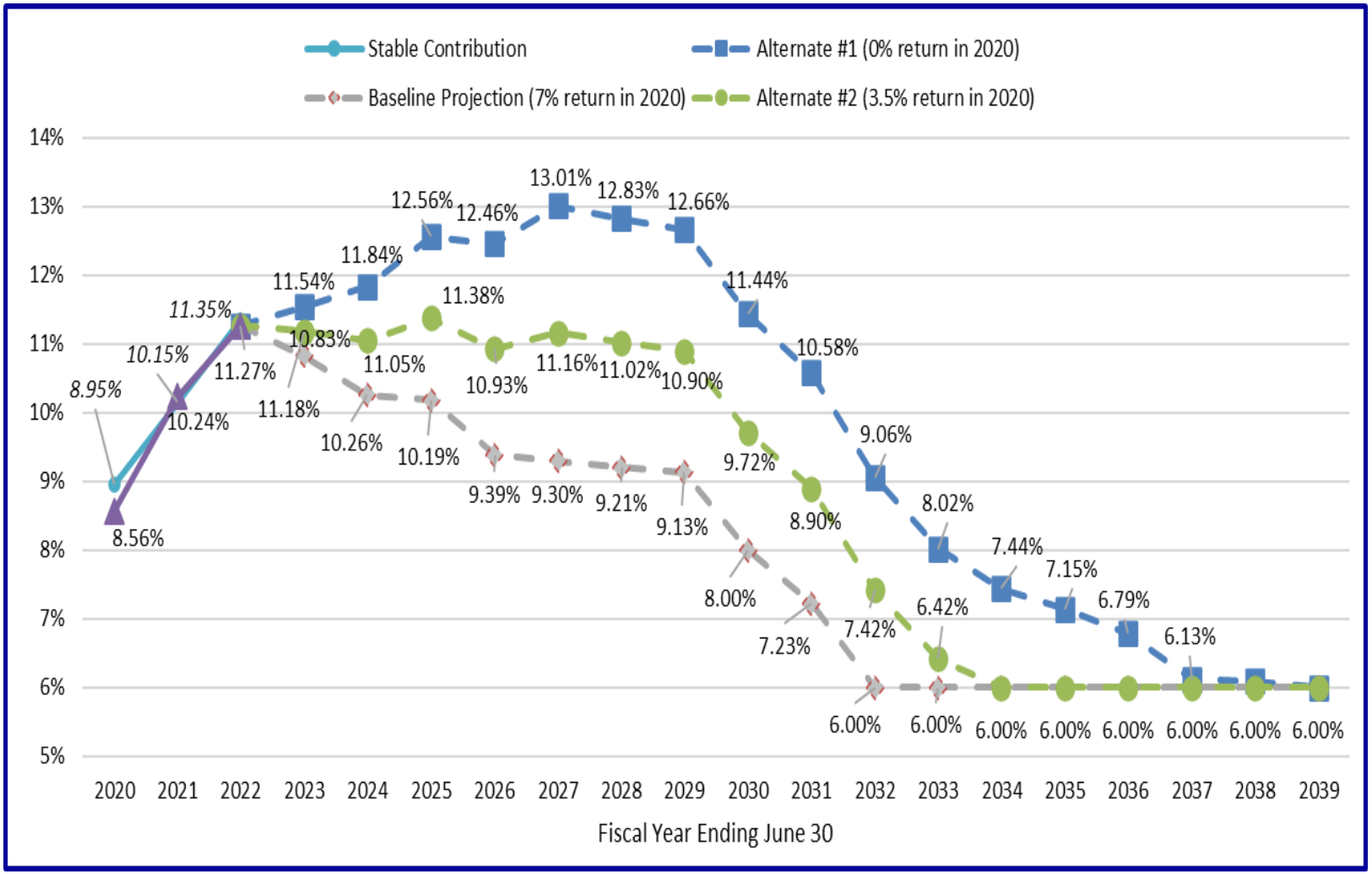
- Key Projection Assumptions
  - Valuation interest rate of 7.00% for all years in conjunction with direct rate smoothing of the employer contribution rate over a 3-year period beginning July 1, 2019.
  - Baseline investment return of 14.88% on market value of assets in calendar 2019 and 7.00% thereafter.
  - Actuarial assumptions and methods as described in Appendix D of the latest actuarial valuation report. All future demographic experience is assumed to be exactly realized.
  - The contribution rate under the Employer Contribution Rate Stabilization Policy (ECRSP) and Direct Rate Smoothing is contributed until fiscal year ending 2022.
  - The actuarially determined employer contribution rate is contributed for fiscal years ending 2023 and beyond.
  - 0% increase in the total active member population
  - No cost-of-living adjustments granted
  - Future pay increases based on long-term salary increase assumptions

Projections
LGERS

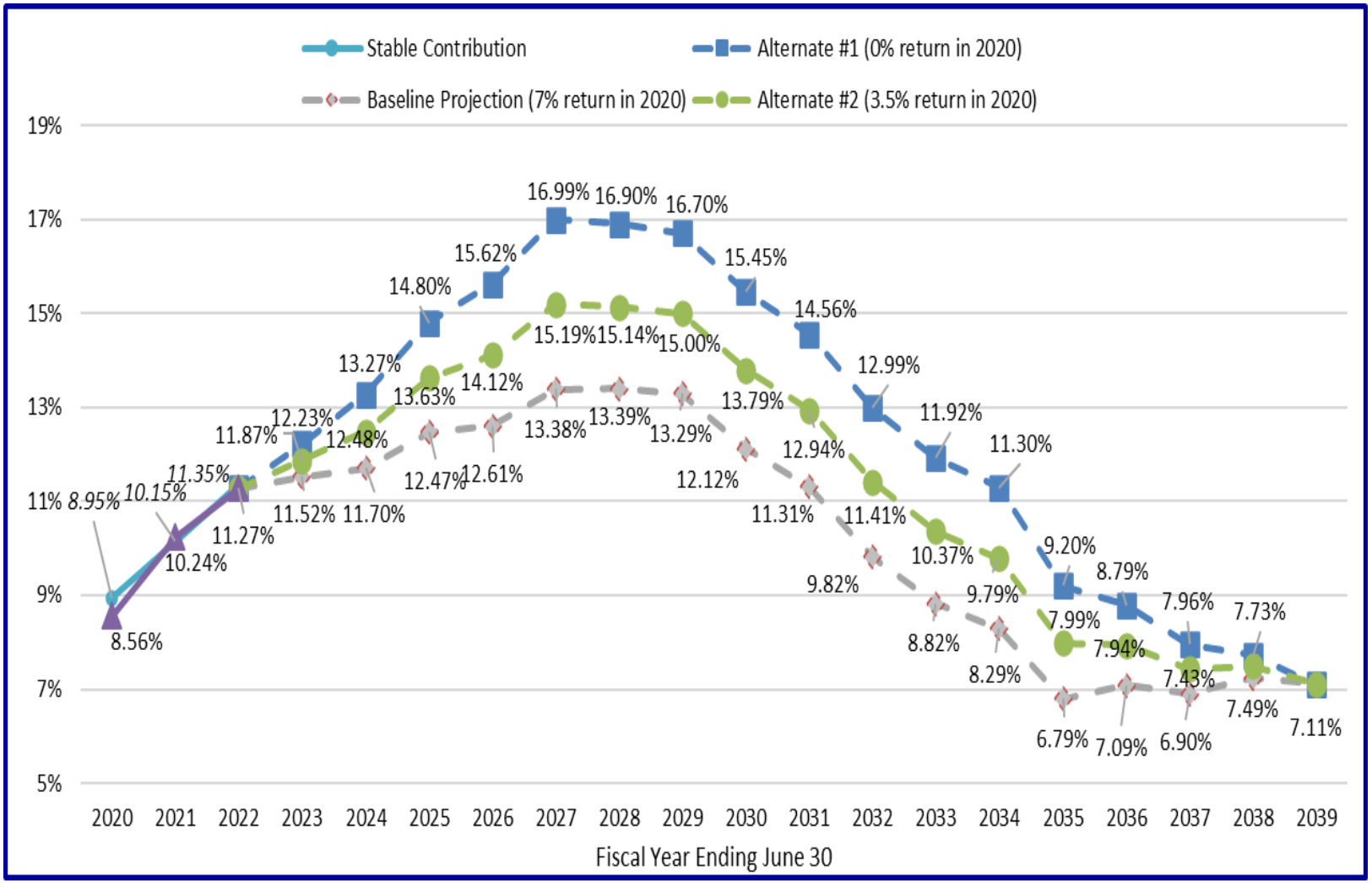
- The revised ECRSP adopted by the Board of Trustees on January 31, 2019 requires that recommended contributions for general employees be set at 8.95% of payroll for fiscal year ending 2020, 10.15% for fiscal year ending 2021, and 11.35% for fiscal year ending 2022, with the following additional adjustments, if applicable:
  - If the underlying actuarially determined employer contribution rate (ADEC) for a given fiscal year is 50% higher than the scheduled employer contribution rate for that fiscal year, the scheduled employer contribution rate for the current and future fiscal years increases 0.50%;
  - If the underlying ADEC for a given fiscal year is 50% lower than the scheduled employer contribution rate for that fiscal year, the scheduled employer contribution rate for the current and future fiscal year decreases 0.50%;
  - If the General Assembly grants any additional COLA beyond the amount of COLA granted by the Board, increases the multiplier for active employees, or changes the benefit structure in a way that has a cost to the system, the schedule of contributions for the current and future fiscal years will be increased by the cost of the benefit enhancement. The cost of any COLA granted by the Board under the authority allowed by statute will not impact the scheduled contribution rates.
  - Contribution rates for law enforcement officers will be 0.75% higher than contribution rates for general employees.

- In addition, we have provided alternate deterministic projections:
  - Estimated 2020 asset return of 0.00%
  - 6.50% investment return assumption based on:
    - Valuation interest rate of 6.50% for all years in conjunction with direct rate smoothing of the employer contribution rate over a 5-year period beginning July 1, 2022; includes 2.50% inflation.
    - Investment return on market value of assets of 6.50% beginning December 31, 2020.
    - Direct rate smoothing of employer contribution rate over a 5-year period beginning July 1, 2022 through June 30, 2027

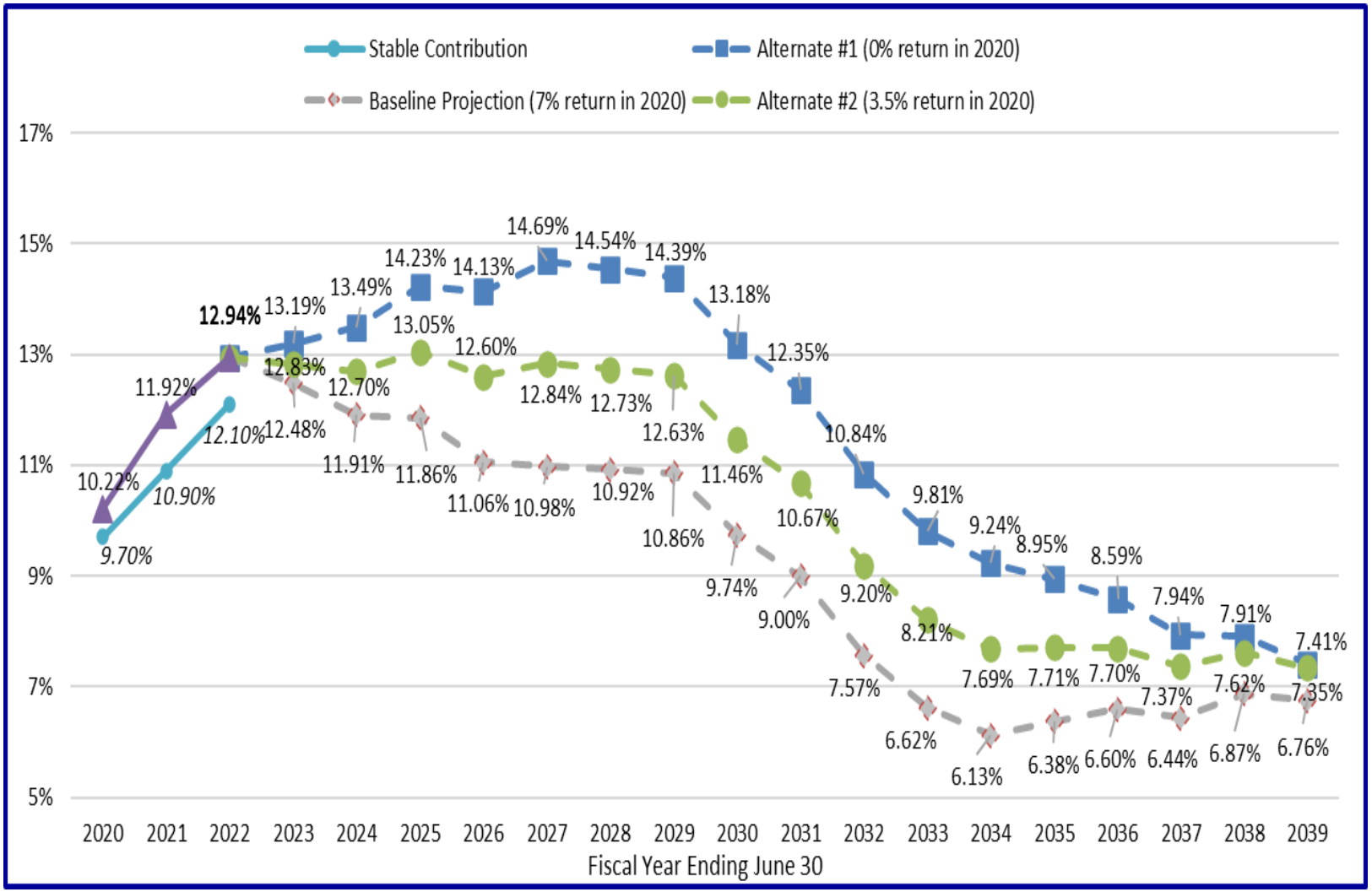
Contribution Rate Projection General Employees and Firefighters- Current Assumptions



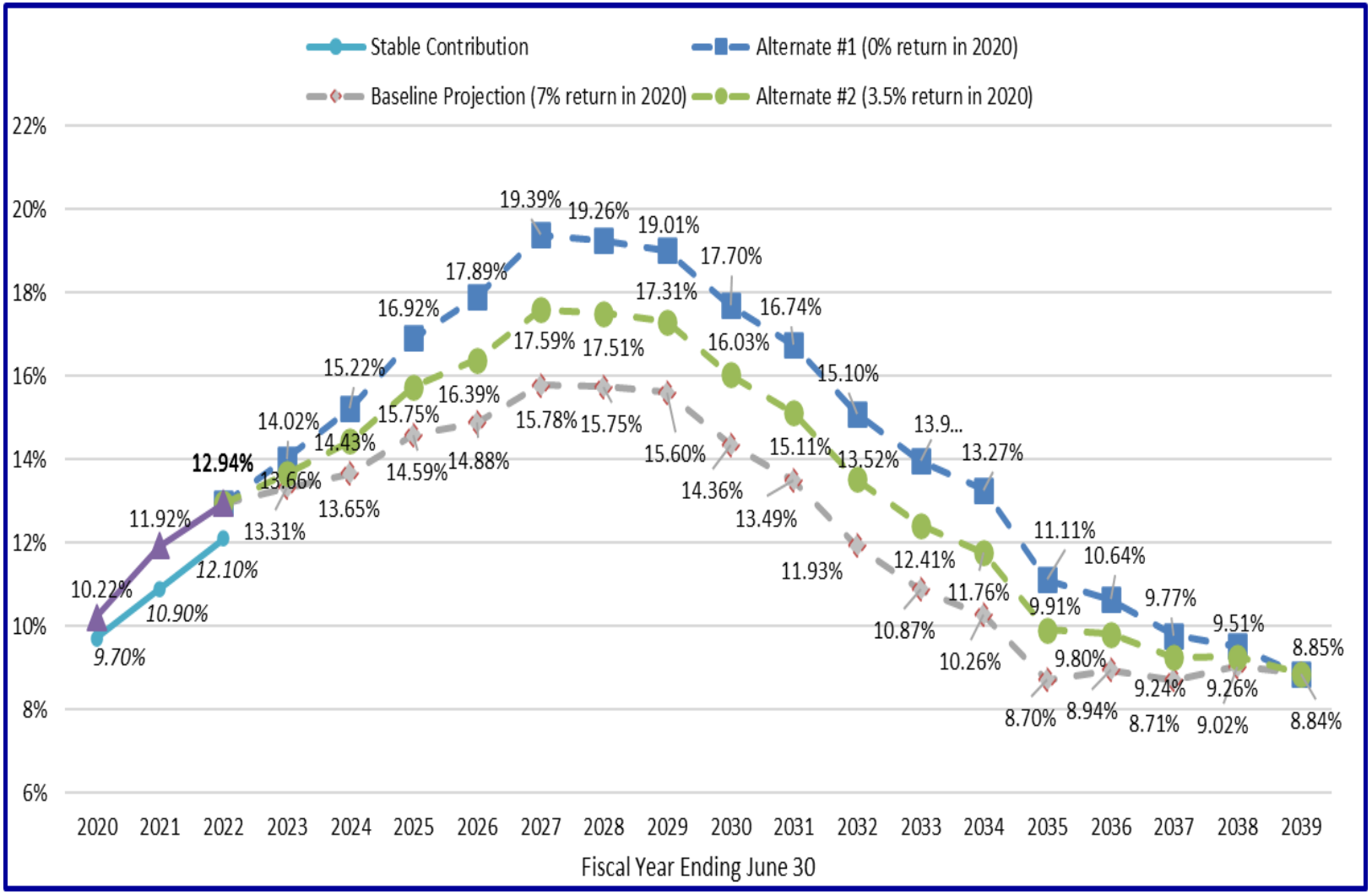
Contribution Rate Projection General Employees and Firefighters- Proposed Assumptions



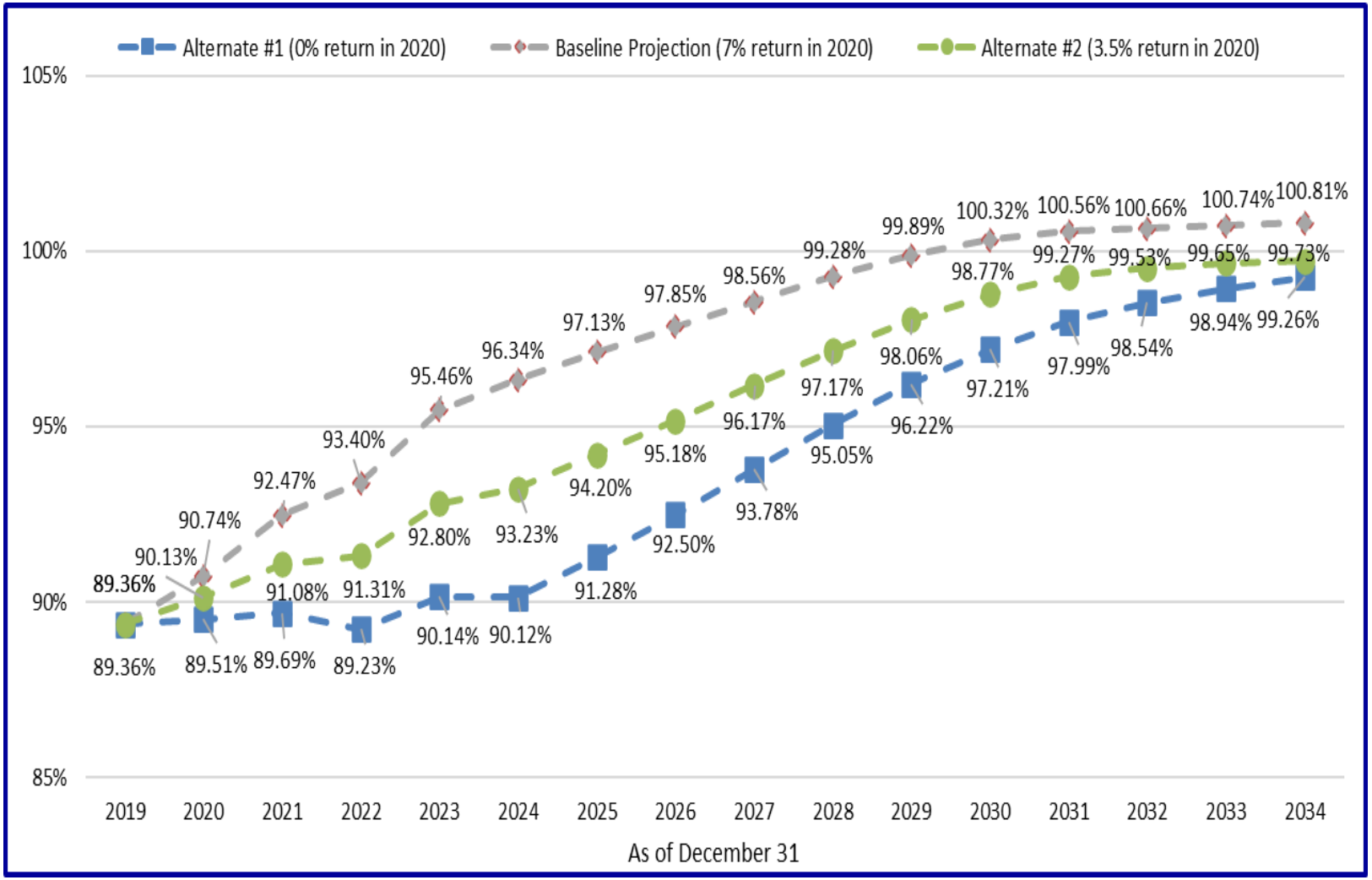
Contribution Rate Projection Law Enforcement Officers- Current Assumptions



Contribution Rate Projection Law Enforcement Officers- Proposed Assumptions

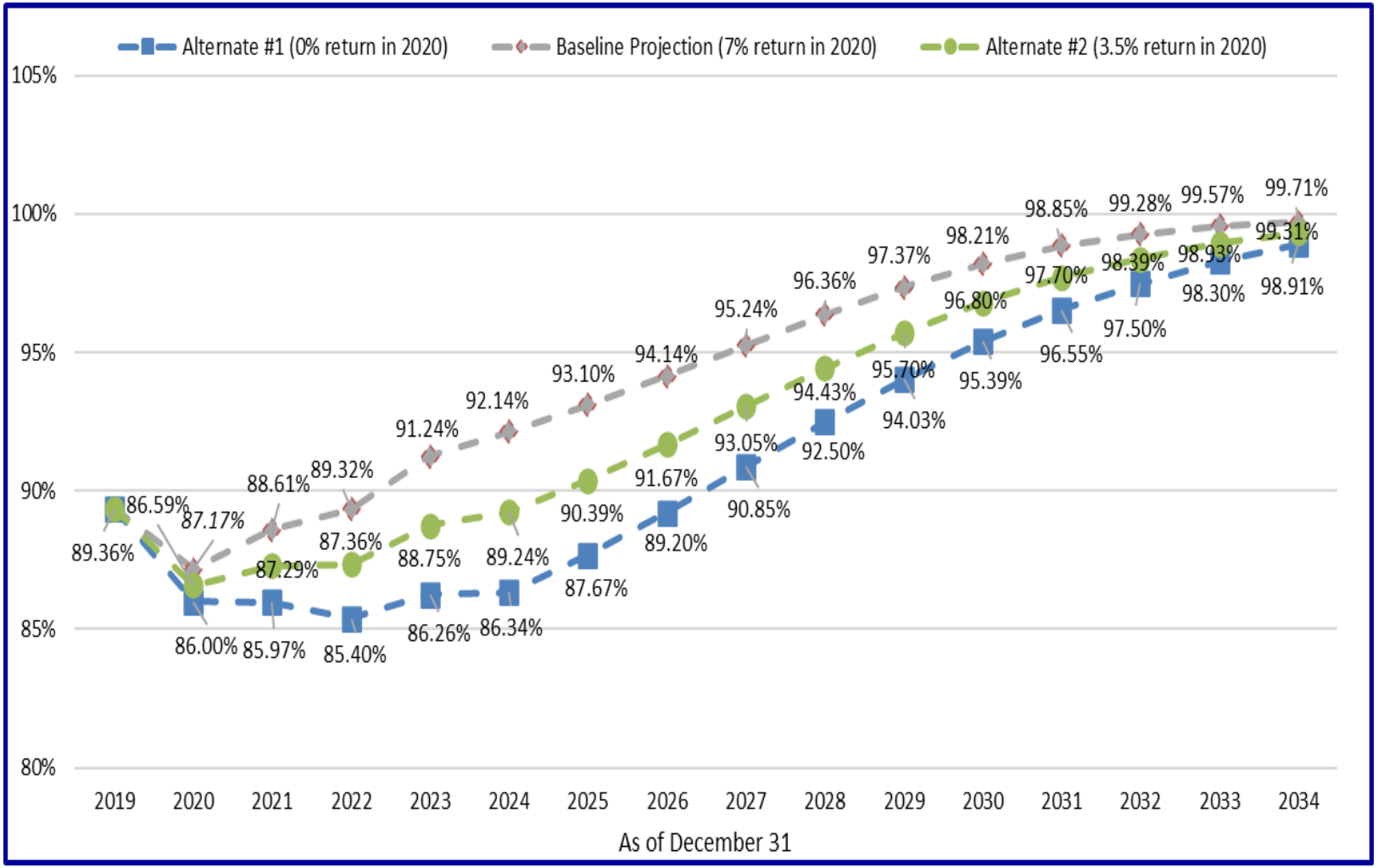


Funded Ratio
Projection - Current Assumptions



North Carolina
Total Retirement Plans

Funded Ratio Projection - Proposed Assumptions



Key Takeaways

Register of Deeds' Supplemental Pension Fund

Valuation Component Reviewed	Observation	Recommendation	Financial Impact
Demographic Assumptions			
1 Post-Retirement Mortality Rates	Fewer deaths	Decrease rates	Increase
2 Active Mortality	Limited exposures	Decrease rates	Increase
3 Mortality improvement	SOA projects lower improvement	Update from MP-2015 to MP-2019	Decrease
4 Service retirement	Fewer retirements	Decrease rates	Decrease
5 Disability retirement	Fewer disabilities	Decrease rates	Immaterial
6 Termination from active employment	More terminations	Increase rates	Decrease
Economic Assumptions			
7 Investment return	Lower projected returns	Reduce 0.75% (Alt 1)/ 0.50% (Alt 2)	Increase
8 Inflation	SSA predicts lower	Lower by 0.50%	Increase
9 Individual pay increases	Higher Increases	Increase rates	Increase
10 Productivity growth	Decrease not as much as inflation	Increase by 0.25%	Increase
Funding Method			
11 Amortization Method	Current method reasonable	No change	No change
12 Actuarial Cost method	Current method reasonable	Refine method - see below	Increase
13 Asset valuation method	Current method reasonable	No change	No change
14 Administrative expenses	Expenses lower than assumed	Decrease rate	Decrease

Notes:

1. The Pub-2010 Public Retirement Plans Mortality Tables published by the Society of Actuaries in January 2019 provided a closer fit than the previous table which were based on corproate plan expereince, resulting in less modifications.
3. For the fifth consecutive year, the SOA has reduced its projection of mortality improvement, resultings in lower liabilities.
7. Lower investment returns are the largest single source of liability and cost increases
12. The load on normal cost to account for new entrants was increased.
12. Previously unreflected provisions included.

Financial Impact

Register of Deeds' Supplemental Pension Fund

Had the proposed assumptions and methods been reflected for the December 31, 2019 Actuarial Valuation, the financial impact would have been as follows:

- The AAL would increase by 5.8% from $30.91 million to $32.71 million under Alternative 1; under Alternative 2, it would increase by 3.1% to $31.86 million.
- The ADEC would remain unchanged at $0 under Alternative 1; under Alternative 2, it would remain unchanged at $0.
- The Employer Contribution would remain unchanged at $0 under Alternative 1; under Alternative 2 it would remain unchanged at $0.

	Current Valuation	Reflect Alternative 1 Economic Assumptions	Reflect Demographic Assumptions	Reflect Funding Method	Alternative 1 w/ Five-year Direct Rate Smoothing	Alternative 2 w/ Five-year Direct Rate Smoothing
Employer Contribution						
Employer Normal Cost	1,079,297	1,249,870	1,308,822	1,353,046	1,353,046	1,292,084
Payment for UAAL	$ (1,079,297)	$ (1,249,870)	$ (1,308,822)	$ (1,353,046)	$ (1,353,046)	$ (1,292,084)
Preliminary ADEC*	0	0	0	0	0	0
Impact of Direct Rate Smoothing	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Impact of Rate Stabilization Policy	0	0	0	0	0	0
Employer Contribution	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
Cumulative Δ in Employer Contribution		$ 0	$ 0	$ 0	$ 0	$ 0
Actuarial Accrued Liability (AAL)	$ 30,907,611	$ 33,374,940	$ 33,107,362	$ 32,708,957	$ 32,708,957	$ 31,858,185
Actuarial Value of Assets (AVA)	50,389,452	50,389,452	50,389,452	50,389,452	50,389,452	50,389,452
Unfunded Accrued Liability (UAAL)	(19,481,841)	(17,014,512)	(17,282,090)	(17,680,495)	(17,680,495)	(18,531,267)
Funded Ratio (AVA / AAL)	163.0%	151.0%	152.2%	154.1%	154.1%	158.2%
Cumulative Δ in UAAL		$ 2,467,329	$ 2,199,751	$ 1,801,346	$ 1,801,346	$ 950,574

* Actuarially Determined Employer Contribution. Note that the employer normal cost includes administrative expenses.

Financial Impact

Death Benefit Plans

	Current Valuation	Alternative 1	Alternative 2
Teachers' and State Employees' Retirement System Death Benefit Plan			
Liabilities	$ 169,651,732	$ 163,695,331	$ 160,918,265
Current Assets	58,812,369	58,812,369	58,812,369
Present Value of Future Contributions	256,670,319	254,505,681	249,644,940
Surplus / (Deficit)	145,830,956	149,622,719	147,539,044
Δ in Surplus/(Deficit		3,791,763	1,708,088
Local Governmental Employees' Retirement System Death Benefit Plan			
Liabilities	$ 58,975,706	$ 52,993,061	$ 52,025,503
Current Assets	88,568,566	88,568,566	88,568,566
Present Value of Future Contributions	43,141,531	39,207,132	38,400,828
Surplus / (Deficit)	72,734,391	74,782,637	74,943,891
Δ in Surplus/(Deficit		2,048,246	2,209,500
Separate Insurance Benefits Plan for Law Enforcement Officers			
Liabilities	$ 37,917,284	$ 46,212,762	$ 43,414,858
Current Assets	59,136,649	59,136,649	59,136,649
Present Value of Future Contributions	0	0	0
Surplus / (Deficit)	21,219,365	12,923,887	15,721,791
Δ in Surplus/(Deficit		(8,295,478)	(5,497,574)
Retirees' Contributory Death Benefit Plan			
Liabilities	$ 1,266,494,557	$ 1,458,950,966	$ 1,375,347,090
Current Assets	271,691,476	271,691,476	271,691,476
Present Value of Future Contributions	967,643,306	1,039,448,340	992,257,484
Surplus / (Deficit)	(27,159,775)	(147,811,150)	(111,398,130)
Δ in Surplus/(Deficit		(120,651,375)	(84,238,355)

Items Studied during the Experience Review

Economic Assumptions

Economic Assumptions

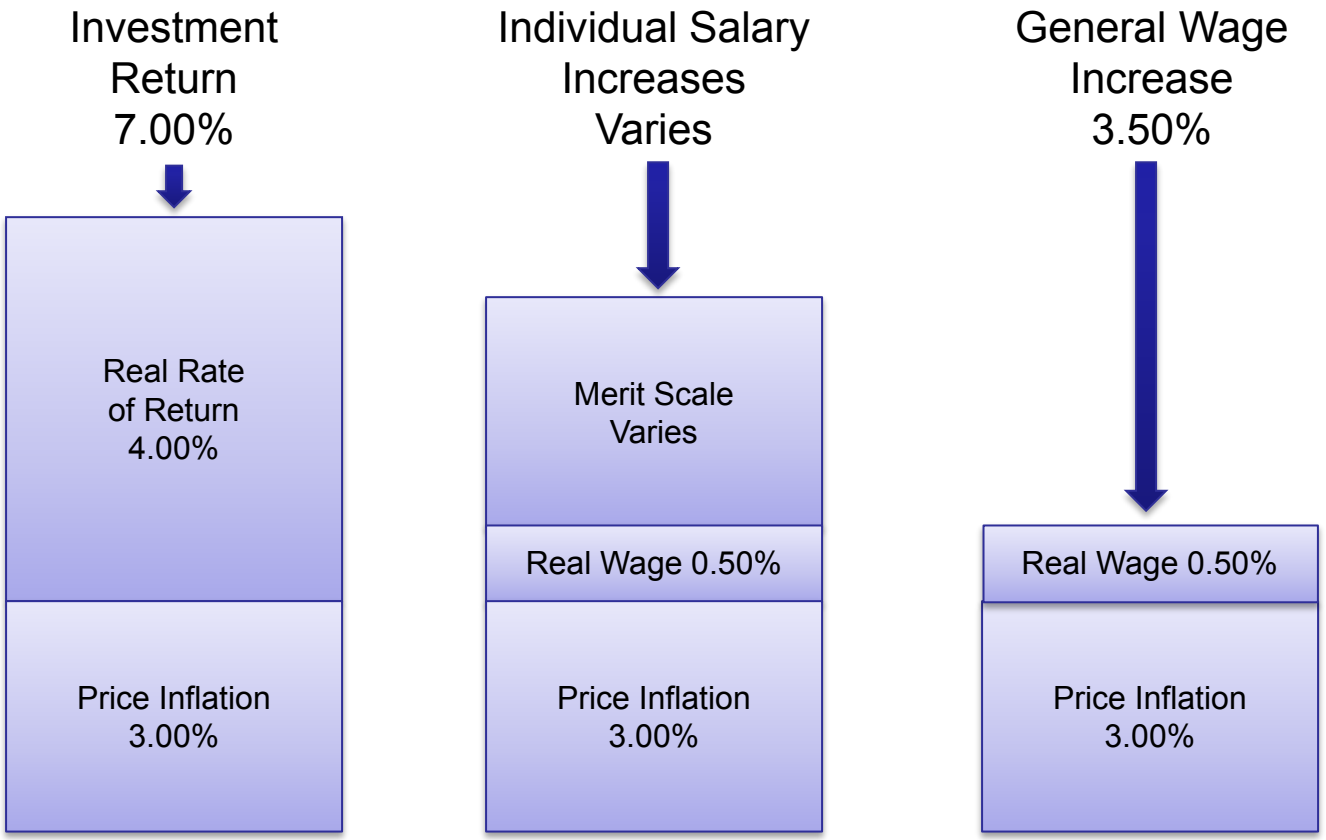
- Inflation
- Investment return
- Real return
- Individual salary increases
- Real wage growth
- Social Security increases
- System payroll growth

Economic Assumptions are assumptions related to money. They tend to be driven by external factors outside of the control of stakeholders.

Economic Assumptions are set based on ASOP 27. They tend to be based on the future economic environment.

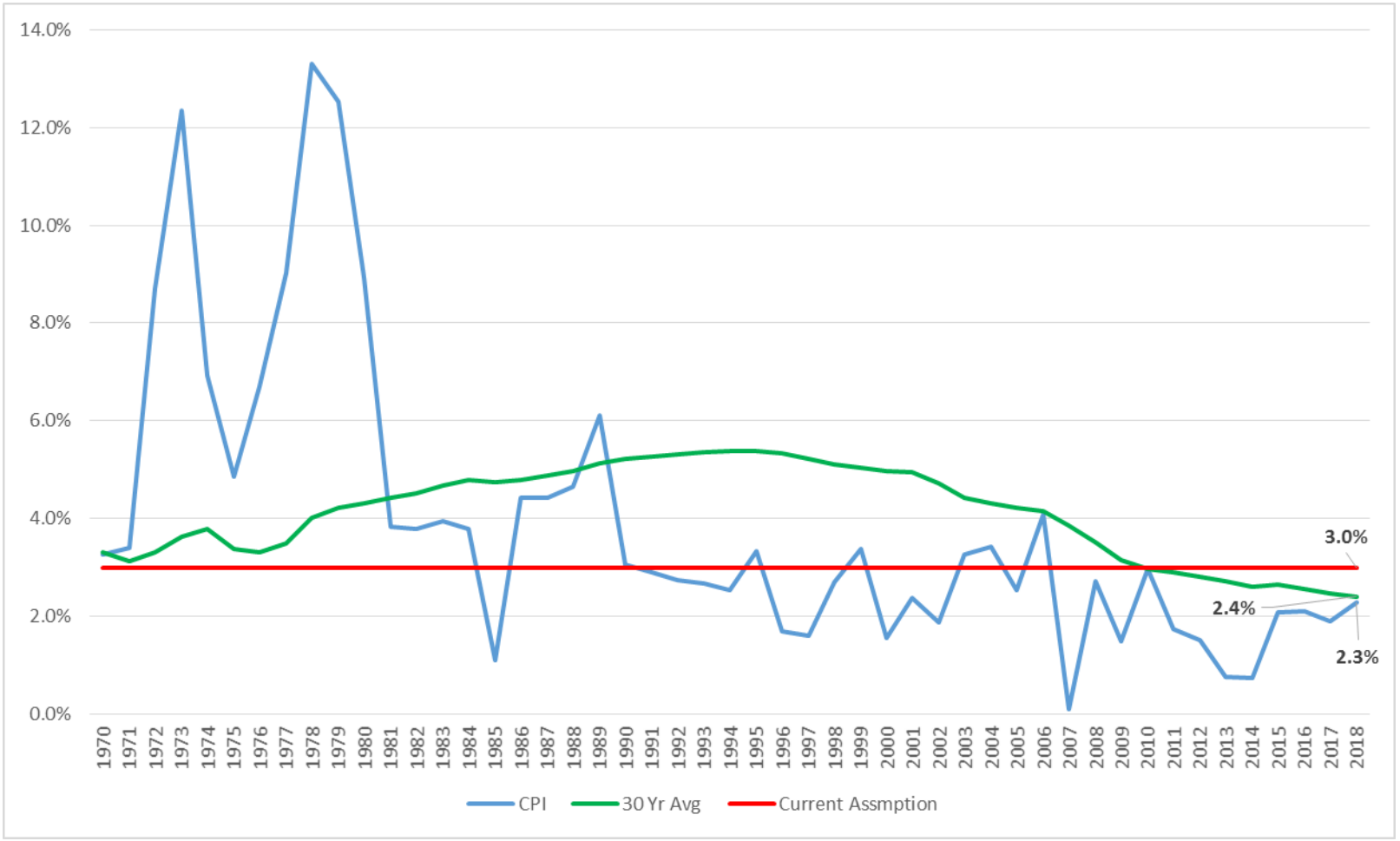
North Carolina
Total Retirement Plans

Economic Assumptions
Building Block Method

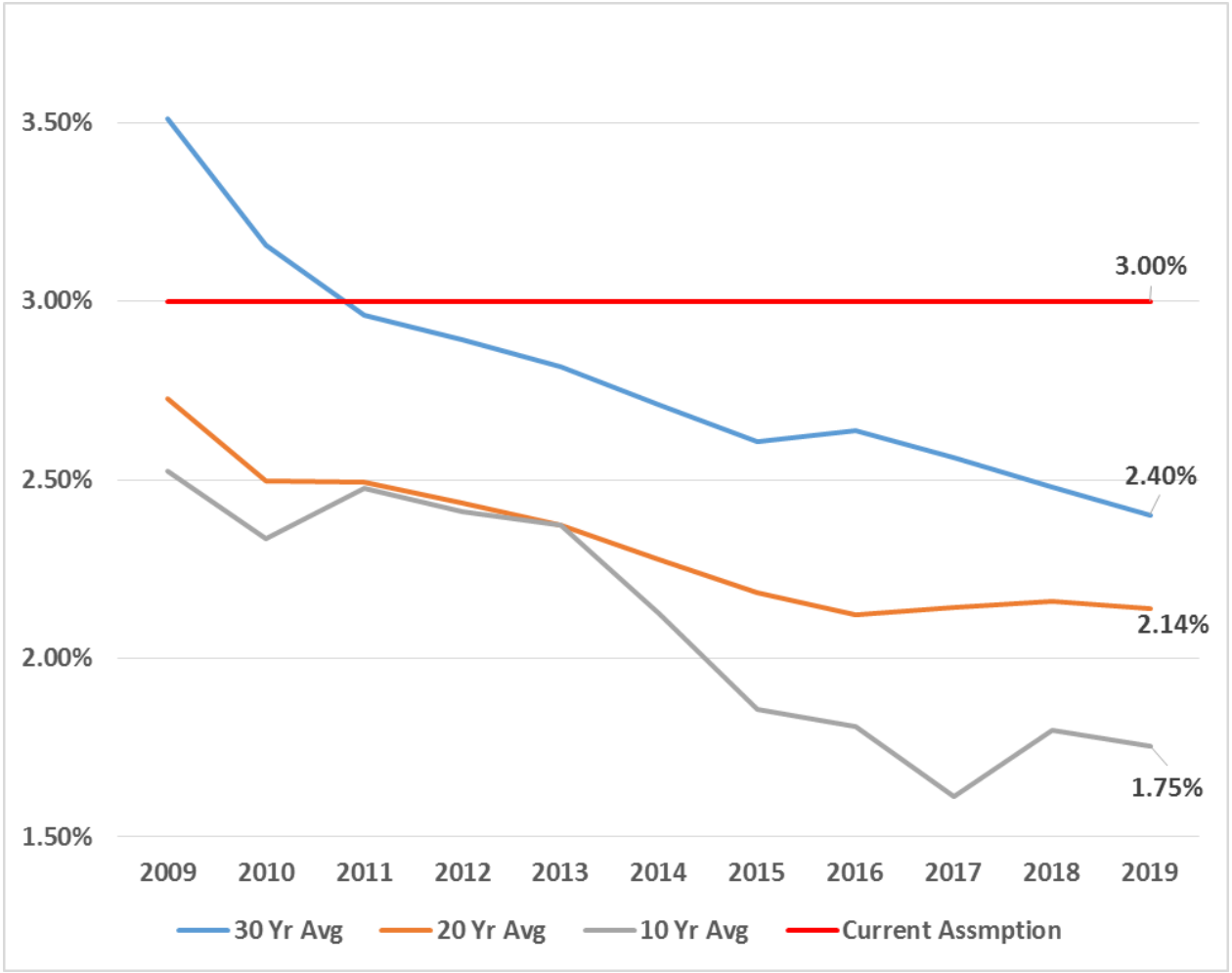


The building block approach used for setting economic assumptions calls for consistency across all assumptions. For example, the same price inflation should be used for the investment return, individual salary increases and general wage increase assumption.

CPI Last 50 Years



Rolling CPI Averages



Federal Reserve Board Monetary Policy

- Policy during most of the post WWII period was to combat price inflation
- Policy since 2012 has been to have an inflation target of 2.0%
  - Price index target is the Personal Consumption Expenditures index (PCE)
  - Since 2000, the CPI has averaged 0.5% higher than the PCE
  - Since 2008, the CPI has averaged 0.3% higher than the PCE
- A “symmetric” 2.0% target has been discussed which indicates a willingness to let inflation run higher than the 2.0% target

PCE, PCE Target, and CPI

CPI is based on a fixed basket of consumer goods while the PCE basket of goods changes with substitution.

For example, if there were an outbreak of mad cow disease and the price of beef skyrocketed, the CPI will reflect the total increase in price. If consumers bought less beef and substituted pork, the PCE will reflect the shift in consumer behavior – the basket of goods would change to more pork and less beef.

2020 Social Security Report
Long Range Inflation Assumption*

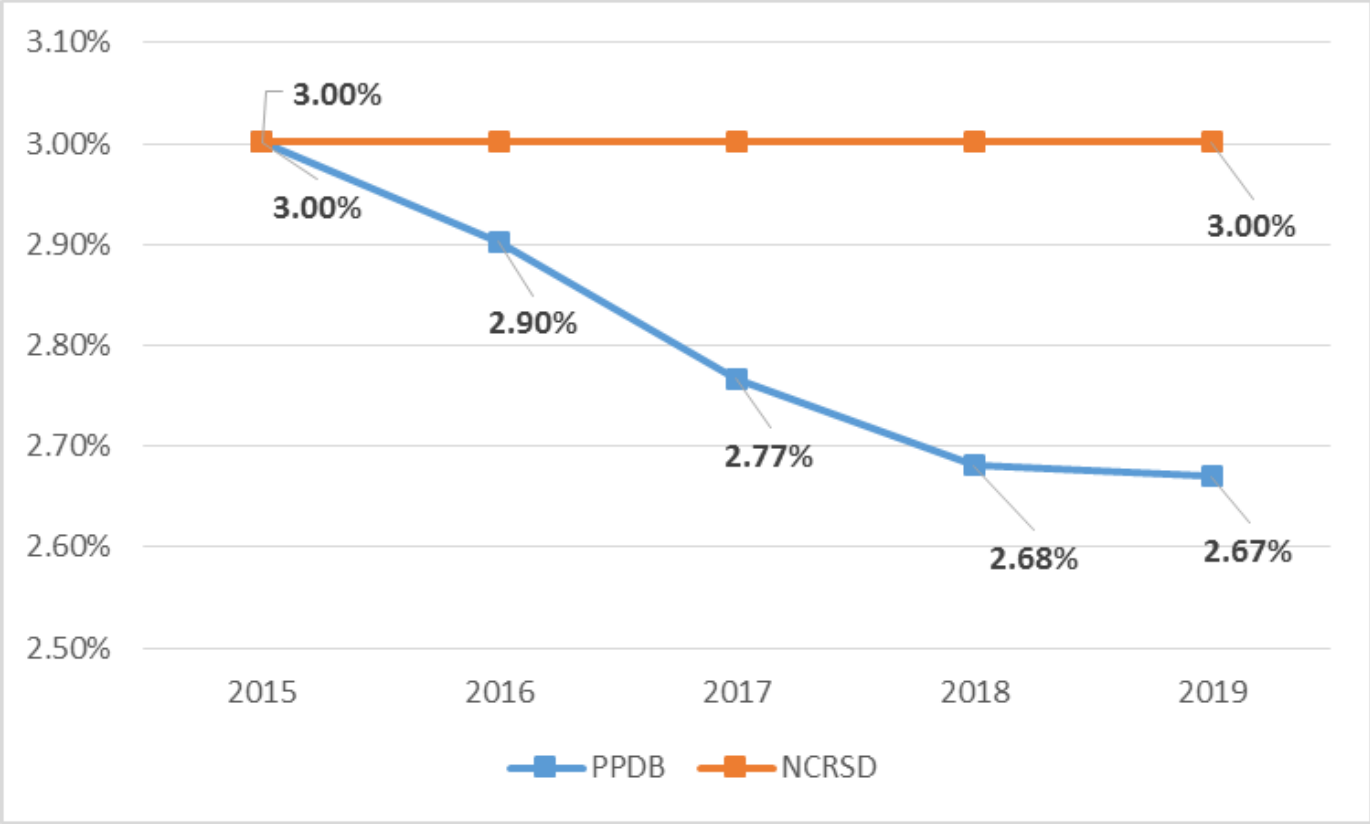
- High: 3.0%
- Intermediate: 2.4%
- Low: 1.8%

*From “The Long-Range Economic Assumptions for the 2020 Trustees Report” authored by the Office of the Chief Actuary of the Social Security Administration dated April 22, 2020

https://www.ssa.gov/OACT/TR/2020/2020_Long-Range_Economic_Assumptions.pdf

North Carolina
Total Retirement Plans

Average Assumed Inflation Rate Public Plans Database*

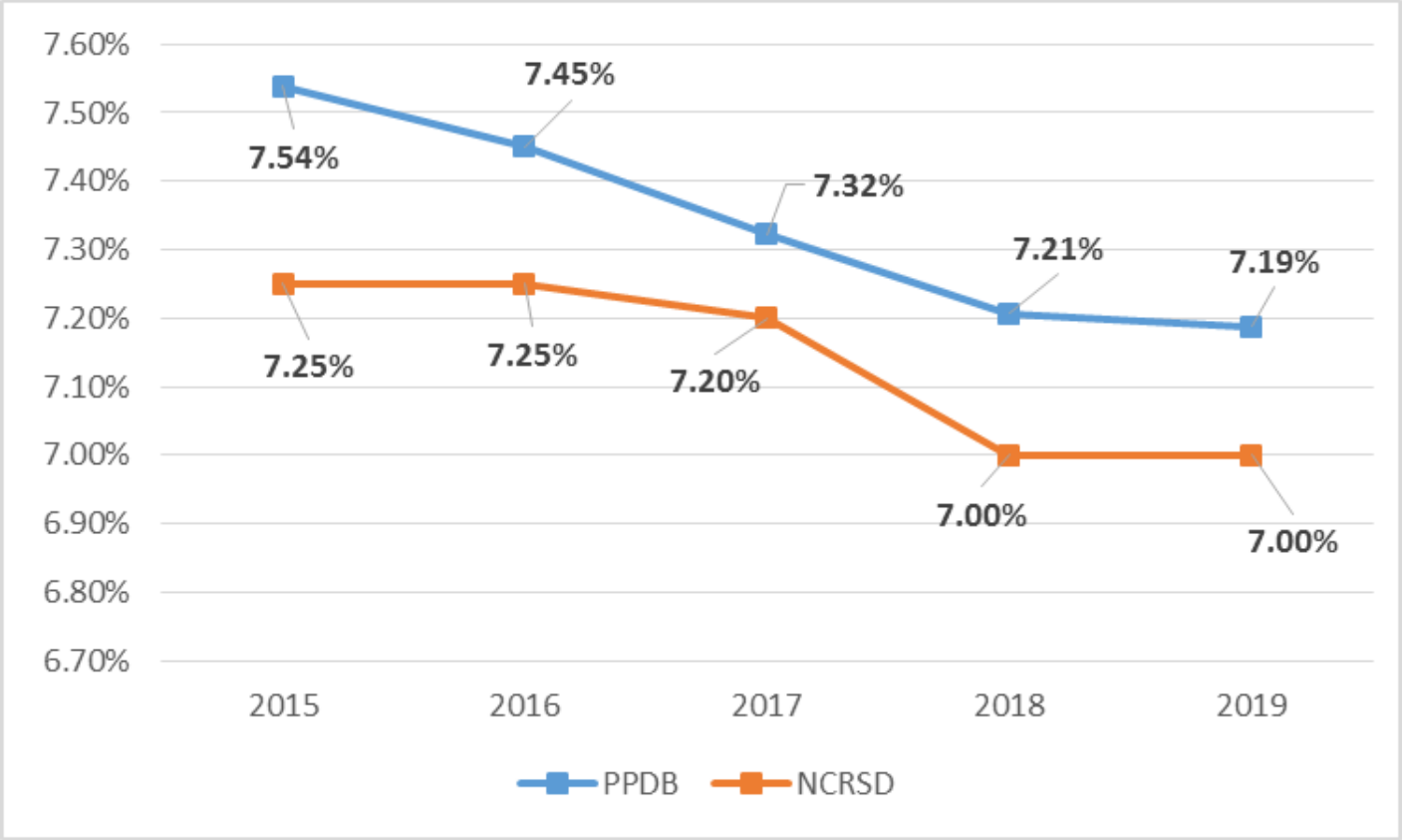


*From the Center for Retirement Research at Boston College

- https://publicplansdata.org/

North Carolina
Total Retirement Plans

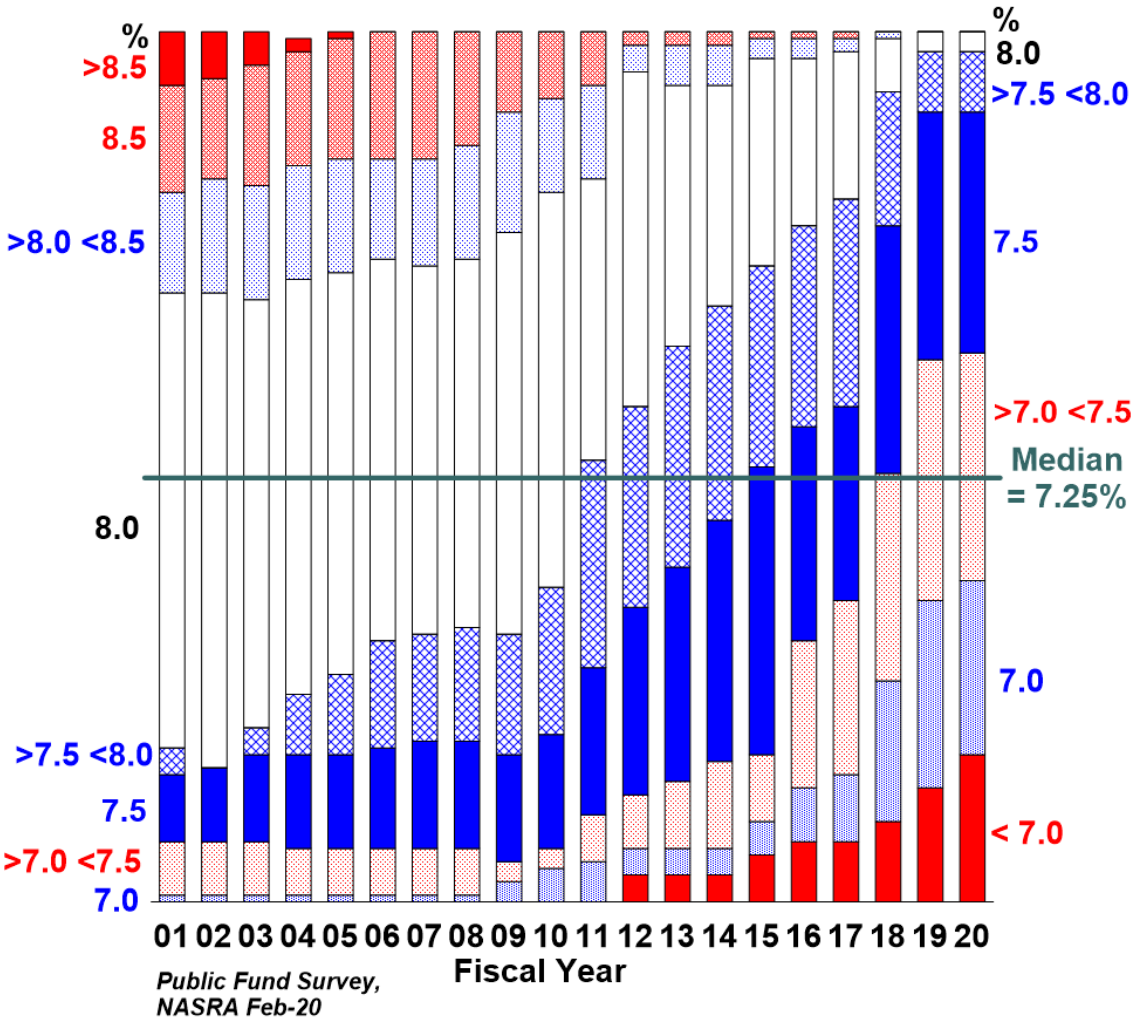
Average Expected Return Assumption Public Plans Database*



*From the Center for Retirement Research at Boston College

- https://publicplansdata.org/

Change in Distribution of Public Pension Investment Return Assumptions (NASRA)



https://www.nasra.org/files/Issue%20Briefs/NASRAInvReturnAssumptBrief.pdf

The reduction in assumed returns over the past 20 years has been driven by lower expectations of future returns by investment professionals and has resulted in increases in liabilities and employer contribution rates.

The latest information presented to the IAC puts NCRS at the 6th percentile in long-term investment risk, and the 7.0% return assumption is well over 10th percentile among peers.

https://files.nc.gov/nctreasurer/documents/files/IMD/MeetingDocuments/5-20-20_iac_performance_presentation.pdf

Expected Returns - Asset Allocation Studies and Actuarial Assumptions

The following slide was presented at the April 2018 Board Meeting. This information was a primary consideration for reducing the investment return assumption to 7.00%.

Current Information

2016 IMD Asset Allocation Study

- Study performed in 2016
  - Based on market conditions and asset allocation as of year-end 2015
  - Incorporates Employer Contribution Rate Stabilization Policies adopted by Boards in 2016
- Expected range of annualized passive compound returns is summarized below
  - All returns are net of expenses
- Both 7.25% (pre-2017 assumption) and 7.20% (adopted in 2017) are somewhat greater than the median 20-year expected return, and close to (but greater than) median 30-year expected return
- At Feb. 2018 Investment Advisory Committee meeting, it was noted that there have been only modest changes in return expectations since the 2016 study, so that there is no urgent need for a new study

Horizon	5th Percentile	25th Percentile	50th Percentile	75th Percentile	95th Percentile
10 Years	0.2%	4.0%	5.9%	8.0%	11.5%
20 Years	2.2%	4.8%	6.7%	8.5%	11.8%
30 Years	3.1%	5.3%	7.1%	8.7%	12.0%

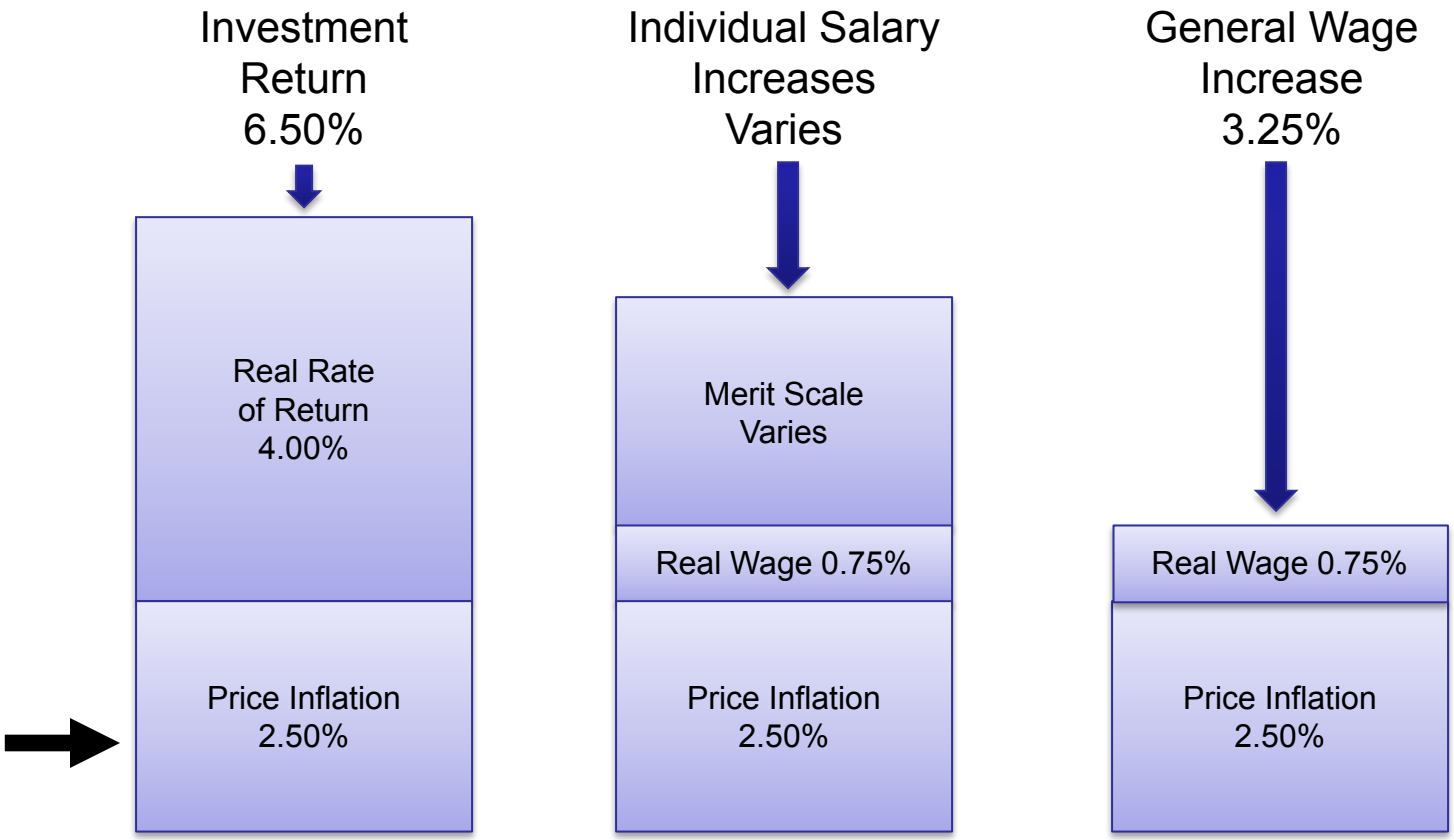
Source: North Carolina Department of State Treasurer and Buck Consulting

North Carolina Total Retirement Plans

9

Projected returns are based on the asset allocation, which is a key consideration to setting the investment return assumption.

Economic Assumptions
Building Block Method



The building block approach used for setting economic assumptions calls for consistency across all assumptions. For example, the same price inflation should be used for the investment return, individual salary increases and general wage increase assumption. The reduction in price inflation impacts investment return, individual salary increases and general wage increases.

Salary Increases

- Generally, a participant's compensation will increase over the long term based on Inflation + Productivity Growth + Merit Adjustments
- We recommend Inflation be reduced to 2.50%
- We recommend Productivity Growth be increased to 0.75%. Wage inflation did not decline as much as consumer prices.
- Merit Adjustments are increases in a member's salary unrelated to above
  - CMC removed the current Inflation and Productivity Growth assumption (3.50%) from actual salaries to determine Merit Adjustments for each member over 2015 – 2019
  - We then studied Merit Adjustments by service and employee group
- Overall salary increases were generally lower across all groups
- Higher (lower) salary increases result in higher (lower) estimated benefits and higher (lower) projected costs.
- Because contributions are financed over projected payroll, higher (lower) salary increases tend to defer (accelerate) employer contributions.
- Tables of the proposed salary merit increase rates can be found in the Appendix.

Other Economic Assumptions – Disability Income Plan

- Medical Premium Trend
  - Recommend using the same assumptions as the State Health Plan
- Expected Across-the-Board Salary Increases
  - For disability events that first occur on or after January 1, 1988, extended STD and LTD benefits (before reductions) recommend assuming an increase of 3.25% per year (inflation + productivity). Otherwise, no increases will be assumed.
- Expected Long-term National Average Wage Growth
  - Recommend 3.25% per year (inflation + productivity) for the purposes of calculating Social Security benefits.
- Expected Future Increases in Social Security Benefits
  - For disability events that first occur on or after January 1, 1988, recommend Social Security disability benefits be assumed to increase by 2.50% per year (inflation). Otherwise, no increases will be assumed.

Items Studied during the Experience Review

Demographic Assumptions

Demographic Assumptions

- Mortality
- Retirement
- Termination
- Disability
- Other Demographic Assumptions

Demographic Assumptions are assumptions related to people. They tend to be established based on behavior of the members of the retirement system.

Demographic assumptions are set based on ASOP 35 and should reflect the best estimate of future experience, which is typically informed by studying trends in census information over the experience review period.

Demographic Assumptions

Mortality

Mortality

- Mortality tables vary by age, gender, employee group and health status
  - Current retiree mortality rates are based on RP-2014 tables adjusted to reflect various TSERS and LGERS populations
  - Since the last review public sector tables, collectively known as PUB2010, have been released
    - Tables were released in 2019
    - These tables are a much better fit, requiring less adjustment
    - Some small adjustments, such as setting ages forward or backward, were utilized to fine tune the fit
- Mortality assumption also includes a provision to reflect future mortality improvements
  - Current assumption is based on mortality projection scale MP-2015
  - Since the last review, mortality has increased compared to that predicted by MP-2015. The most recent scale, MP-2019, represents the fifth straight year of increasing mortality
- Cost impact:
  - The change in rates did not change results significantly
  - The change to MP-2019 decreases costs

Mortality

- The Active and Disabled mortality assumptions make use of standard tables because they are not a big driver of costs and there is not sufficient experience to warrant adjusting a standard table:
  - Active Mortality: relatively low number of deaths and the potentially lower amount of benefits due than had the member retired.
  - Disabled Mortality: like Actives, infrequency of disability relative to other benefits
- Beneficiary mortality for all systems was grouped together (separated only by gender) as follows to give credibility to the data:
  - CJRS and LRS beneficiaries were determined to exhibit different mortality than the other plans and we recommend an unadjusted standard table for these plans
  - For all other plans we recommend a standard table with adjustments for males and females.
- Please see the Appendix for a description of the tables recommended for each plan and group

Mortality

Decline in Benefit Payments Due To Mortality

Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
-General Employees
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-Law Enforcement
RODs
Death
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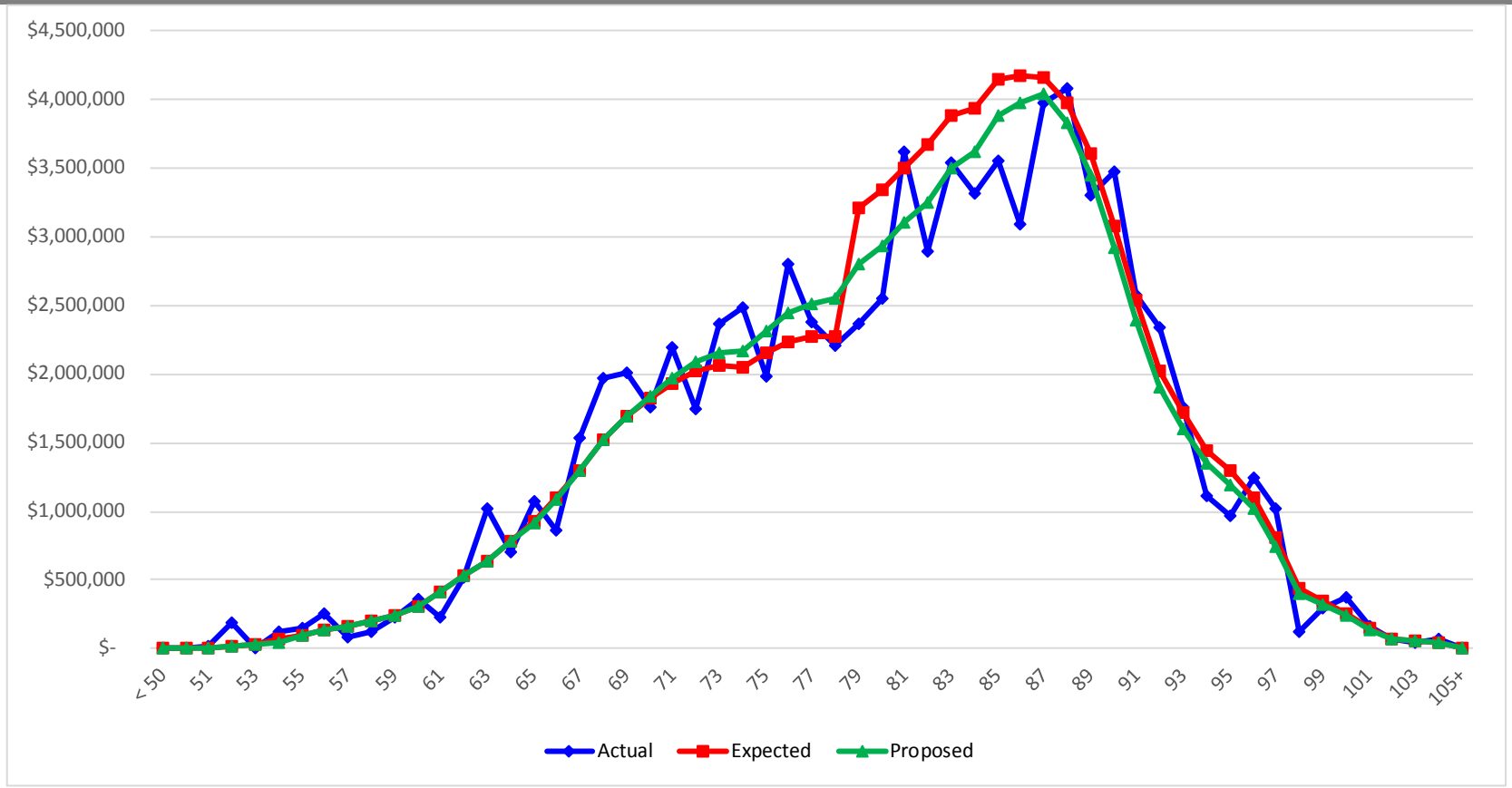
Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop
Reduction in benefits $M	83.29	85.97	0.9688	82.93	1.0043
Total	83.29	85.97	0.9688	82.93	1.0043

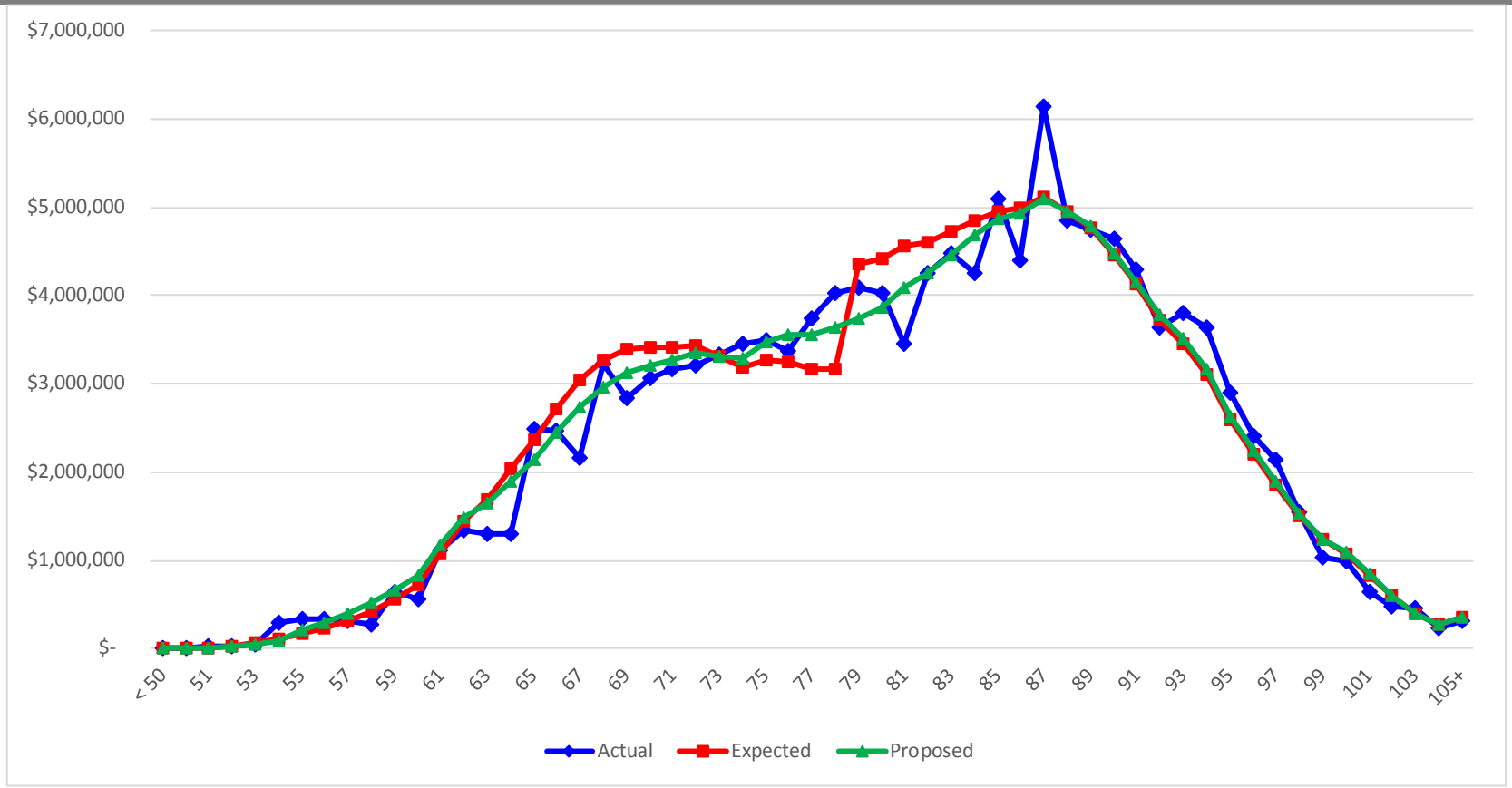
Observation: less decline in benefit payments due to mortality over the period than expected overall

Recommendation: adjust rates, generally dow nw ards to reflect actual experience

Cost Impact: increase

Mortality

Decline in Benefit Payments Due To Mortality



	Actual	Expected	Act to Exp	Proposed	Act to Prop
Reduction in benefits $M	134.92	137.34	0.9824	135.21	0.9978
Total	134.92	137.34	0.9824	135.21	0.9978

Observation: less decline in benefit payments due to mortality over the period than expected overall

Recommendation: adjust rates, generally dow nw ards to reflect actual experience

Cost Impact: increase

Mortality

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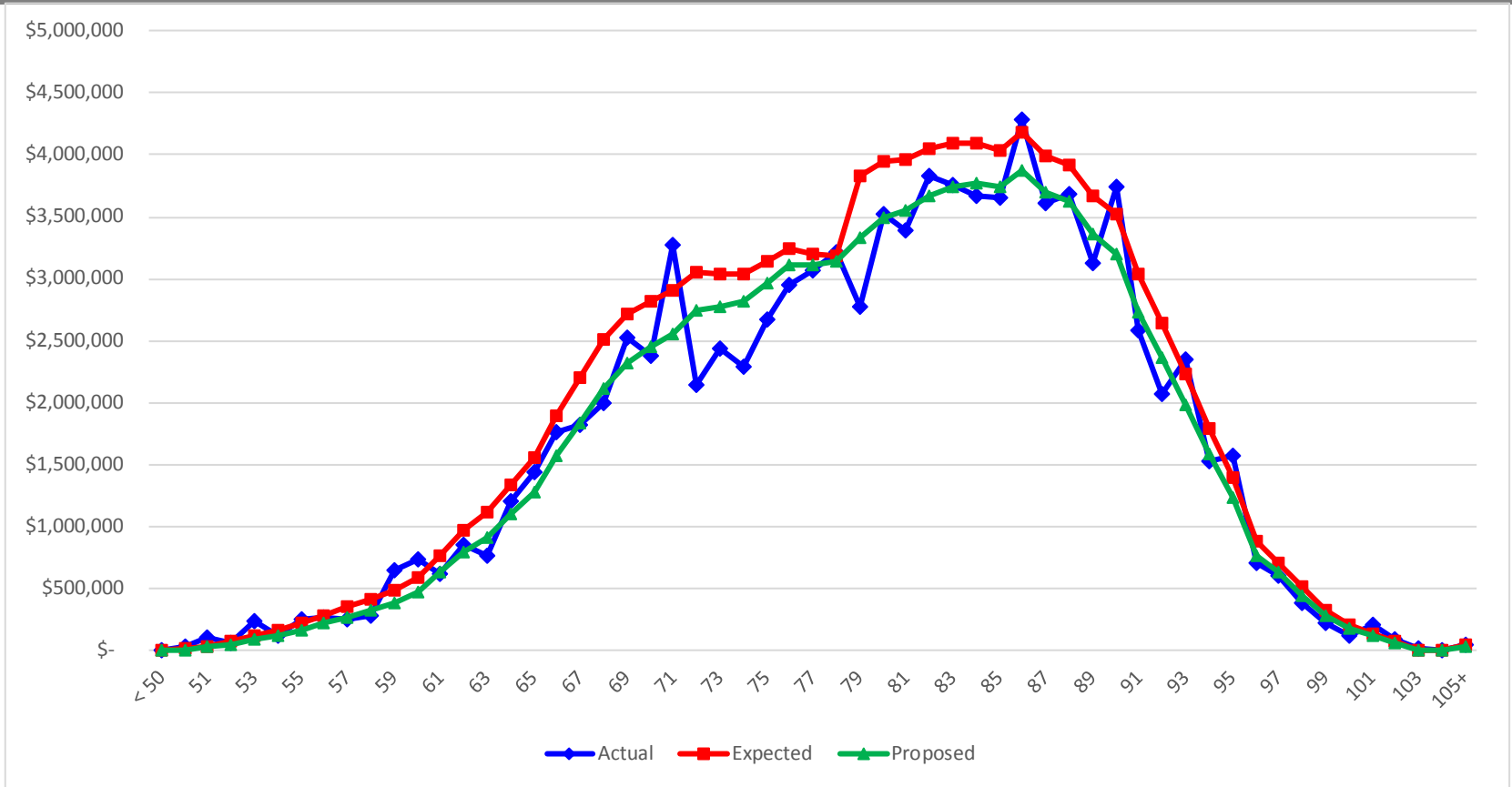


	Actual	Expected	Act to Exp	Proposed	Act to Prop
Reduction in benefits $M	96.00	106.79	0.8990	95.89	1.0011
Total	96.00	106.79	0.8990	95.89	1.0011

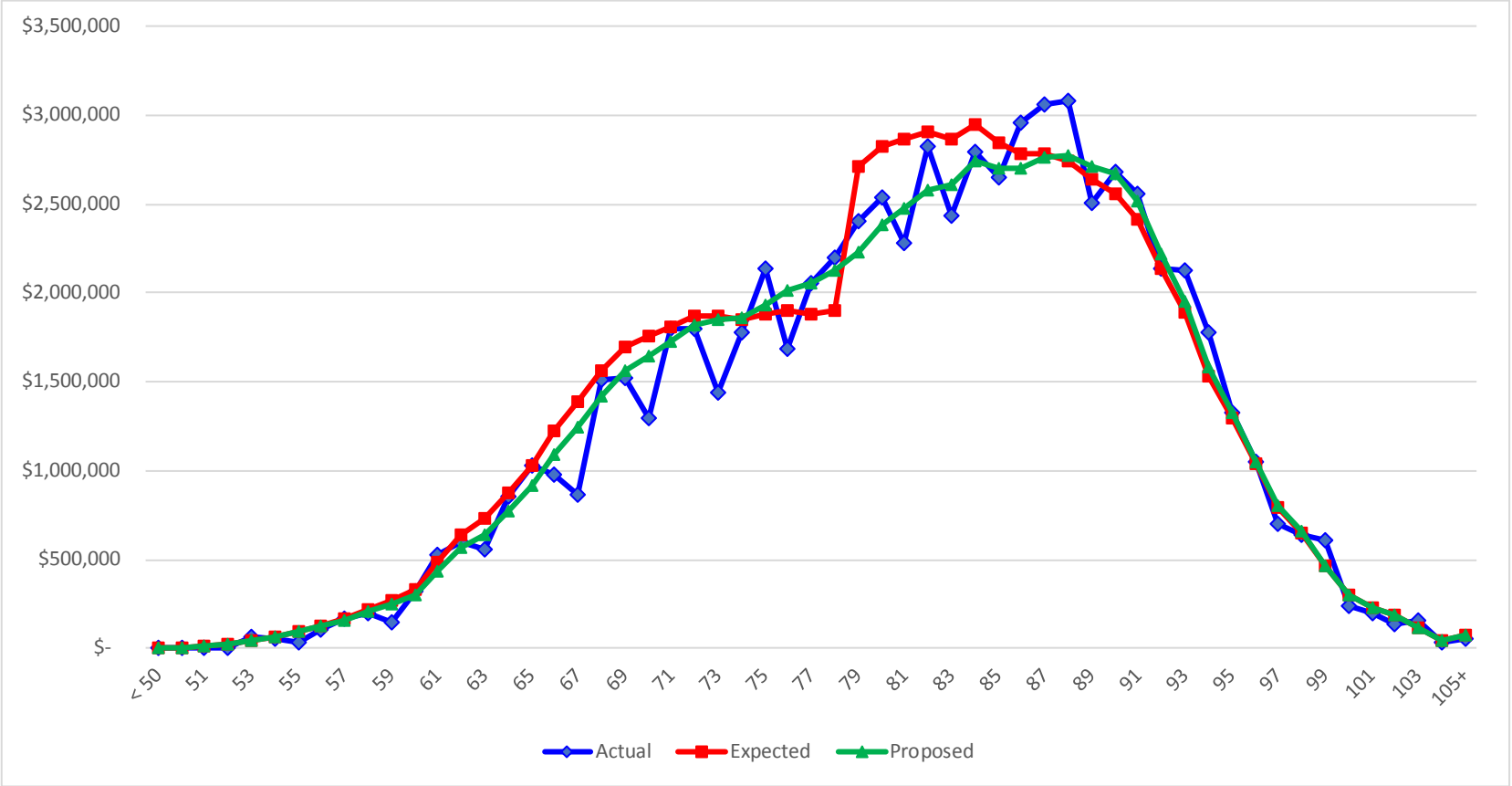
Observation: less decline in benefit payments due to mortality over the period than expected overall

Recommendation: adjust rates, generally dow nw ards to reflect actual experience

Cost Impact: increase

Mortality

Decline in Benefit Payments Due To Mortality



	Actual	Expected	Act to Exp	Proposed	Act to Prop
Reduction in benefits $M	71.69	74.38	0.9638	71.84	0.9979
Total	71.69	74.38	0.9638	71.84	0.9979

Observation: less decline in benefit payments due to mortality over the period than expected overall

Recommendation: adjust rates, generally downwards to reflect actual experience

Cost Impact: increase

Mortality

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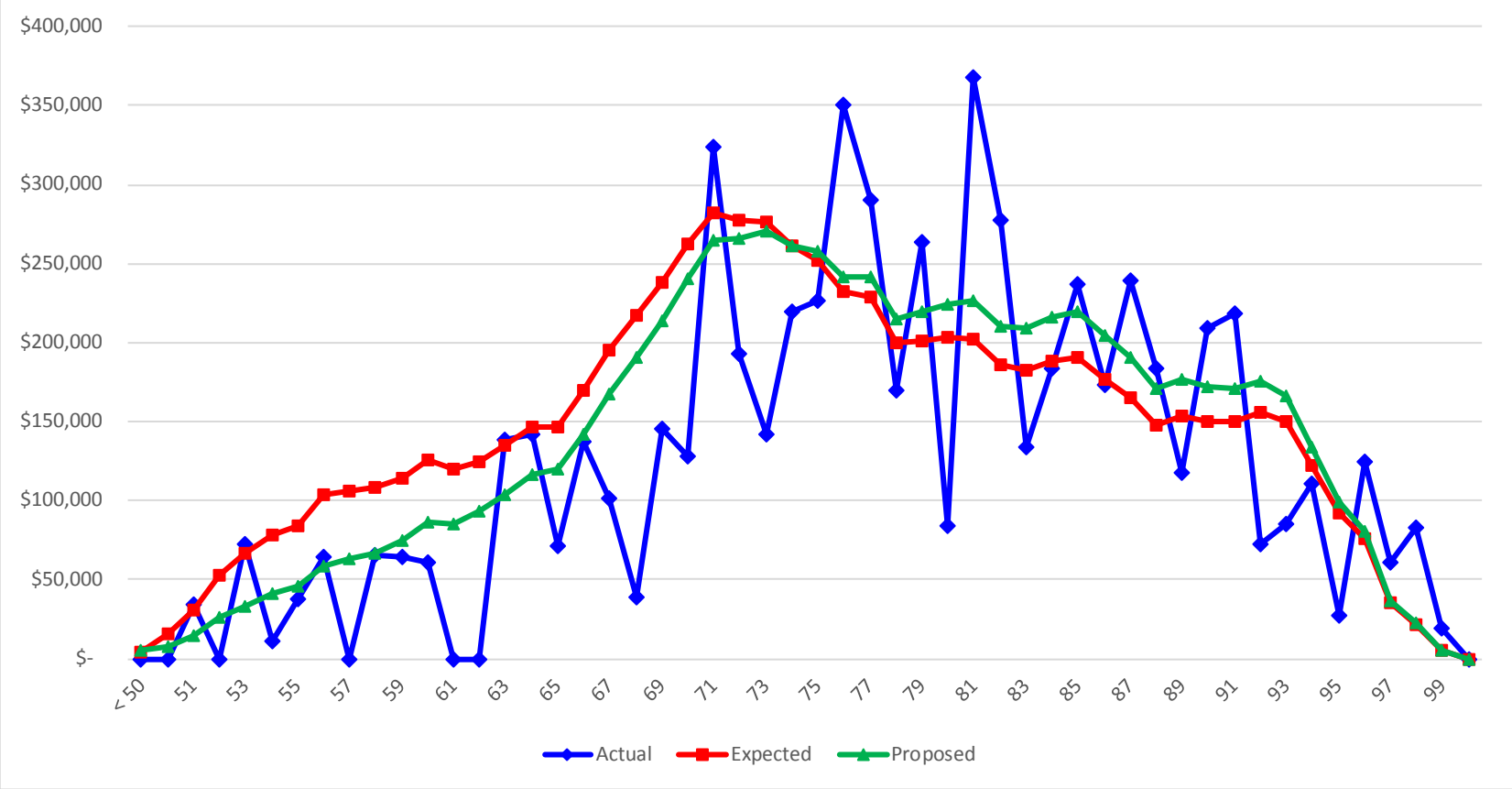

	Actual	Expected	Act to Exp	Proposed	Act to Prop
Reduction in benefits $M	6.50	7.62	0.8540	7.34	0.8855
Total	6.50	7.62	0.8540	7.34	0.8855

Observation: less decline in benefit payments due to mortality over the period than expected overall

Recommendation: adjust rates, generally dow nw ards to reflect actual experience

Cost Impact: increase

Mortality

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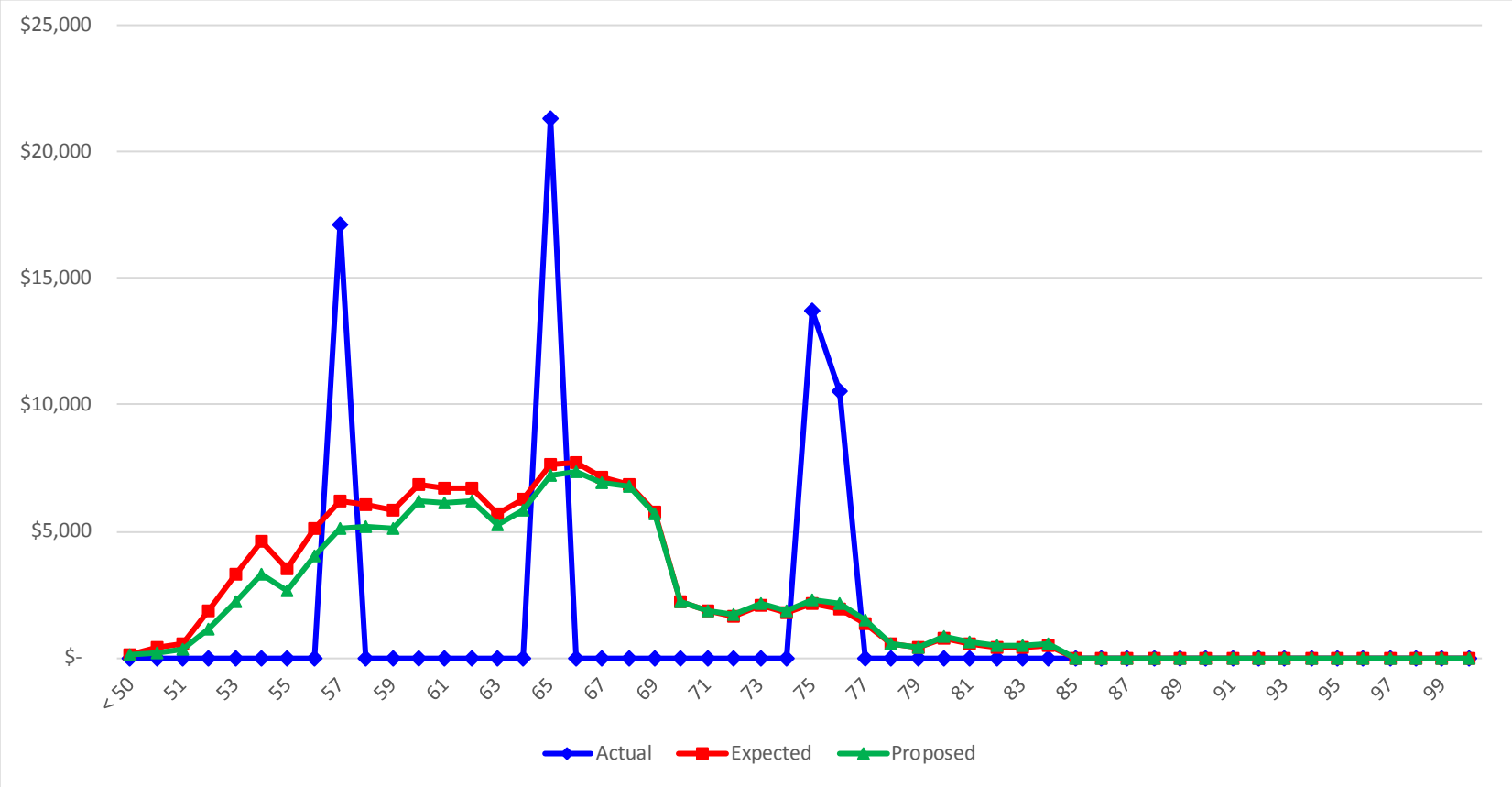

	Actual	Expected	Act to Exp	Proposed	Act to Prop
Reduction in benefits $M	0.06	0.12	0.5084	0.11	0.5568
Total	0.06	0.12	0.5084	0.11	0.5568

Observation: less decline in benefit payments due to mortality over the period than expected overall

Recommendation: adjust rates, generally dow nw ards to reflect actual experience

Cost Impact: decrease

Mortality

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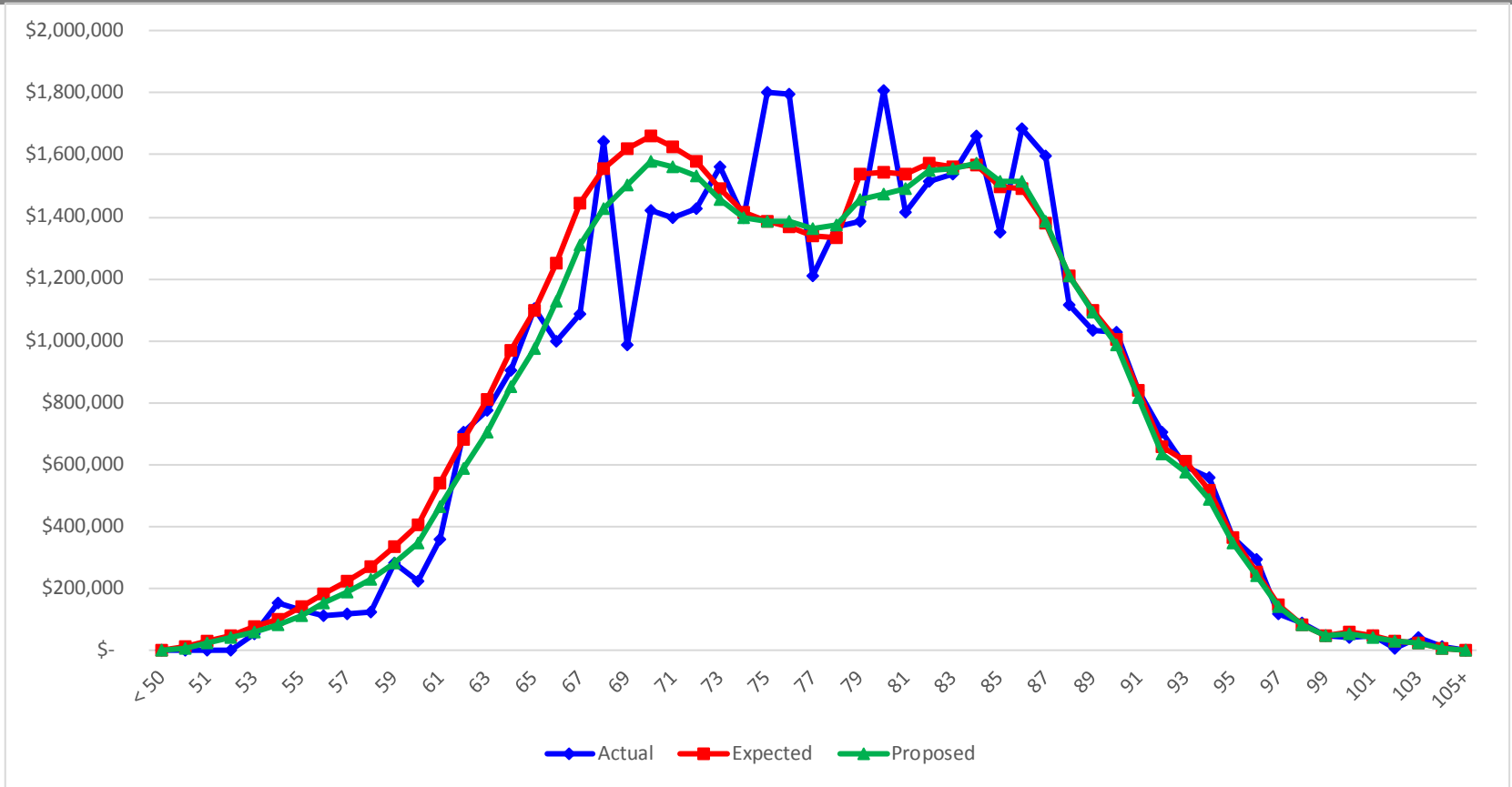

	Actual	Expected	Act to Exp	Proposed	Act to Prop
Reduction in benefits $M	44.04	45.72	0.9633	43.87	1.0038
Total	44.04	45.72	0.9633	43.87	1.0038

Observation: less decline in benefit payments due to mortality over the period than expected overall

Recommendation: adjust rates, generally downwards to reflect actual experience

Cost Impact: decrease

Mortality

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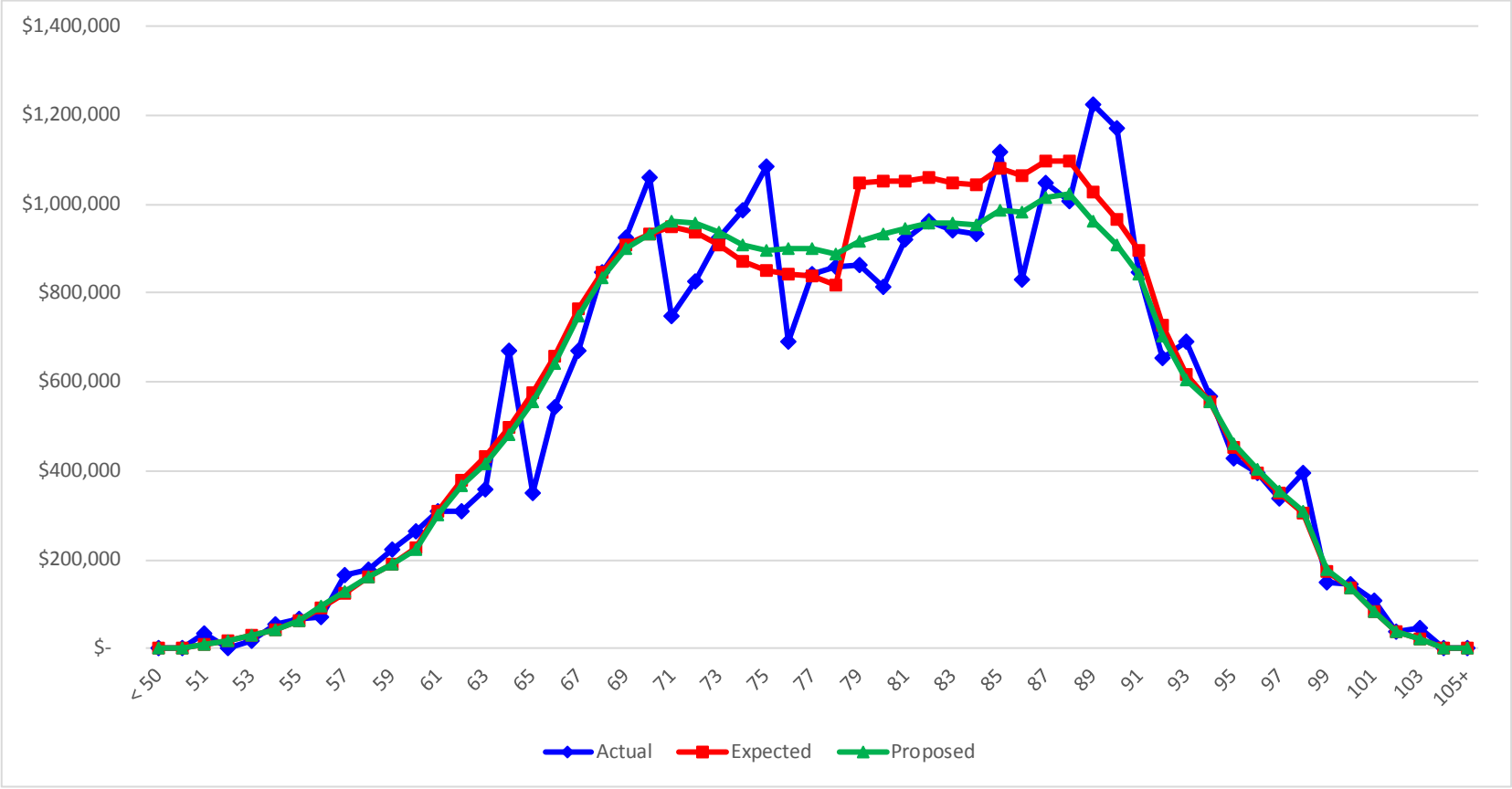

	Actual	Expected	Act to Exp	Proposed	Act to Prop
Reduction in benefits $M	30.71	31.66	0.9702	30.72	0.9999
Total	30.71	31.66	0.9702	30.72	0.9999

Observation: less decline in benefit payments due to mortality over the period than expected overall

Recommendation: adjust rates, generally dow nw ards to reflect actual experience

Cost Impact: decrease

Mortality

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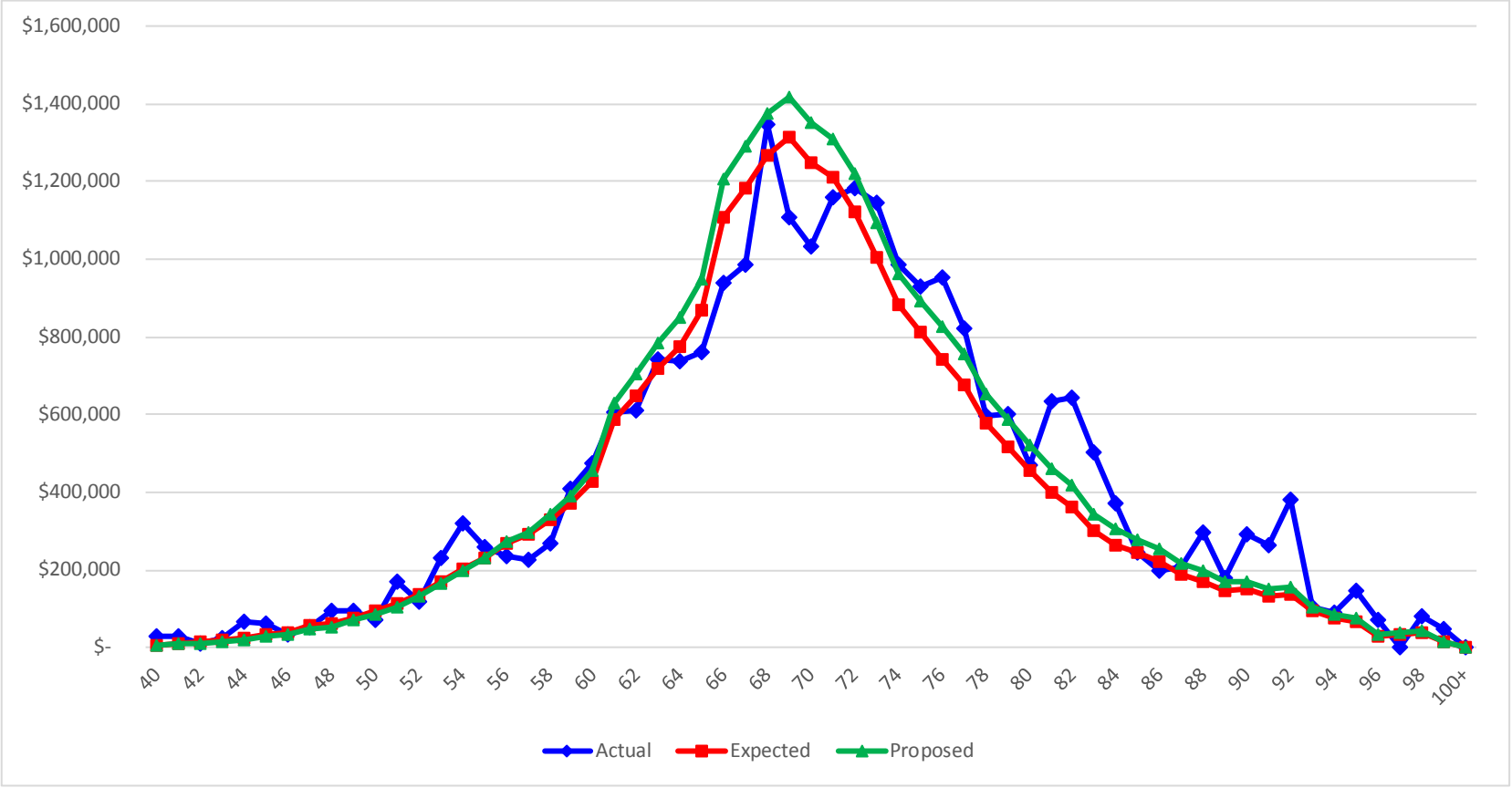

	Actual	Expected	Act to Exp	Proposed	Act to Prop
Reduction in benefits $M	25.81	23.84	1.0826	25.91	26.0785
Total	25.81	23.84	1.0826	25.91	0.9961

Observation: more decline in benefit payments due to mortality over the period than expected overall

Recommendation: adjust rates, generally upwards, to reflect actual experience

Cost Impact: minimal

Mortality

Decline in Benefit Payments Due To Mortality

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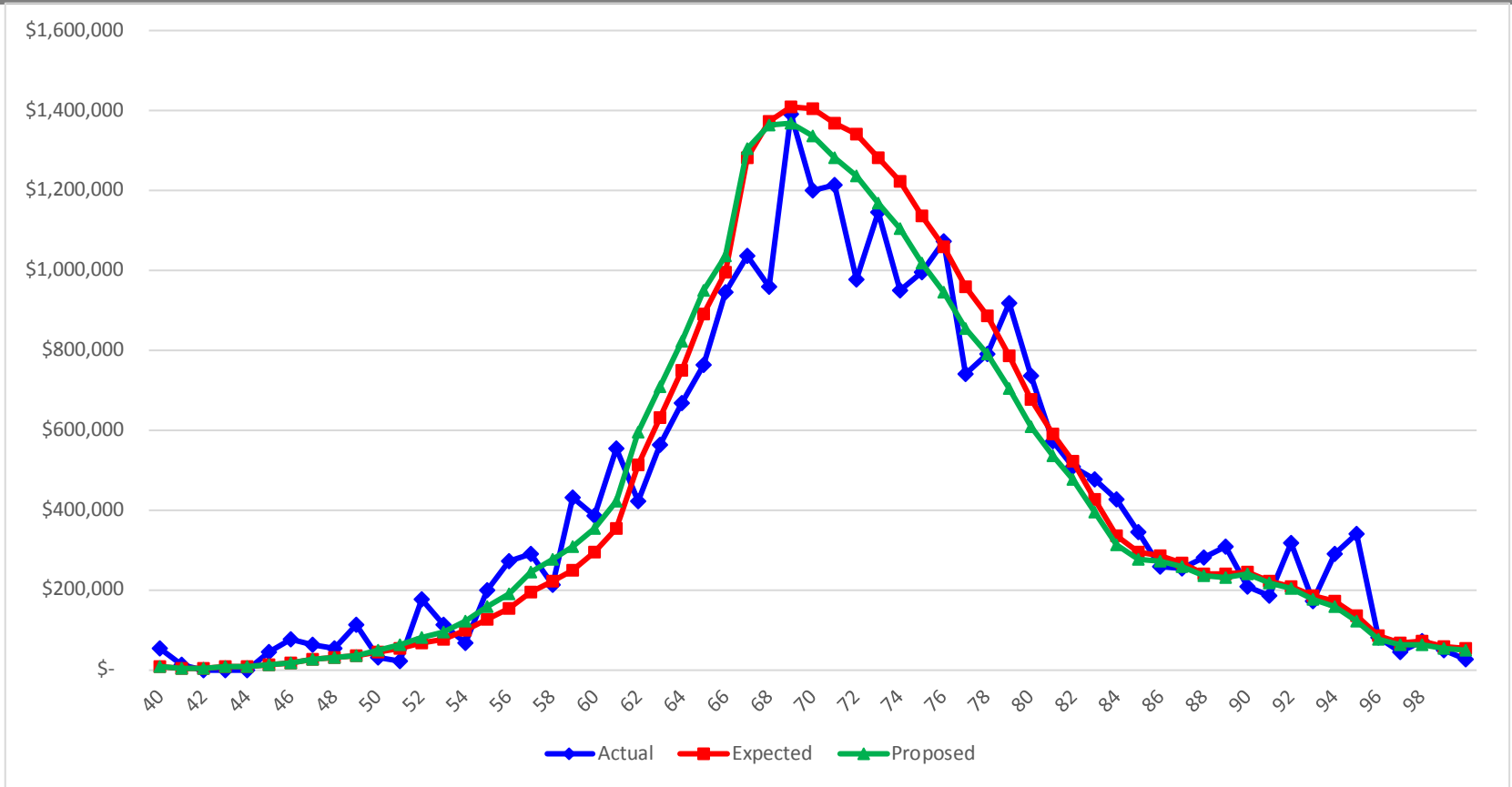

	Actual	Expected	Act to Exp	Proposed	Act to Prop
Reduction in benefits $M	26.08	26.87	0.9706	26.24	26.0785
Total	26.08	26.87	0.9706	26.24	0.9938

Observation: less decline in benefit payments due to mortality over the period than expected overall

Recommendation: adjust rates, generally dow nw ards to reflect actual experience

Cost Impact: minimal

Mortality

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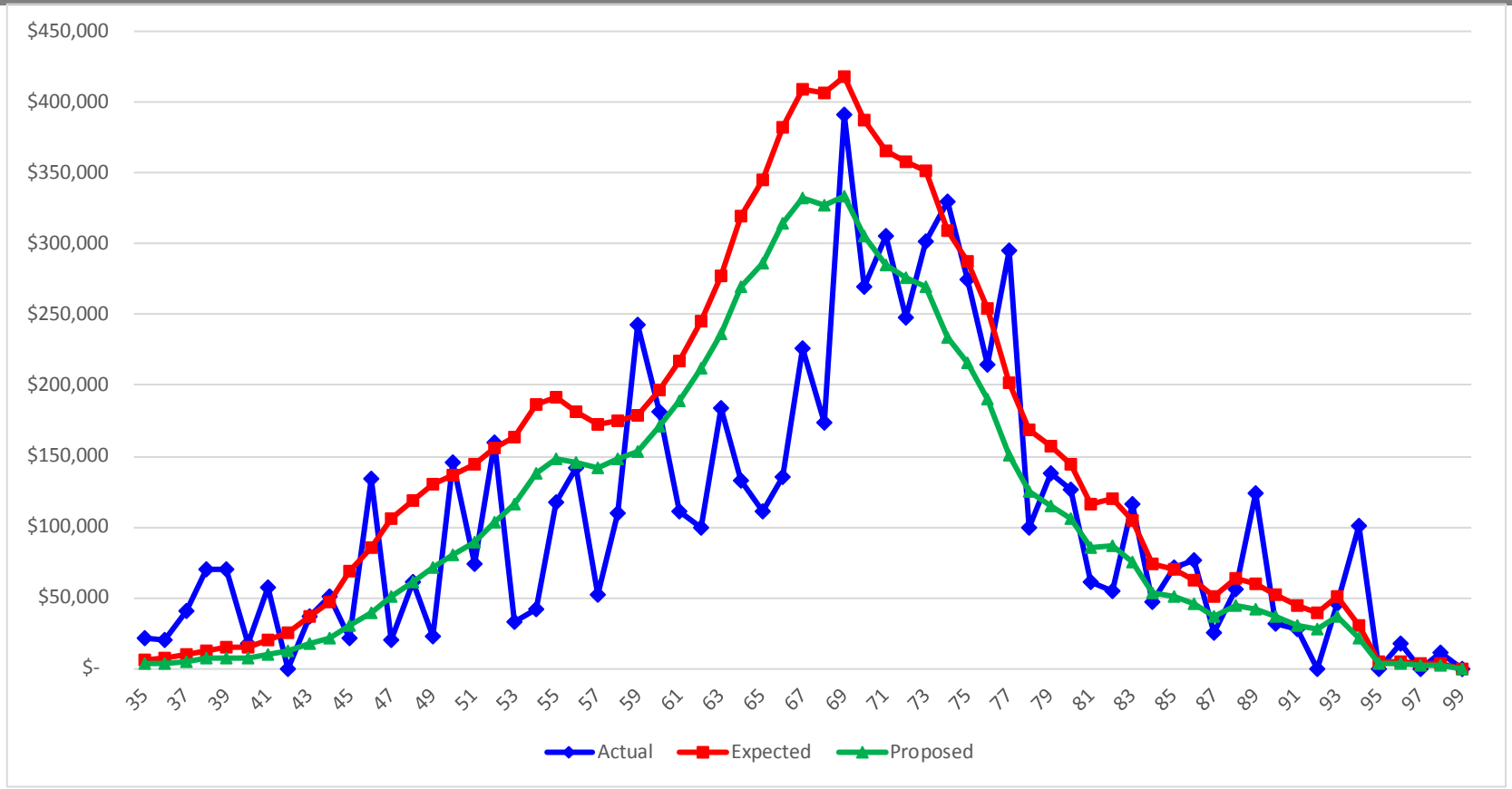

	Actual	Expected	Act to Exp	Proposed	Act to Prop
Reduction in benefits $M	7.03	9.56	0.7354	7.25	0.7937
Total	7.03	9.56	0.7354	7.25	0.9696

Observation: less decline in benefit payments due to mortality over the period than expected overall

Recommendation: adjust rates, generally dow nw ards to reflect actual experience

Cost Impact: minimal

Mortality

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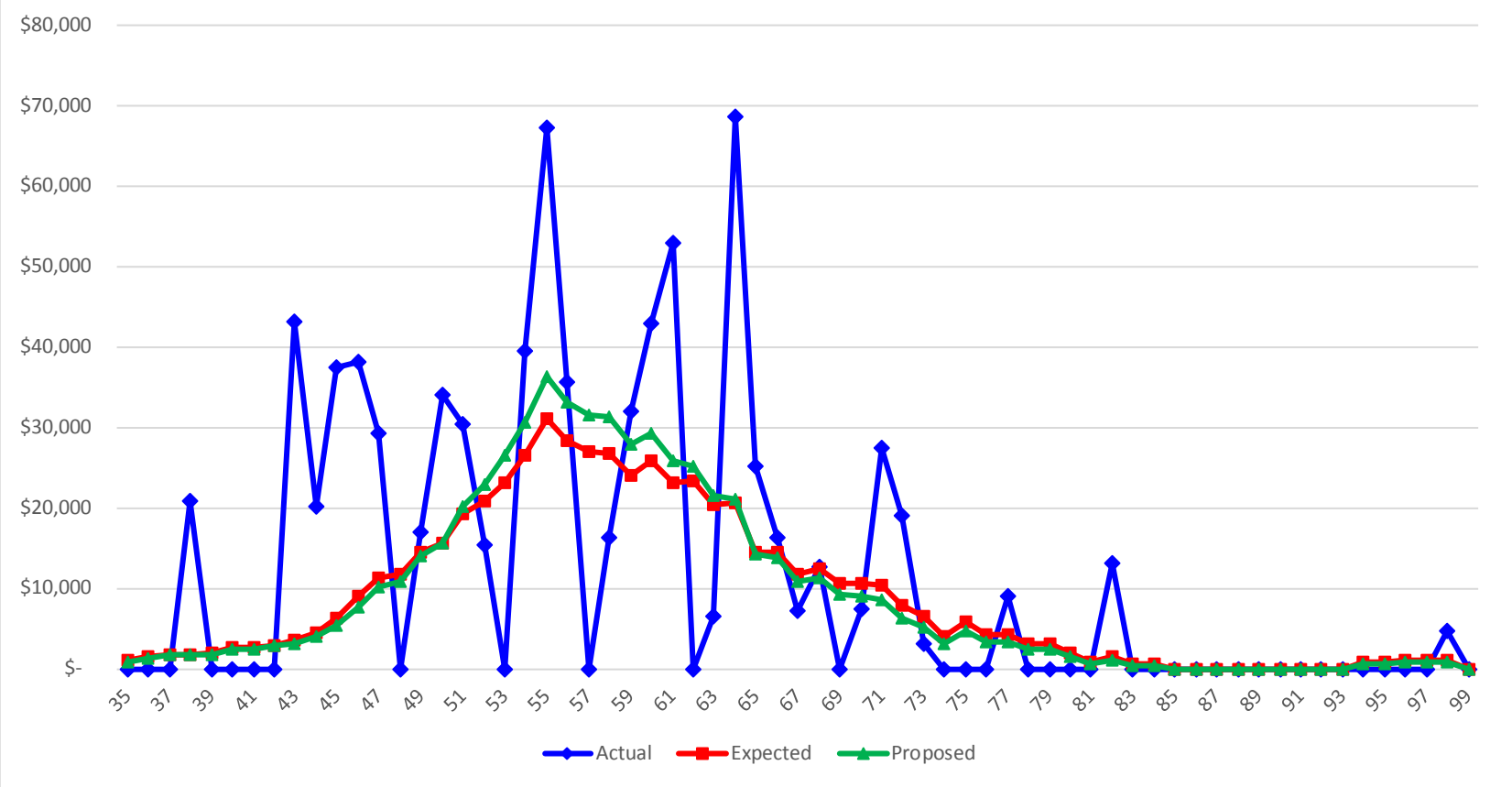

	Actual	Expected	Act to Exp	Proposed	Act to Prop
Reduction in benefits $M	0.79	0.57	1.3917	0.59	0.7937
Total	0.79	0.57	1.3917	0.59	1.3498

Observation: more decline in benefit payments due to mortality over the period than expected overall

Recommendation: adjust rates, generally upwards, to reflect actual experience

Cost Impact: minimal

Mortality

Decline in Benefit Payments Due To Mortality

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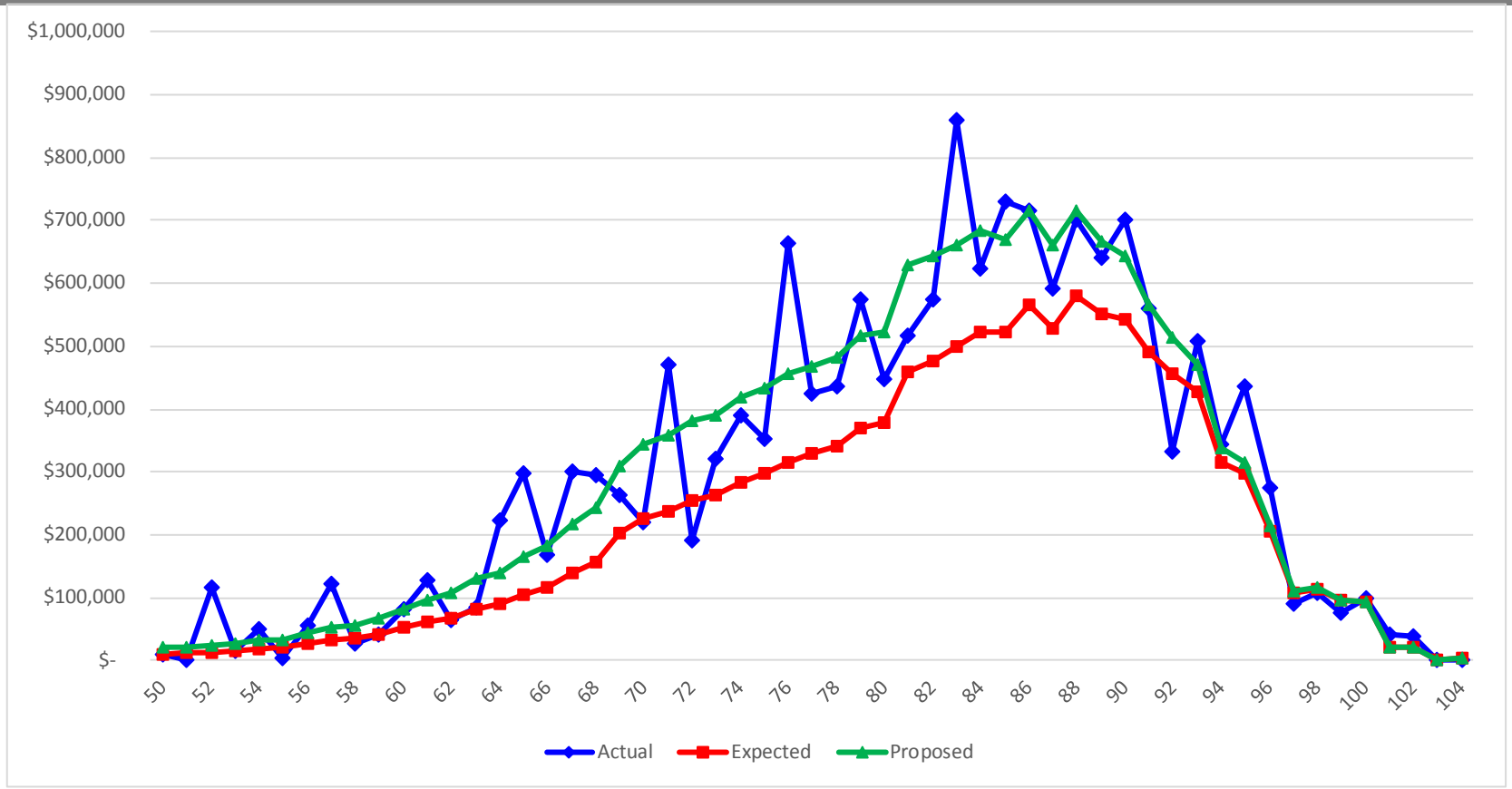

	Actual	Expected	Act to Exp	Proposed	Act to Prop
Reduction in benefits $M	16.44	12.47	1.3185	16.46	0.9987
Total	16.44	12.47	1.3185	16.46	0.9987

Observation: more decline in benefit payments due to mortality over the period than expected overall

Recommendation: adjust rates, generally upw ards, to reflect actual experience

Cost Impact: minimal

Mortality

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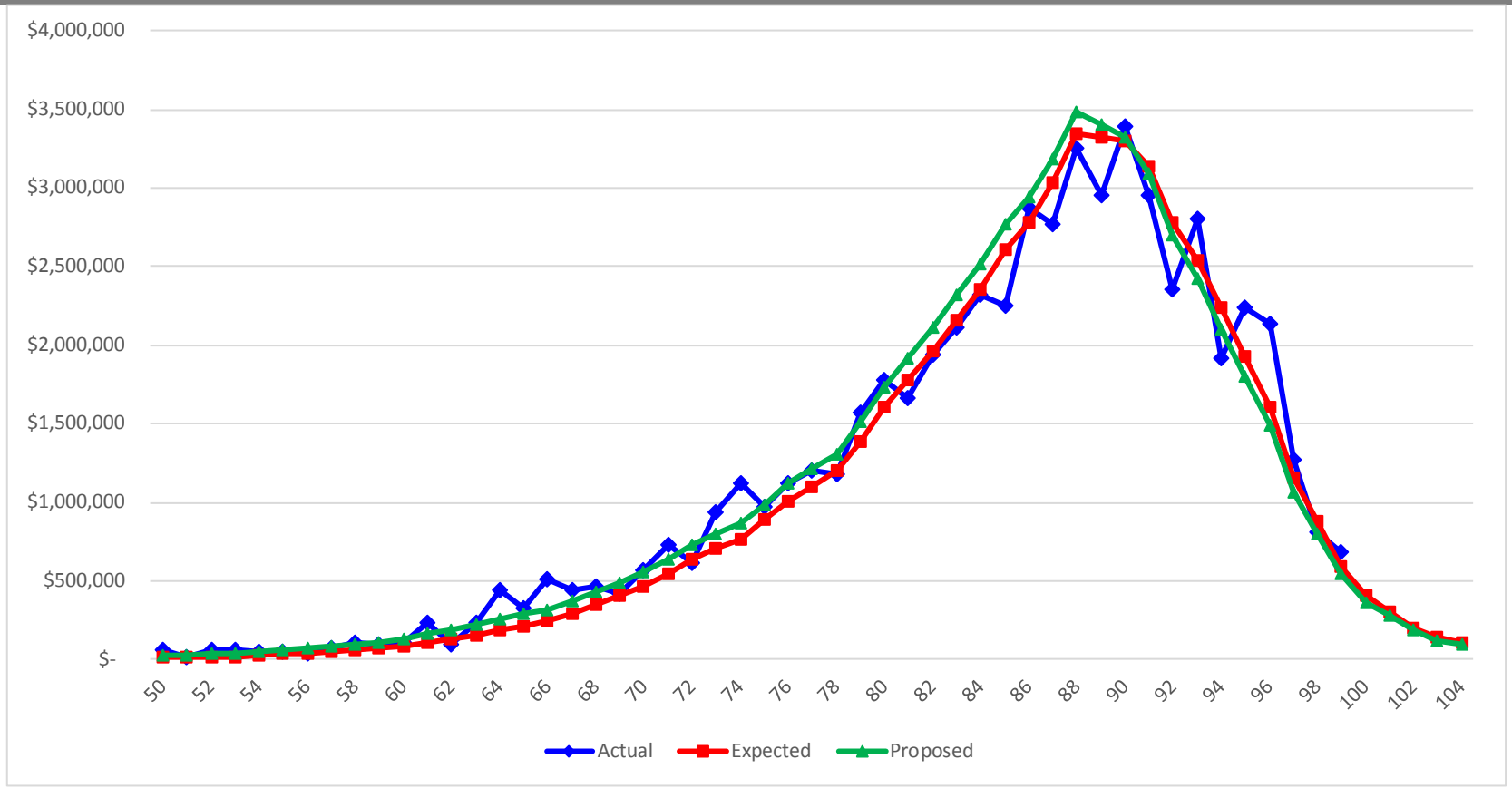

	Actual	Expected	Act to Exp	Proposed	Act to Prop
Reduction in benefits $M	59.12	56.80	1.0408	59.36	0.9959
Total	59.12	56.80	1.0408	59.36	0.9959

Observation: more decline in benefit payments due to mortality over the period than expected overall

Recommendation: adjust rates, generally upwards, to reflect actual experience

Cost Impact: minimal

Demographic Assumptions

Retirement

Retirement

- Retirement rates vary by age, gender, employee group and type of retirement (i.e., reduced and unreduced)
- The current retirement rates are based on the recommendation made in the prior experience study
- Use of actual experience of the plans is common practice
- The current retirement rates resulted in expected retirements greater than actual retirements for all employee groups other than National Guard and Law Enforcement Officers; proposed rates were adjusted to reflect this experience
- Generally, assuming more (fewer) retirements results in higher (lower) estimated costs
- All retirement eligibility periods were studied for each group, but the age ranges shown on the graphs represent those ranges with the most credibility and may not cover all retirement eligibility periods for each group.

Retirement

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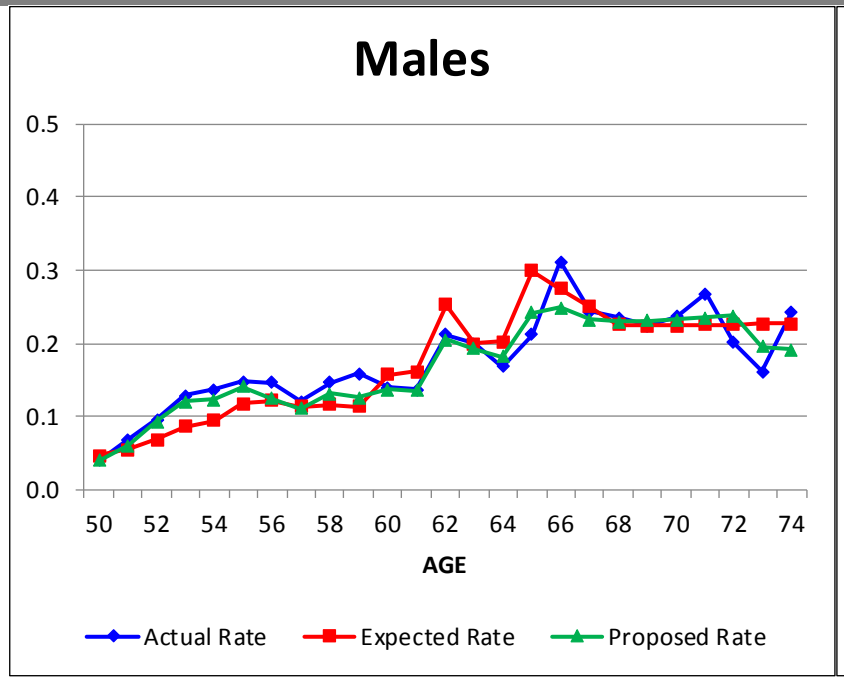
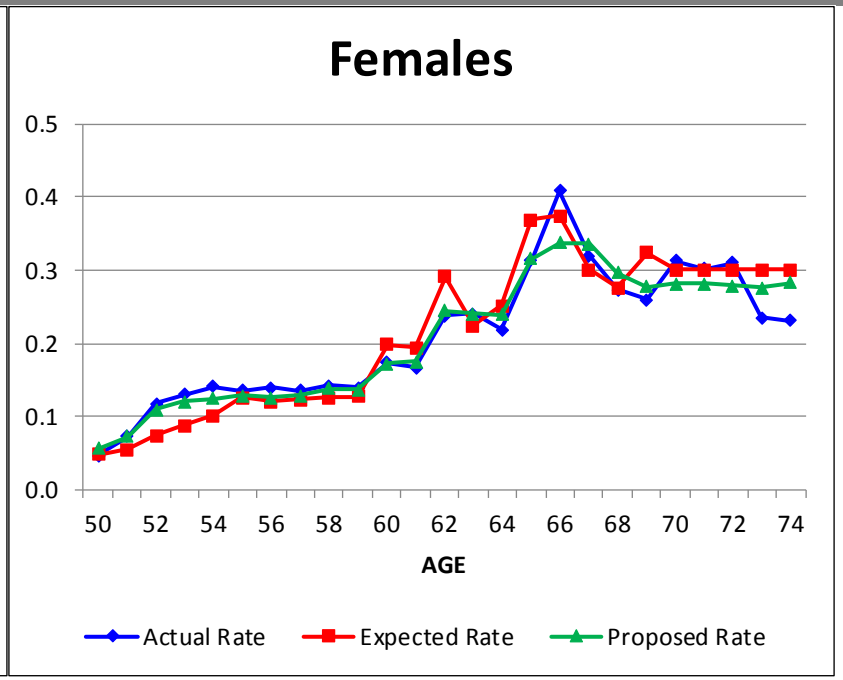
Males and Females





	Actual	Expected	Act to Exp	Proposed	Act to Prop
Males	4,112.00	4,392.88	0.9361	4,202.17	0.9785
Females	16,948.00	17,311.73	0.9790	16,986.32	0.9977
Total	21,060	21,704.61	0.9703	21,188.49	0.9939

Observation: fewer retirements over the period than expected overall

Recommendation: adjust rates, generally downwards to reflect actual experience

Cost Impact: decrease

Retirement

Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
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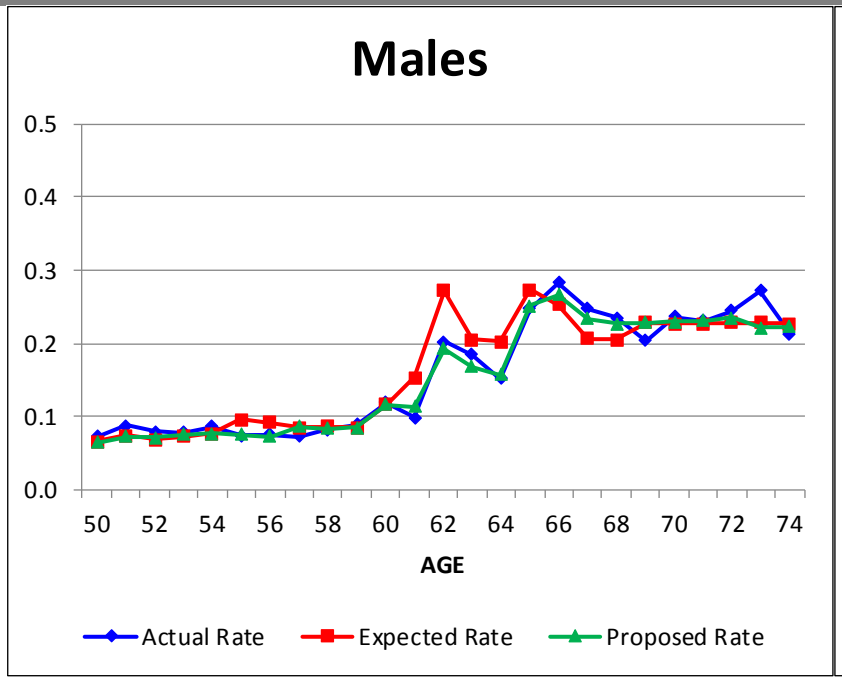
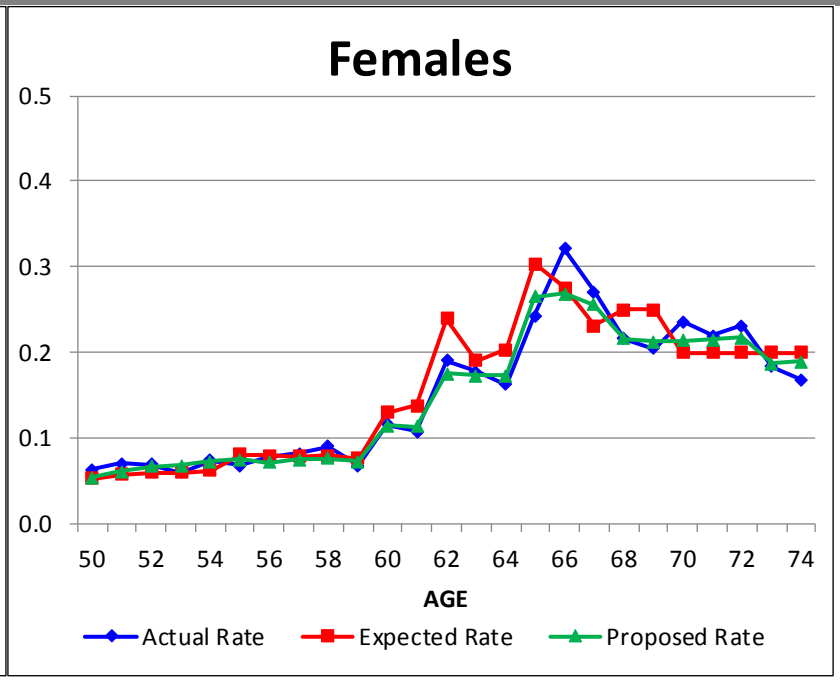
-Law Enforcement
RODs
Death
Membership
Active
Retiree
Disabled
Beneficiary
Gender
Males
Females
Males and Females





	Actual	Expected	Act to Exp	Proposed	Act to Prop
Males	6,611.00	7,585.02	0.8716	6,828.53	0.9681
Females	7,990.00	9,012.03	0.8866	8,118.88	0.9841
Total	14,601	16,597.05	0.8797	14,947.41	0.9768

Observation: fewer retirements over the period than expected overall

Recommendation: adjust rates, generally downwards to reflect actual experience

Cost Impact: decrease

Retirement

Plan
TSERS:
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CJRS
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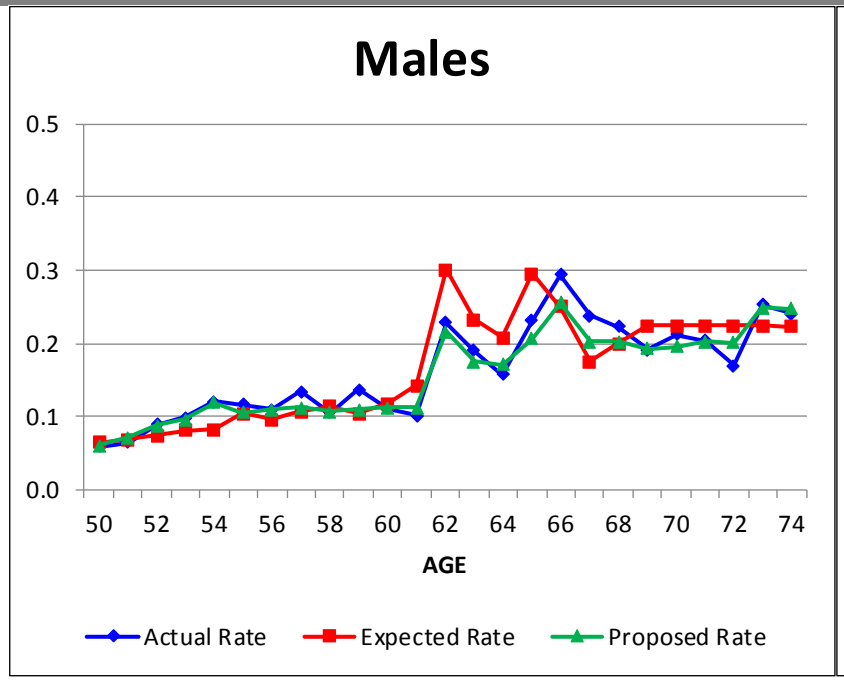
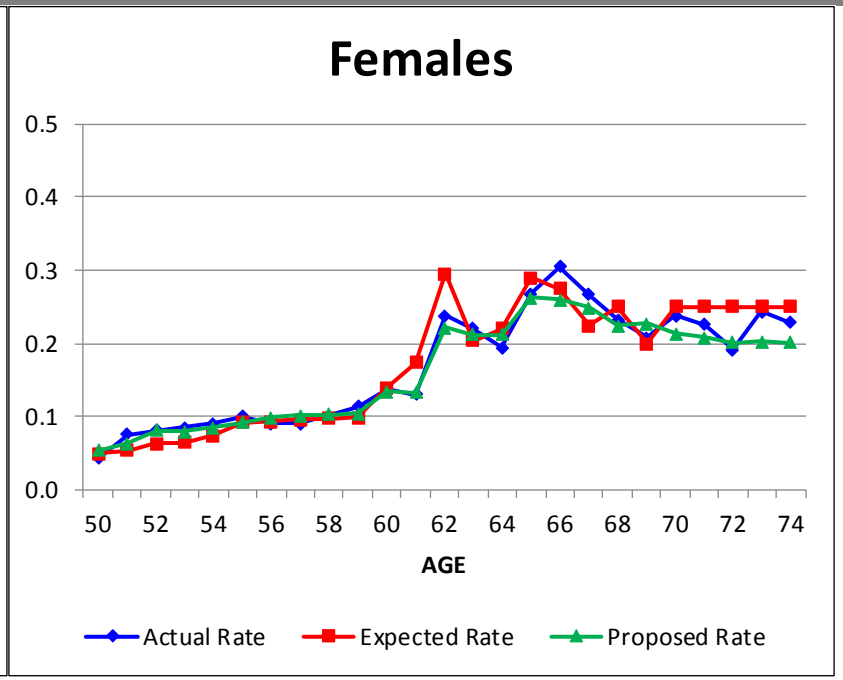
Males and Females





	Actual	Expected	Act to Exp	Proposed	Act to Prop
Males	2,900.00	3,463.93	0.8372	3,116.94	0.9304
Females	6,505.00	7,087.38	0.9178	6,631.55	0.9809
Total	9,405	10,551.31	0.8914	9,748.49	0.9648

Observation: fewer retirements over the period than expected overall

Recommendation: adjust rates, generally downwards to reflect actual experience

Cost Impact: decrease

Retirement

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TSERS:
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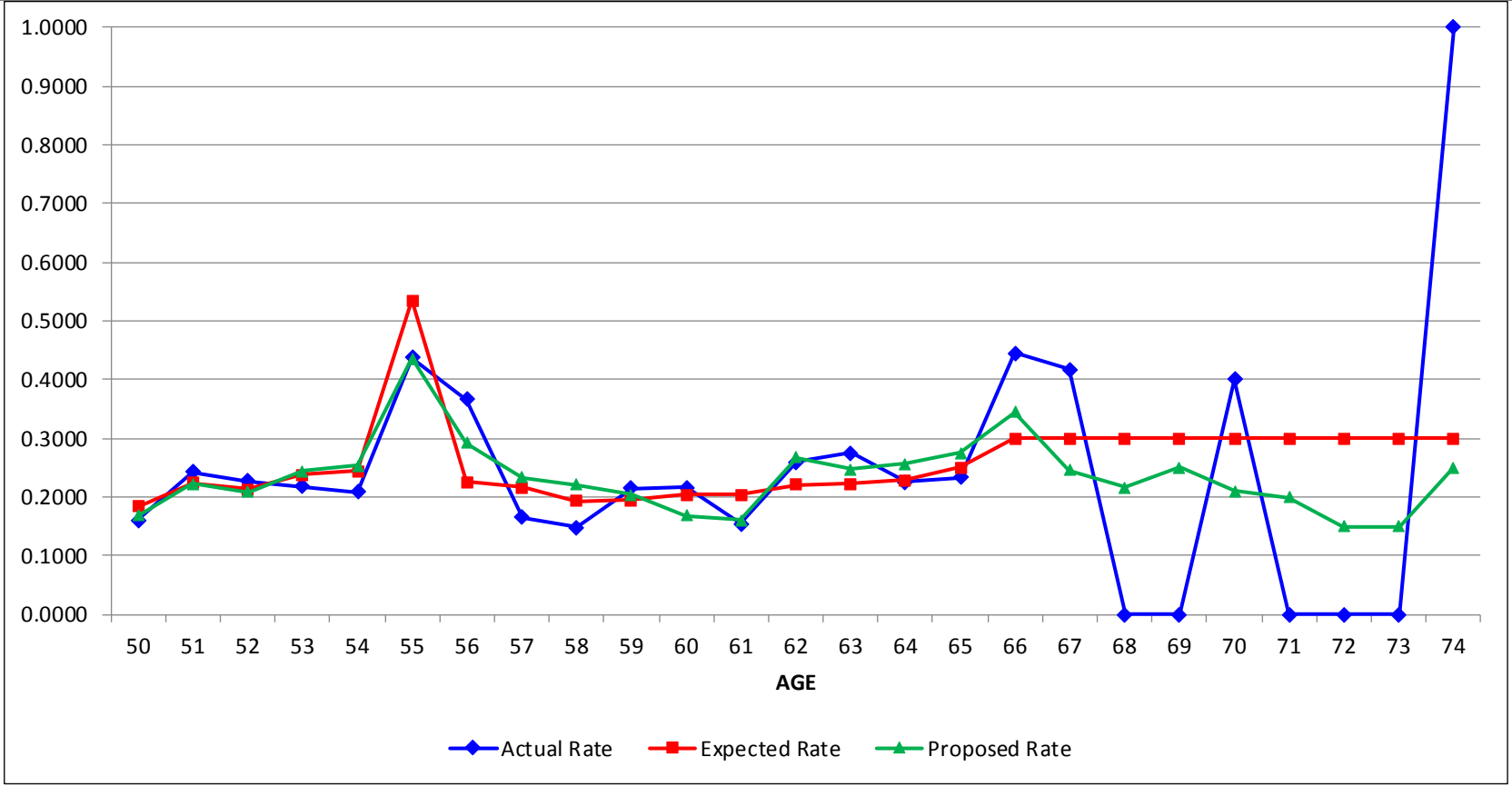

	Actual	Expected	Act to Exp	Proposed	Act to Prop
Males	754.00	697.88	1.0804	742.05	1.0161
Total	754.00	697.88	1.0804	742.05	1.0161

Observation: more retirements over the period than expected overall

Recommendation: adjust rates, generally upwards, to reflect actual experience

Cost Impact: increase

Retirement

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TSERS:
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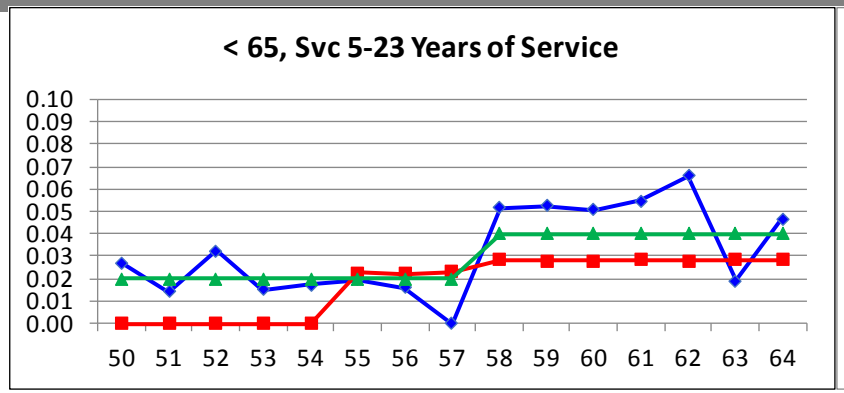

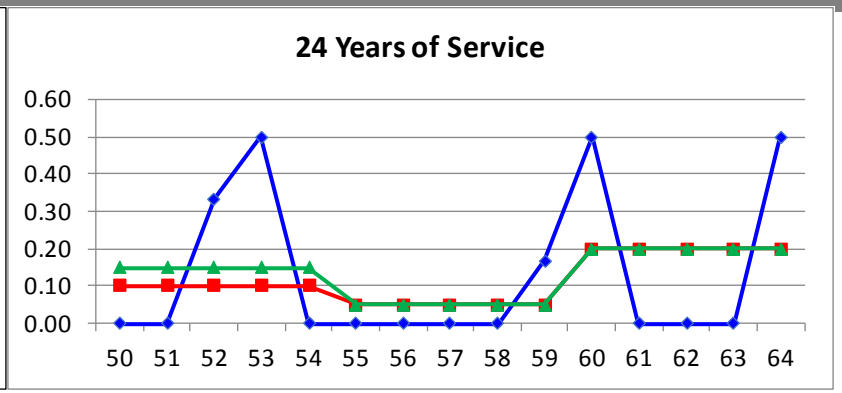

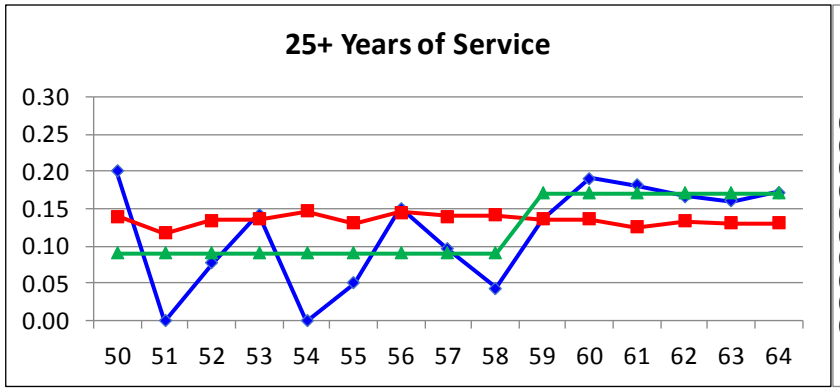

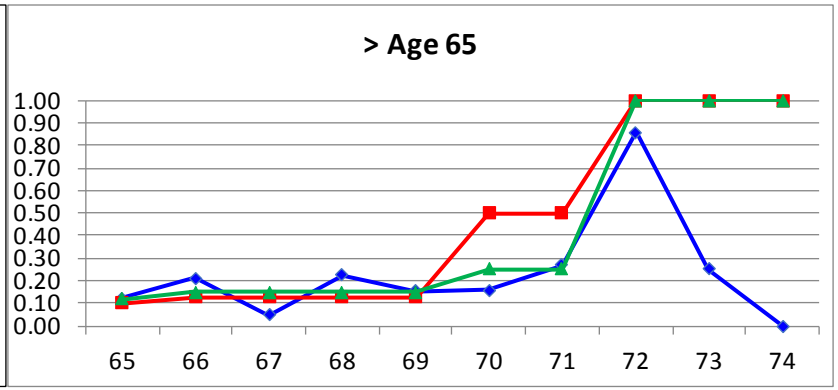

Actual Rate Expected Rate Proposed Rate

	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: fewer retirements over the period than expected overall other than the following groups: 5 - 23 years of Service, 24 Years of Service Recommendation: adjust rates, generally downwards to reflect actual experience
5 - 23 years of Service	28.00	14.67	1.9087	25.42	1.1015	
24 Years of Service	7.00	6.60	1.0606	7.30	0.9589	
25+ Years of Service	36	40.24	0.8946	37.75	0.9536	
> Age 65	92	118.17	0.7785	105.60	0.8712	
Total	163	179.68	0.9072	176.07	0.9258	Cost Impact: increase

Retirement

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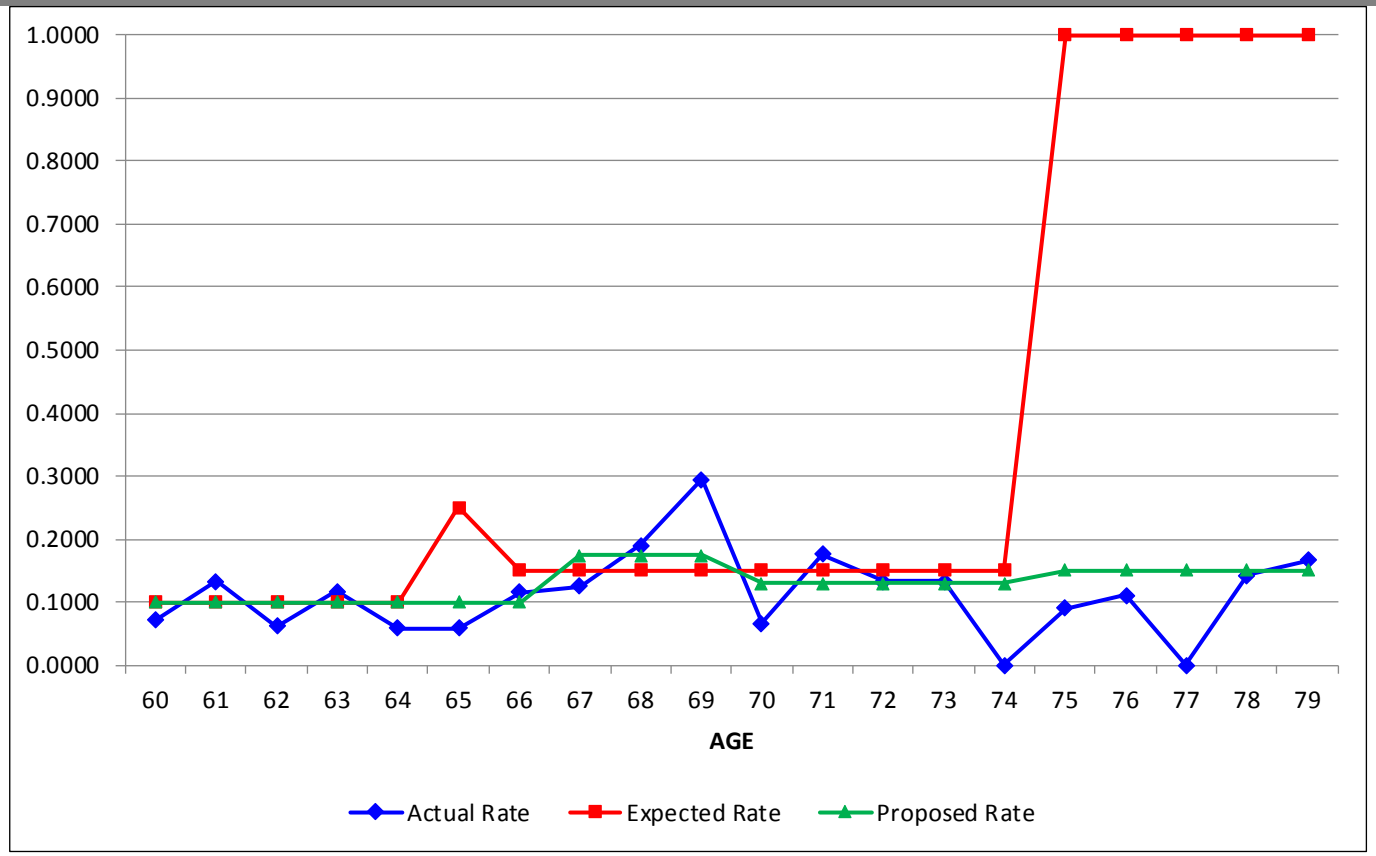

	Actual	Expected	Act to Exp	Proposed	Act to Prop
Males	39.00	89.45	0.4360	51.67	0.7548
Total	39.00	89.45	0.4360	51.67	0.7548

Observation: few er retirements over the period than expected overall

Recommendation: adjust rates, generally dow nw ards to reflect actual experience

Cost Impact: decrease

Retirement

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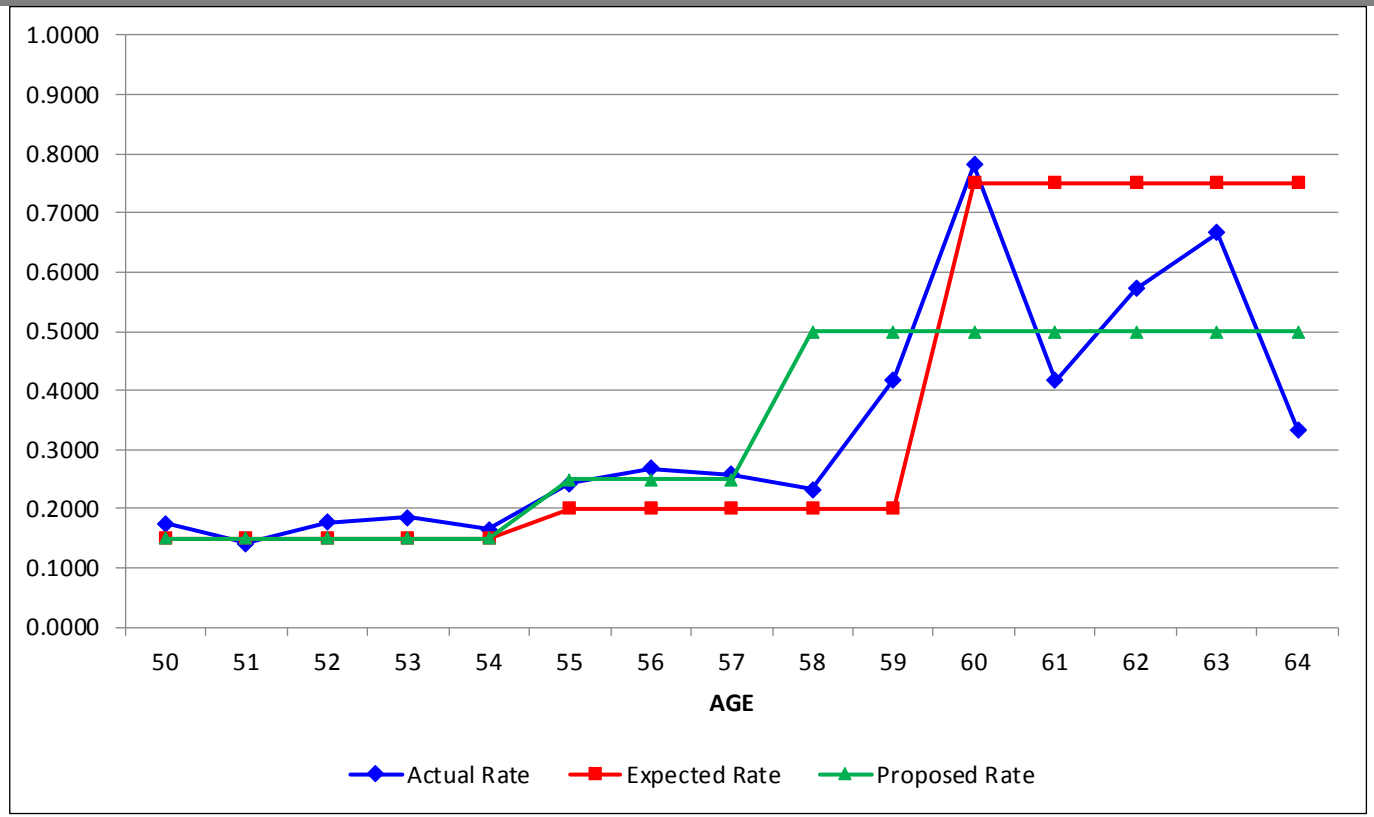

	Actual	Expected	Act to Exp	Proposed	Act to Prop
Males	327.00	290.60	1.1253	324.40	1.0080
Total	327.00	290.60	1.1253	324.40	1.0080

Observation: more retirements over the period than expected overall

Recommendation: adjust rates, generally upwards, to reflect actual experience

Cost Impact: increase

Retirement

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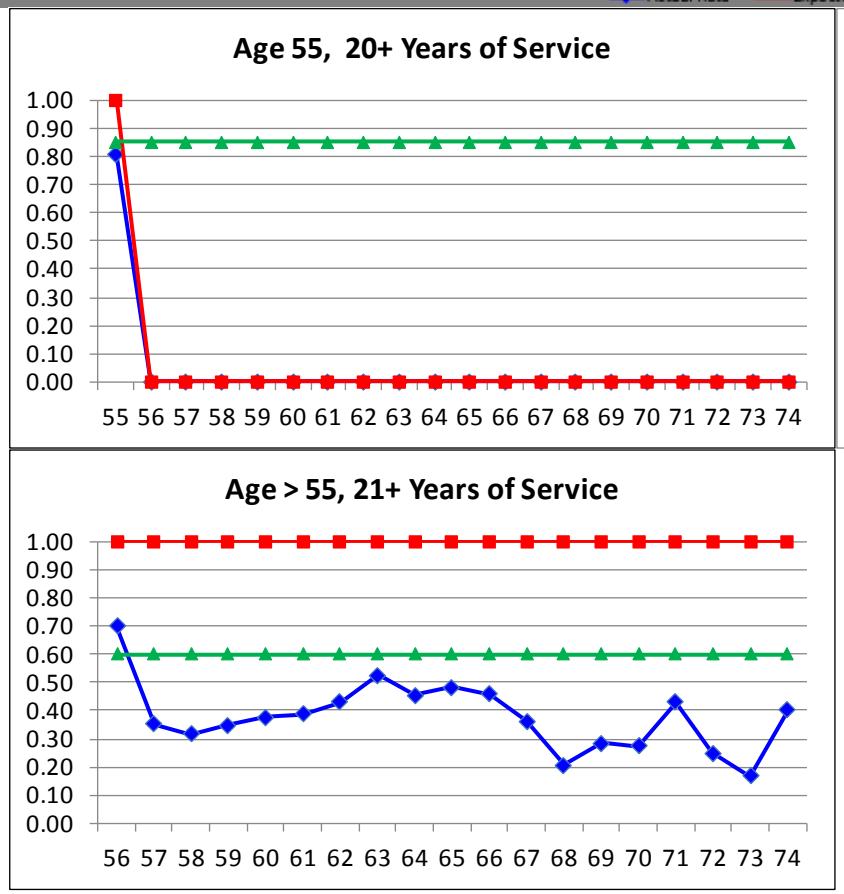

	Actual	Expected	Act to Exp	Proposed	Act to Prop
Age 55, 20+ Yrs of SVC	-	28.00	14.6700	1.91	25.4200
> 55, 20 yrs of Service	7.00	6.60	1.0606	7.30	0.9589
> 55, 21+ Yrs of Service	36	40.24	0.8946	37.75	0.9536
Total	43	74.84	0.5746	46.96	0.9157

Observation: few er retirements over the period than expected overall other than the follow ing groups: Age 55, 20+ Yrs of SVC, > 55, 20 yrs of Service

Recommendation: adjust rates, generally dow nw ards to reflect actual experience

Cost Impact: decrease

Retirement

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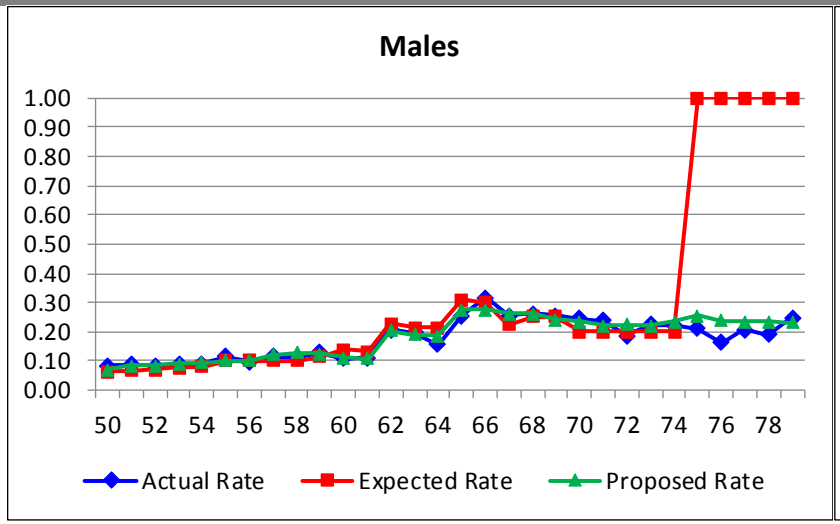

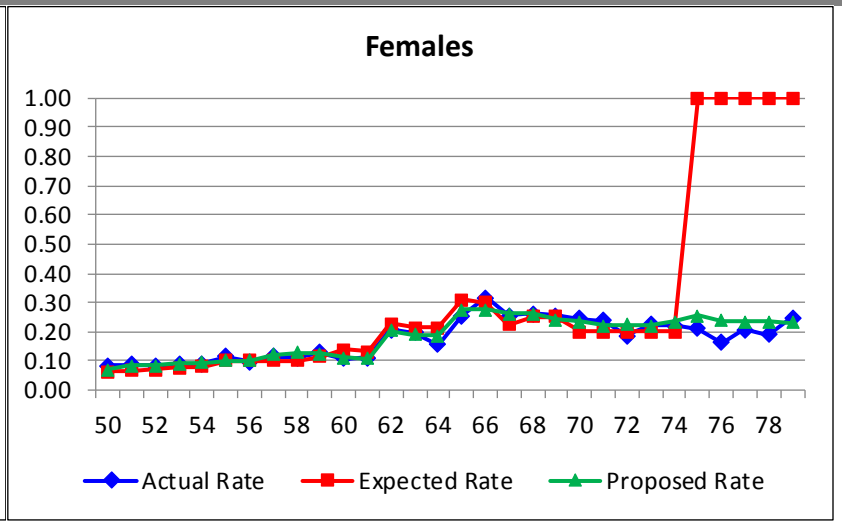

	Actual	Expected	Act to Exp	Proposed	Act to Prop
Males	6,359.00	7,191.42	0.8842	6,545.59	0.9715
Females	7,698.00	8,828.28	0.8720	7,844.64	0.9813
Total	14,057	16,019.70	0.8775	14,390.23	0.9768

Observation: fewer retirements over the period than expected overall

Recommendation: adjust rates, generally downwards to reflect actual experience

Cost Impact: decrease

Retirement

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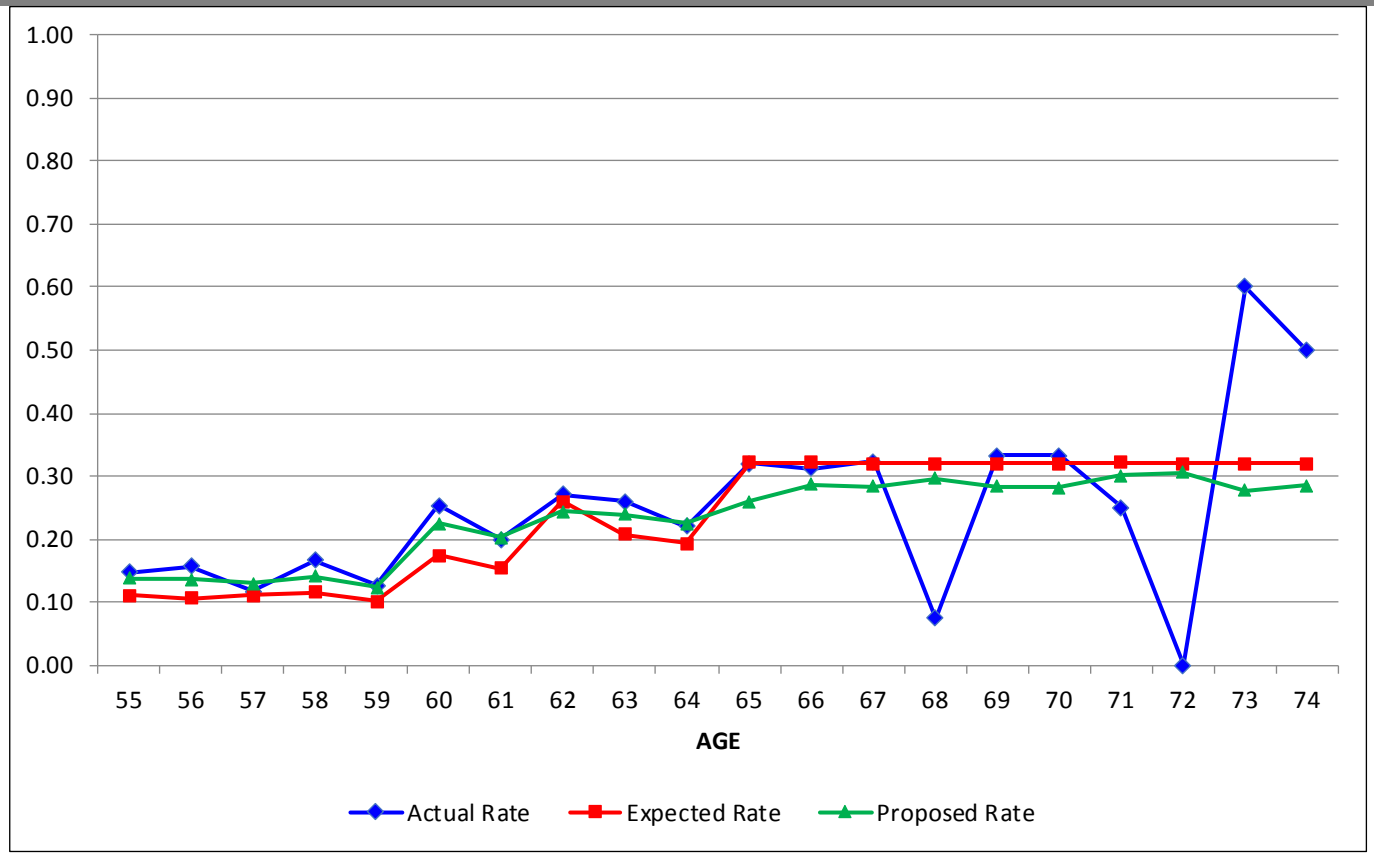

	Actual	Expected	Act to Exp	Proposed	Act to Prop
Total	1,116.00	876.89	1.2727	1,040.72	1.0723
Total	1,116.00	876.89	1.2727	1,040.72	1.0723

Observation: more retirements over the period than expected overall

Recommendation: adjust rates, generally upw ards, to reflect actual experience

Cost Impact: increase

Retirement

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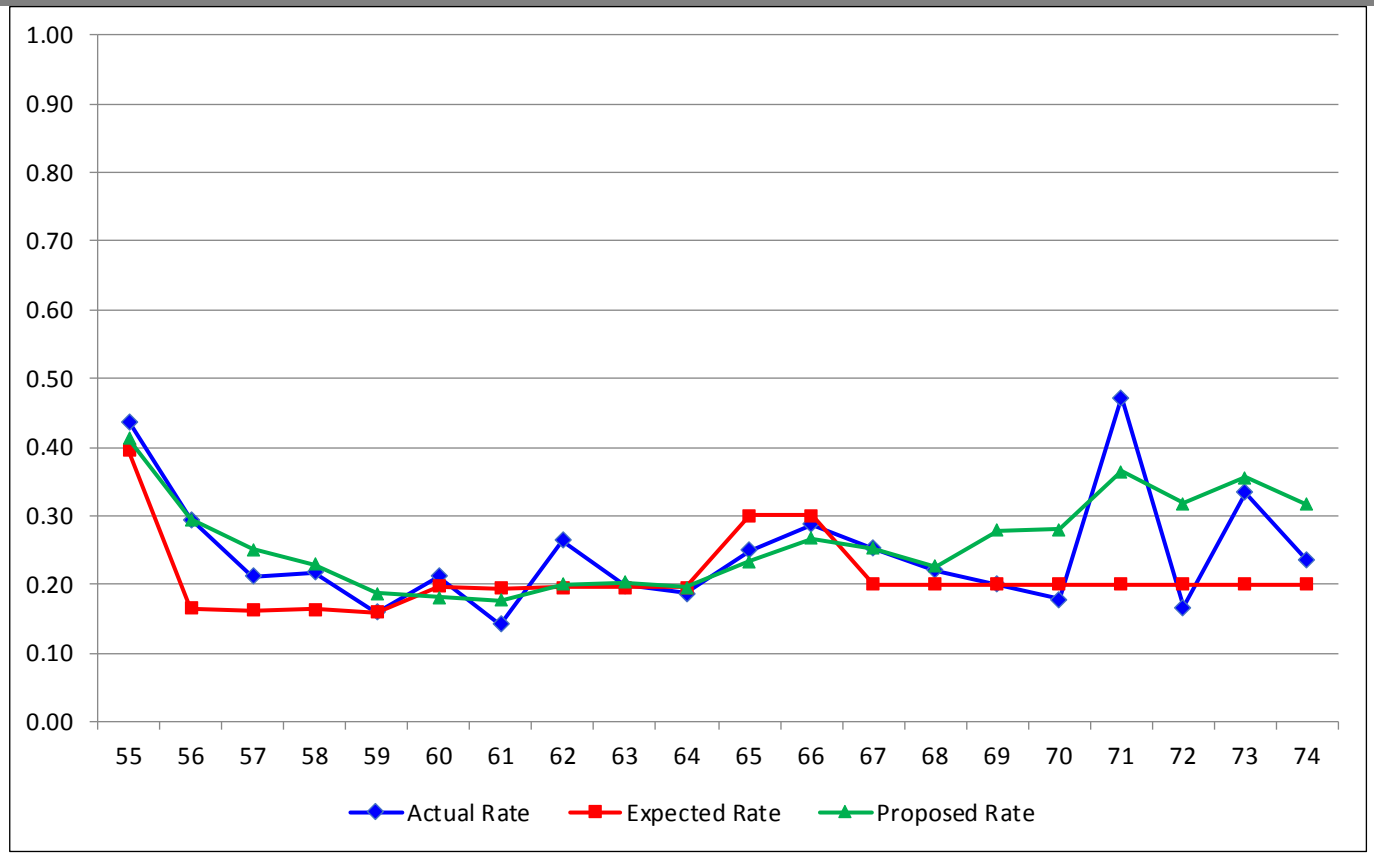

	Actual	Expected	Act to Exp	Proposed	Act to Prop
Total	2,874.00	2,665.77	1.0781	2,806.94	1.0239
Total	2,874.00	2,665.77	1.0781	2,806.94	1.0239

Observation: more retirements over the period than expected overall

Recommendation: adjust rates, generally upw ards, to reflect actual experience

Cost Impact: increase

Demographic Assumptions

Termination

Termination

- The valuation anticipates that members may leave active service for reasons other than retirement, disability and death. We refer to these other reasons as termination.
  - For TSERS, because disability is handled in the DIPNC plan, the termination rates are inclusive of disability
  - For Fire and Rescue, termination rates are inclusive of lapses
- Rates of termination can vary significantly from plan to plan, employee group and by gender, so use of actual experience of the plan is common practice
- Rates of termination tend to be higher earlier in a member's career, so two sets of rates are developed:
  - A set of rates for the first five years of a member's career. These rates are higher than those assumed in the rest of the career and vary based on the member's service
  - A set of rates for the rest of a member's career that vary based on the member's age
- Proposed Termination rates adjusted the current rates to reflect whether actual experience was more or less than expected
- For CJRS, we are recommending adding termination rates for the first time of 2% at all ages
- For valuation purposes termination rates shut off at retirement eligibility
- Generally, assuming more (fewer) terminations results in higher (lower) estimated costs

Termination (<5 Years of Service)

Plan
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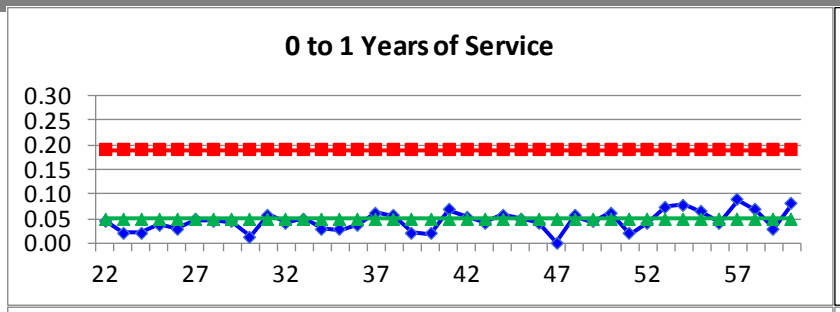

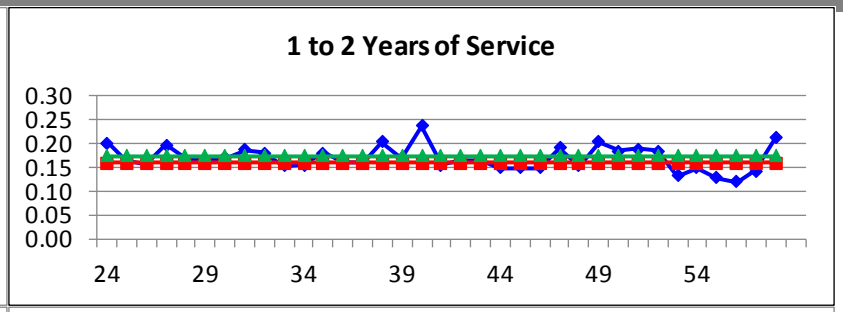

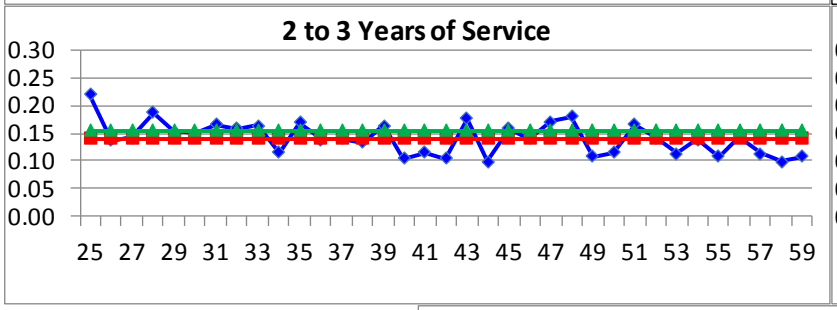

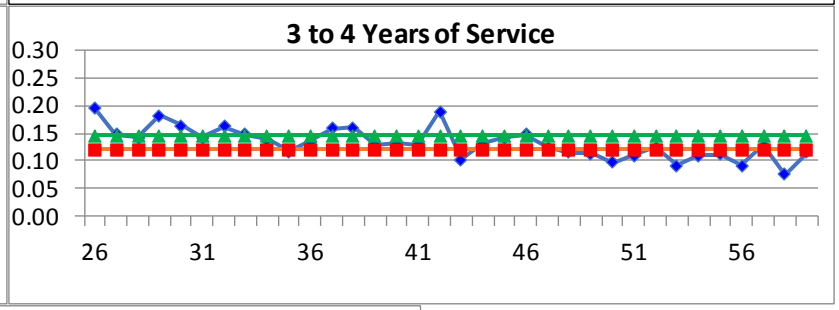

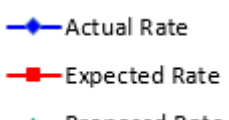

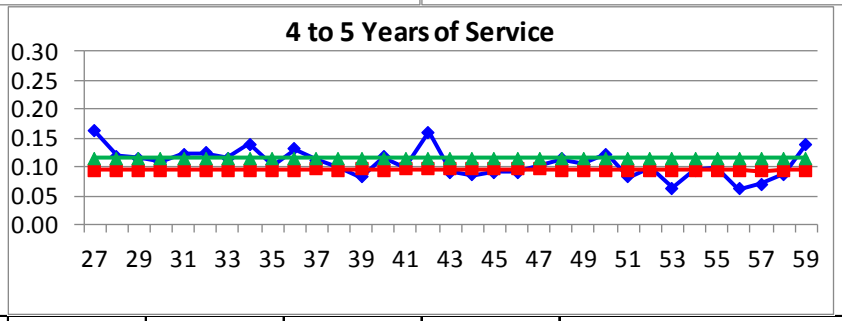

	Actual	Expected	Act to Exp	Proposed	Act to Prop
0-1 years	346.00	1,607.97	0.2152	423.15	0.8177
1-2 years	2,371.00	2,116.00	1.1205	2,314.38	1.0245
2-3 years	1,820	1,624.14	1.1206	1,798.16	1.0121
3-4 years	1,545	1,235.88	1.2501	1,493.36	1.0346
4-5 years	1,036	839.58	1.2340	1,016.49	1.0192
Total	7,118	7,423.57	0.9588	7,045.52	1.0103

Observation: fewer terminations with less than 5 years of service over the period than expected overall other than the following groups: 1-2 years, 2-3 years, 3-4 years, 4-5 years

Recommendation: adjust rates, generally downwards to reflect actual experience

Cost Impact: minimal

Termination (<5 Years of Service)

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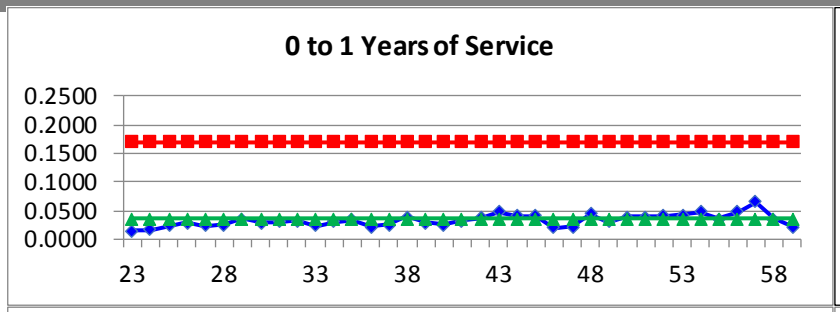

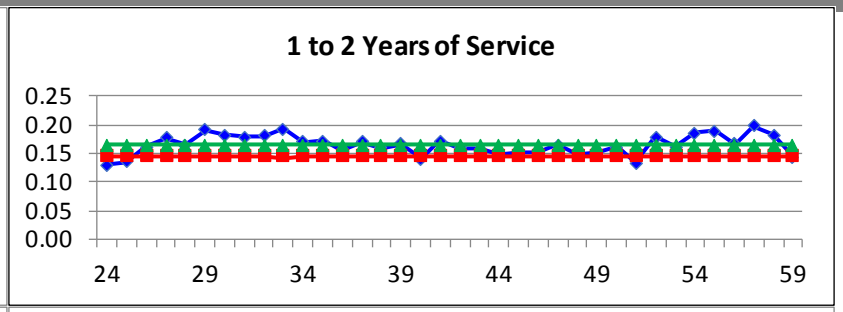

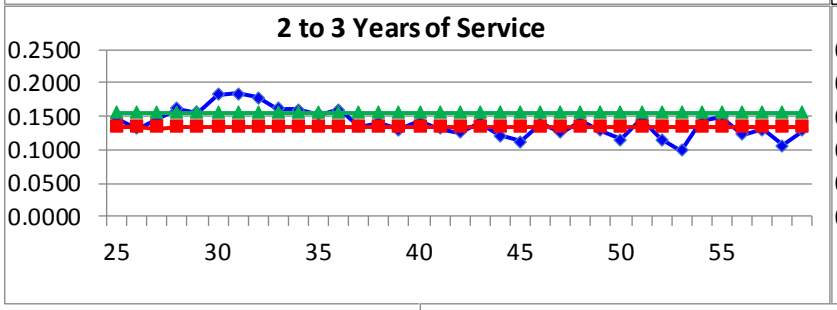

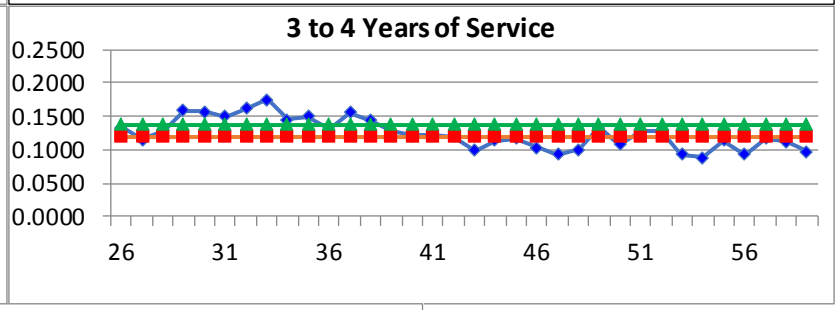

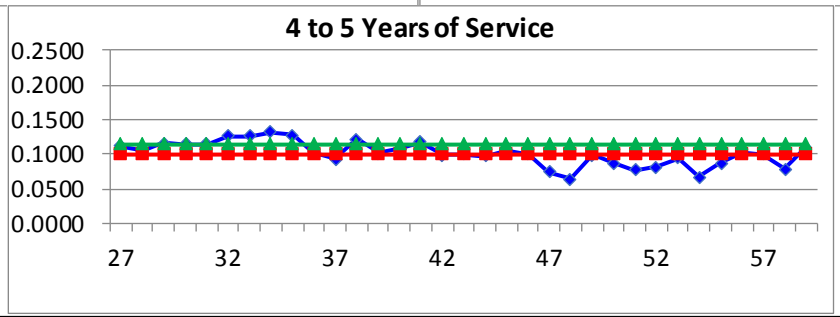

	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: fewer terminations with less than 5 years of service
0-1 years	877.00	5,265.58	0.1666	1,084.09	0.8090	over the period than expected overall other than the following groups:
1-2 years	7,468.00	6,425.60	1.1622	7,311.48	1.0214	1-2 years, 2-3 years, 3-4 years, 4-5 years
2-3 years	6,196	5,354.96	1.1571	6,147.61	1.0079	Recommendation: adjust rates, generally downwards to reflect
3-4 years	4,973	4,239.12	1.1731	4,857.33	1.0238	actual experience
4-5 years	3,585	3,070.60	1.1675	3,531.19	1.0152	Cost Impact: minimal
Total	23,099	24,355.86	0.9484	22,931.70	1.0073	

Termination (<5 Years of Service)

Plan
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-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
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LGERS:
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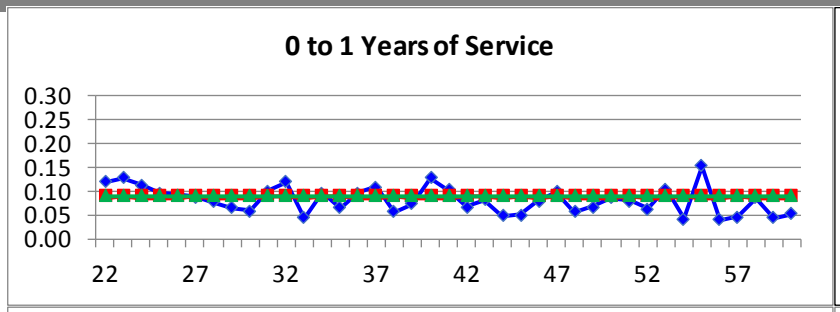
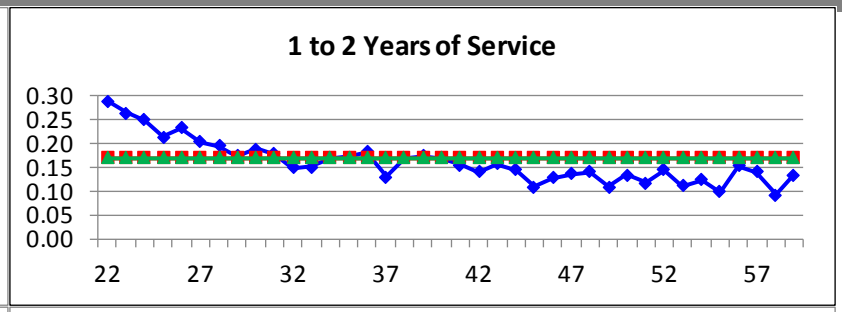
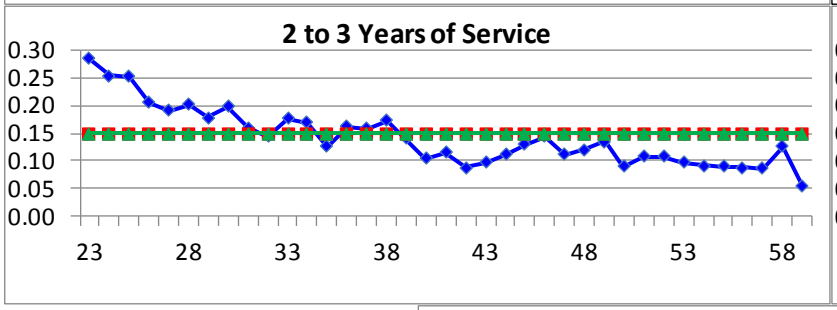
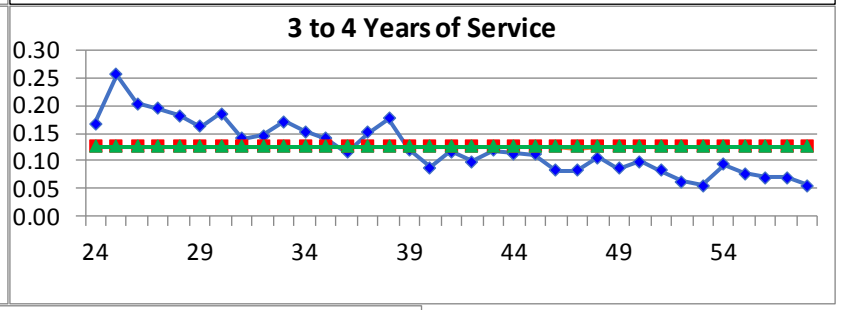
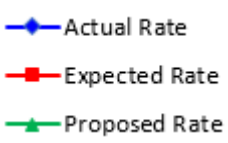
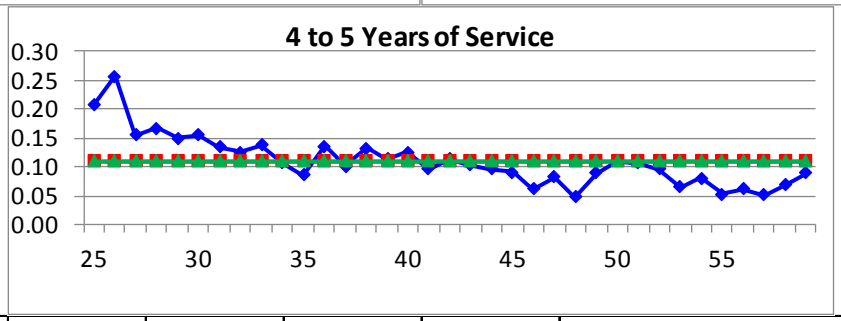








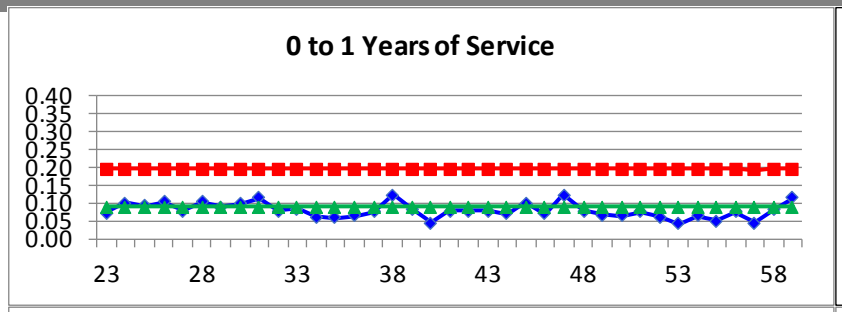


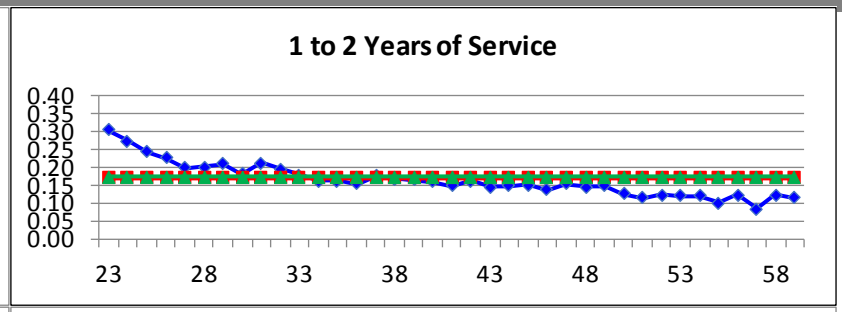


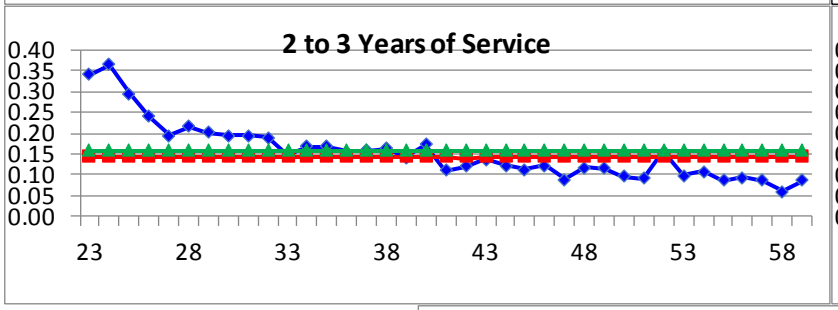
	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more terminations with less than 5 years of service
0-1 years	578.00	1,224.72	0.4719	612.36	0.9439	over the period than expected overall other than the following groups:
1-2 years	3,181.00	2,865.35	1.1102	3,142.96	1.0121	0-1 years
2-3 years	2,414	2,062.58	1.1704	2,379.90	1.0143	Recommendation: adjust rates, generally upwards, to reflect actual
3-4 years	1,773	1,499.85	1.1821	1,704.38	1.0403	experience
4-5 years	1,327	1,073.25	1.2364	1,311.75	1.0116	Cost Impact: minimal
Total	9,273	8,725.75	1.0627	9,151.35	1.0133	

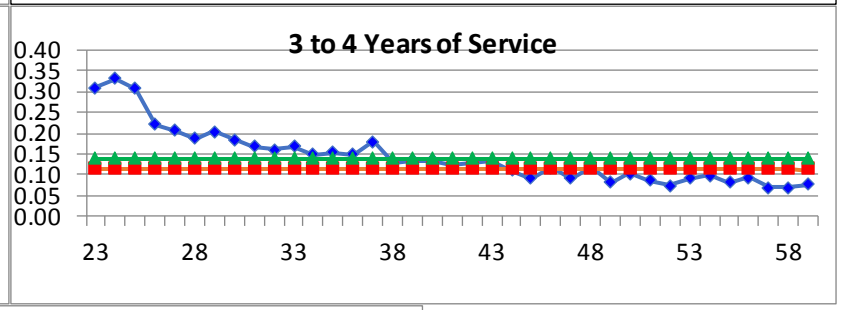
Termination (<5 Years of Service)

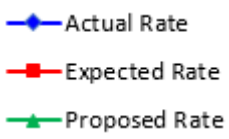
Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
-General Employees
-Fire & Rescue
-Law Enforcement
RODs
Death
Membership
Active
Retiree
Disabled
Beneficiary
Gender
Males
Females
Males and Females

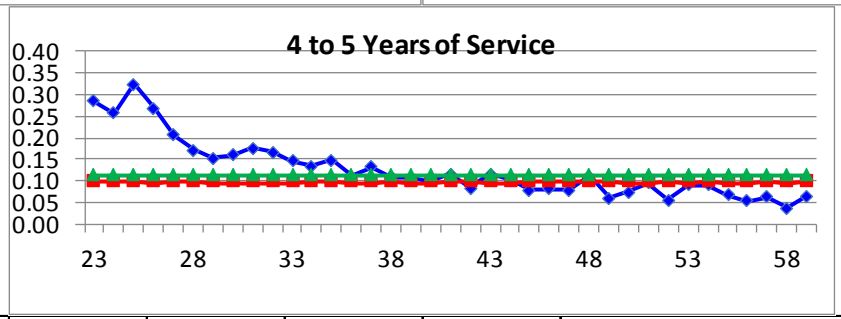












	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more terminations with less than 5 years of service
0-1 years	850.00	1,958.67	0.4340	904.14	0.9401	over the period than expected overall other than the following groups:
1-2 years	4,381.00	4,219.23	1.0383	4,343.33	1.0087	0-1 years
2-3 years	3,352	3,044.49	1.1010	3,306.71	1.0137	Recommendation: adjust rates, generally downwards to reflect
3-4 years	2,481	2,033.93	1.2198	2,476.60	1.0018	actual experience
4-5 years	1,731	1,503.10	1.1516	1,728.57	1.0014	Cost Impact: minimal
Total	12,795	12,759.42	1.0028	12,759.34	1.0028	

Termination (<5 Years of Service)

Plan
TSERS:
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CJRS
LRS
National Guard
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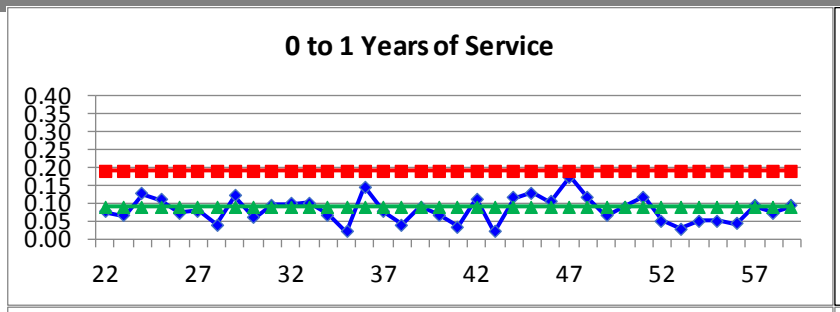
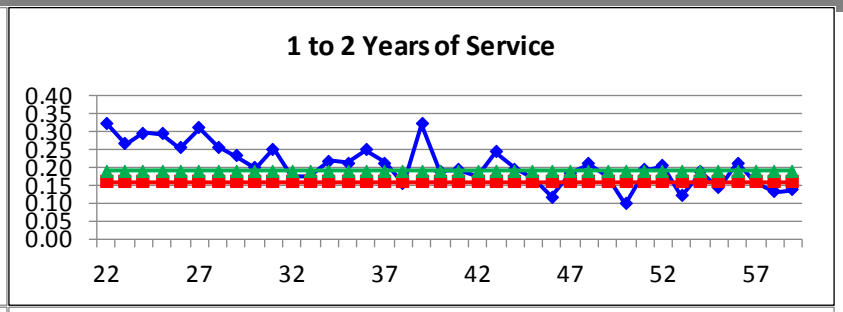
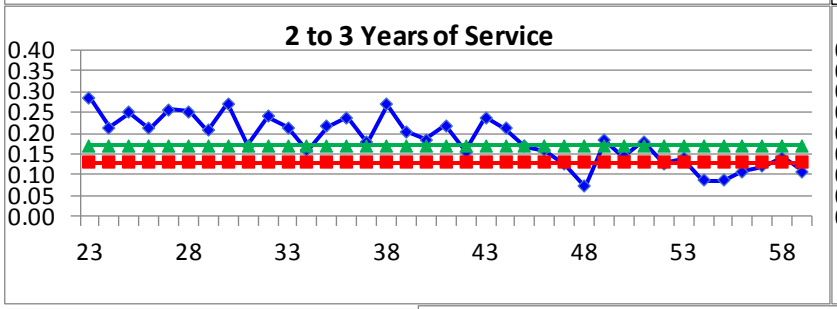
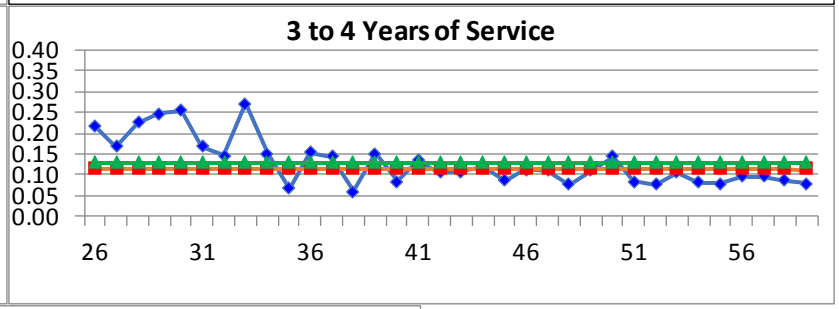
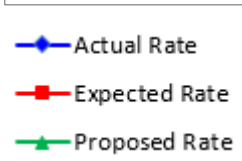
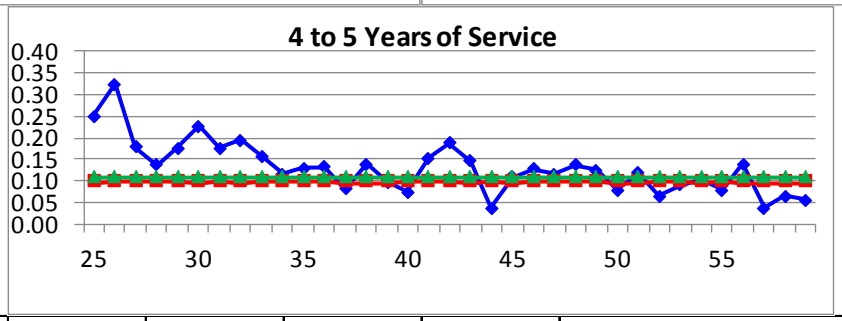






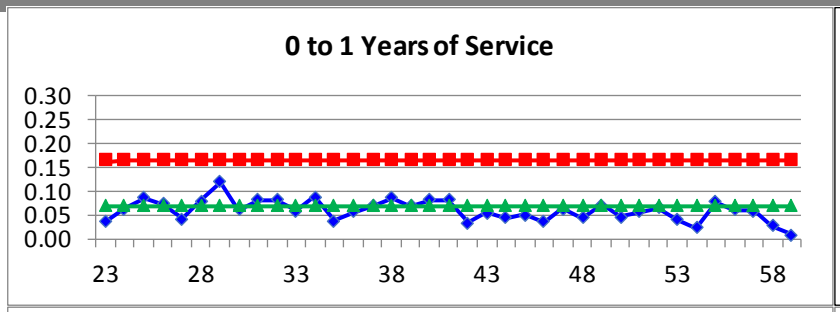


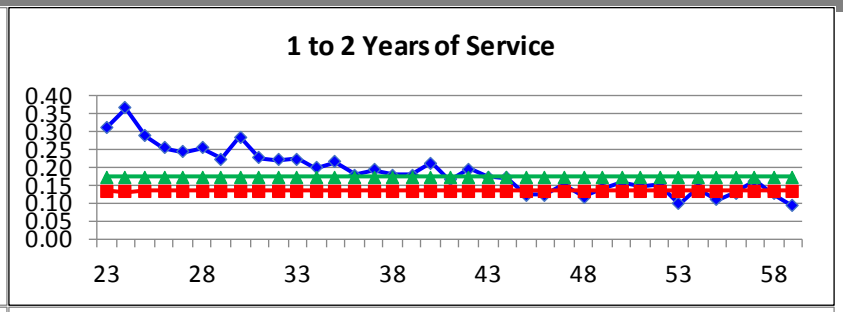


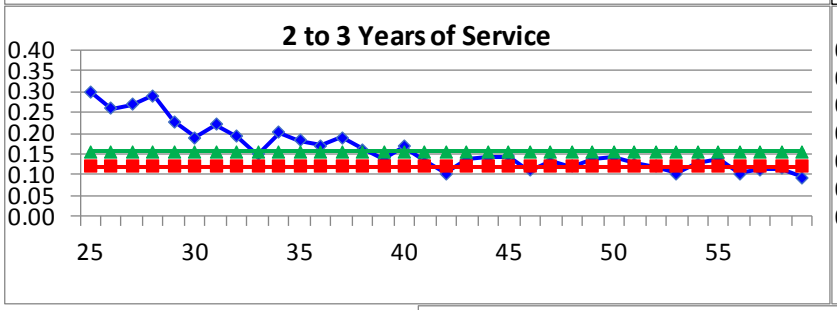


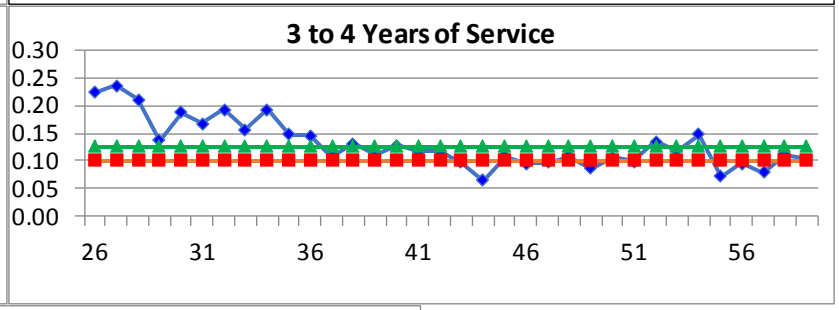
	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more terminations with less than 5 years of service
0-1 years	240.00	579.69	0.4140	274.59	0.8740	over the period than expected overall other than the following groups:
1-2 years	1,256.00	991.36	1.2669	1,177.24	1.0669	0-1 years
2-3 years	905	671.06	1.3486	877.54	1.0313	Recommendation: adjust rates, generally upwards, to reflect actual
3-4 years	598	519.90	1.1502	587.60	1.0177	experience
4-5 years	444	383.40	1.1581	421.74	1.0528	Cost Impact: minimal
Total	3,443	3,145.41	1.0946	3,338.71	1.0312	

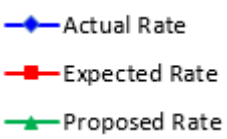
Termination (<5 Years of Service)

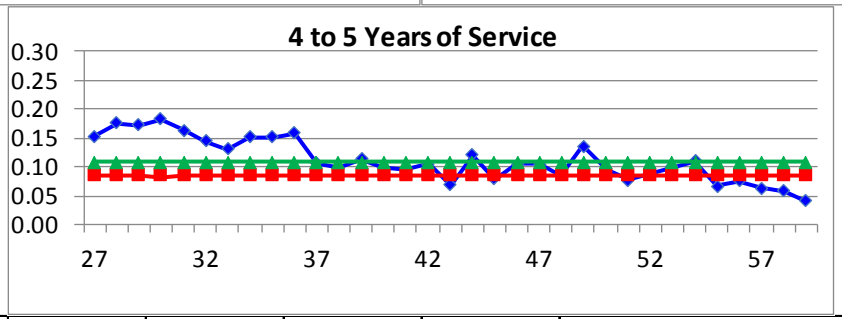












	Actual	Expected	Act to Exp	Proposed	Act to Prop
0-1 years	412.00	1,112.26	0.3704	472.08	0.8727
1-2 years	2,094.00	1,544.36	1.3559	2,002.00	1.0460
2-3 years	1,547	1,173.00	1.3188	1,515.13	1.0210
3-4 years	1,032	822.80	1.2543	1,028.50	1.0034
4-5 years	768	597.66	1.2850	755.19	1.0170
Total	5,853	5,250.08	1.1148	5,772.89	1.0139

Observation: more terminations with less than 5 years of service over the period than expected overall other than the following groups: 0-1 years

Recommendation: adjust rates, generally upwards, to reflect actual experience

Cost Impact: minimal

Termination (<5 Years of Service)

Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
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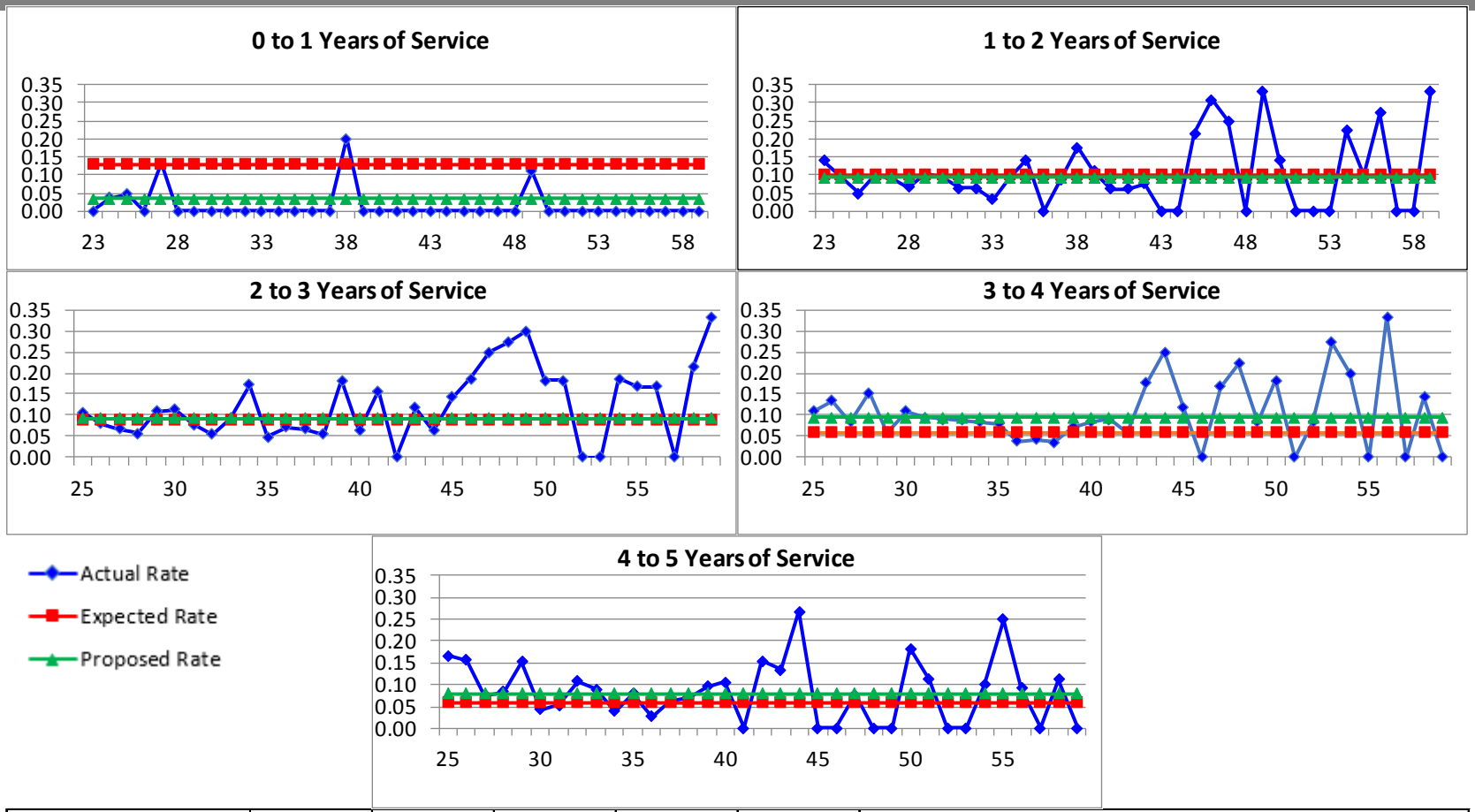
-Fire & Rescue
-Law Enforcement
RODs
Death
Membership
Active
Retiree
Disabled
Beneficiary
Gender
Males
Females
Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more terminations with less than 5 years of service
0-1 years	6.00	37.83	0.1586	10.19	0.5891	over the period than expected overall other than the following groups:
1-2 years	117.00	128.20	0.9126	118.59	0.9866	0-1 years , 1-2 years
2-3 years	130	123.84	1.0497	127.28	1.0214	Recommendation: adjust rates, generally upwards, to reflect actual
3-4 years	129	75.36	1.7118	119.32	1.0811	experience
4-5 years	96	68.10	1.4097	90.80	1.0573	Cost Impact: minimal
Total	478	433.33	1.1031	466.17	1.0254	

Termination (<5 Years of Service)

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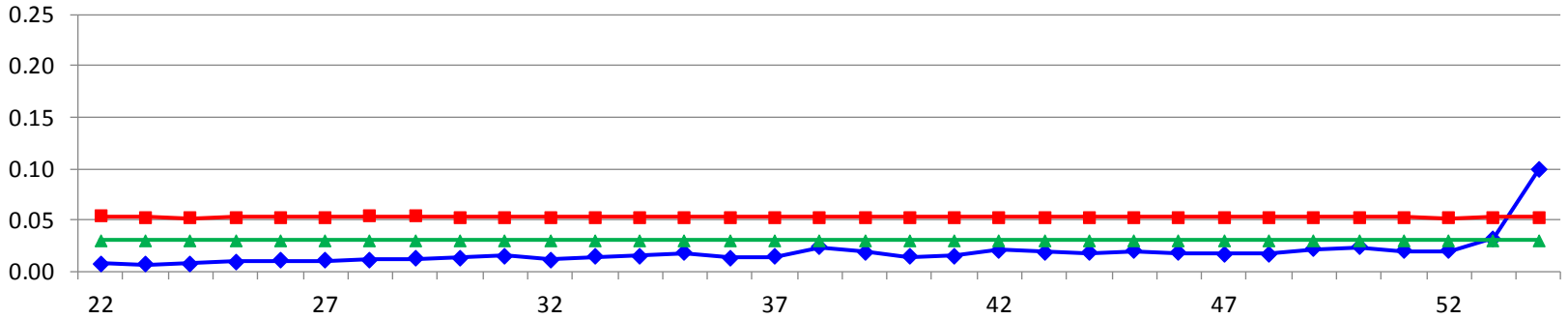
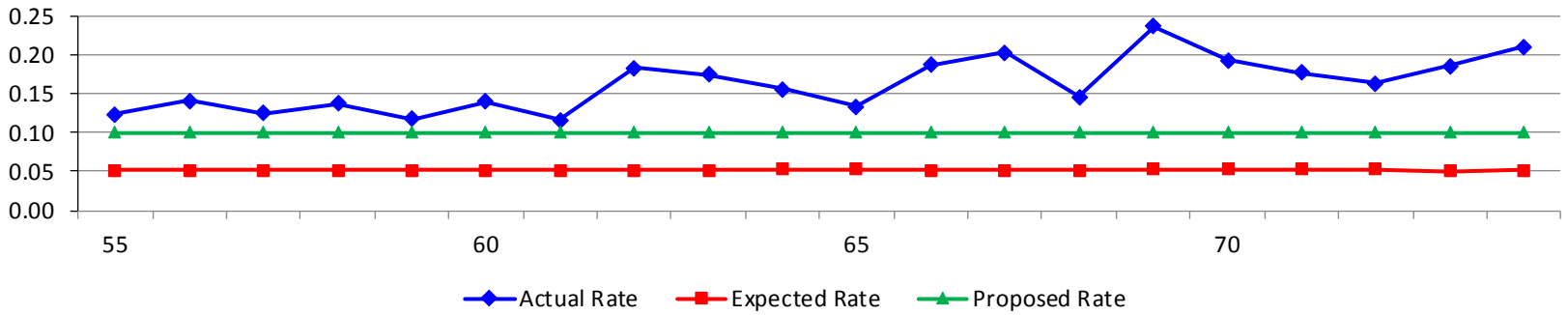
Death
Membership
Active
Retiree
Disabled
Beneficiary
Gender
Males
Females
Males and Females

< Age 55, <5 Yrs of Service



> Age 55, < 5 Yrs of Service



	Actual	Expected	Act to Exp	Proposed	Act to Prop
0-1 years	811.00	2,915.97	0.2781	1,654.29	0.4902
1-2 years	556.00	196.28	2.8327	376.70	1.4760
Total	1,367	3,112.25	0.4392	2,030.99	0.6731

Observation: fewer terminations with less than 5 years of service over the period than expected overall other than the following groups: 1-2 years

Recommendation: adjust rates, generally downwards to reflect actual experience

Cost Impact: minimal

Termination (<5 Years of Service)

Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
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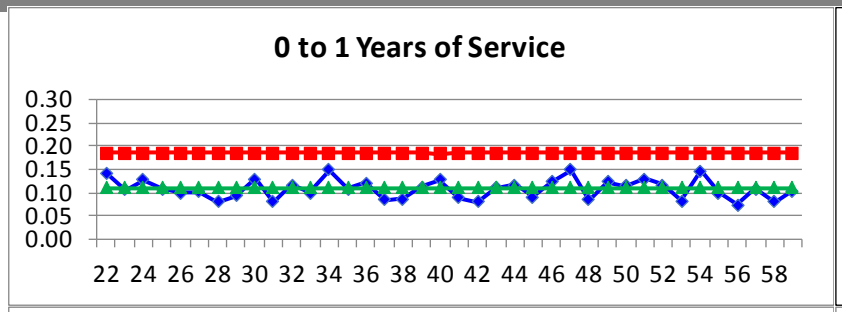

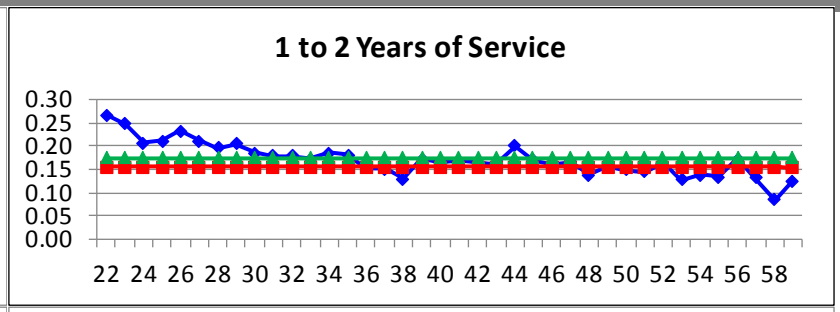

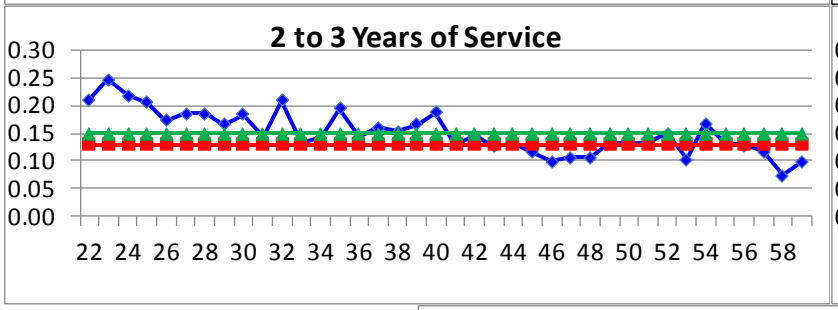

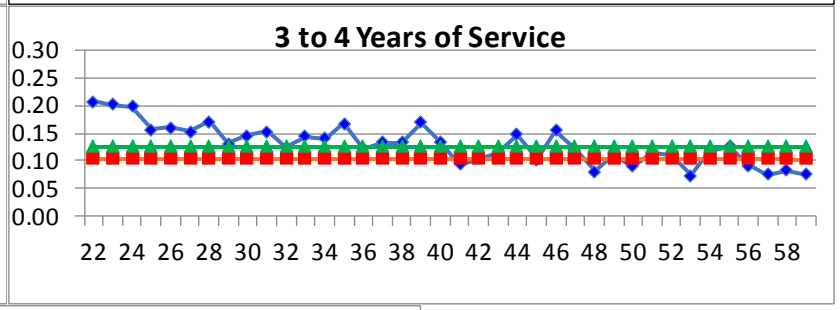

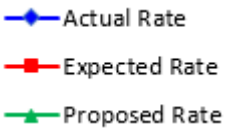

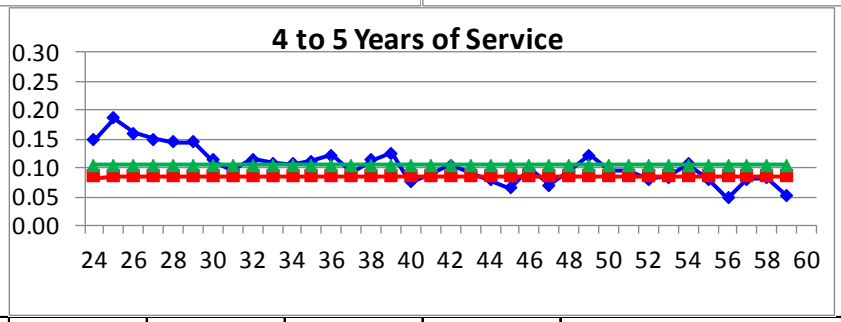

	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more terminations with less than 5 years of service
0-1 years	1,059.00	1,827.66	0.5794	1,086.58	0.9746	over the period than expected overall other than the following groups:
1-2 years	3,853.00	3,324.28	1.1590	3,753.58	1.0265	0-1 years
2-3 years	2,725	2,254.98	1.2084	2,601.90	1.0473	Recommendation: adjust rates, generally upwards, to reflect actual
3-4 years	1,843	1,495.79	1.2321	1,780.88	1.0349	experience
4-5 years	1,258	997.07	1.2617	1,230.92	1.0220	Cost Impact: minimal
Total	10,738	9,899.78	1.0847	10,453.85	1.0272	

Termination (<5 Years of Service)

Plan
TSERS:
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-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
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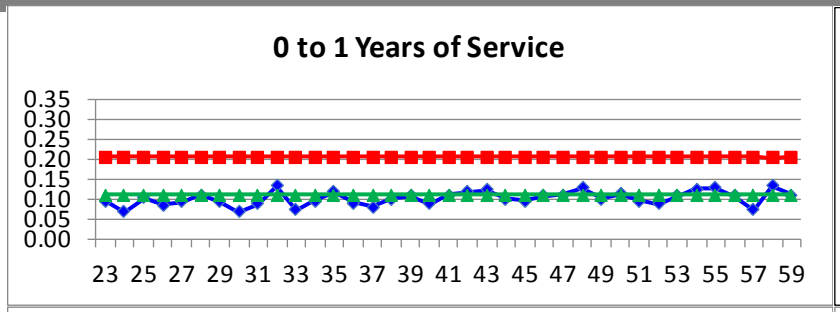
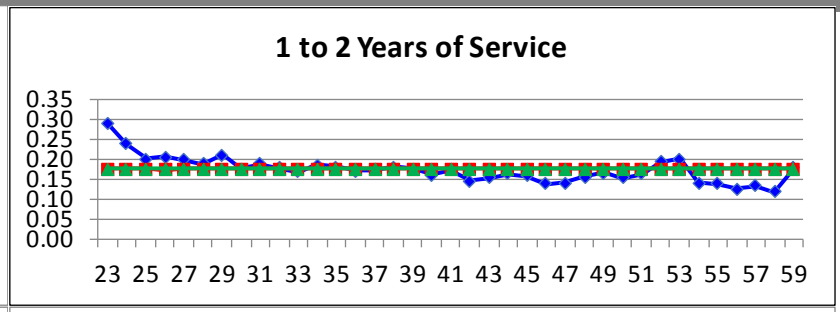
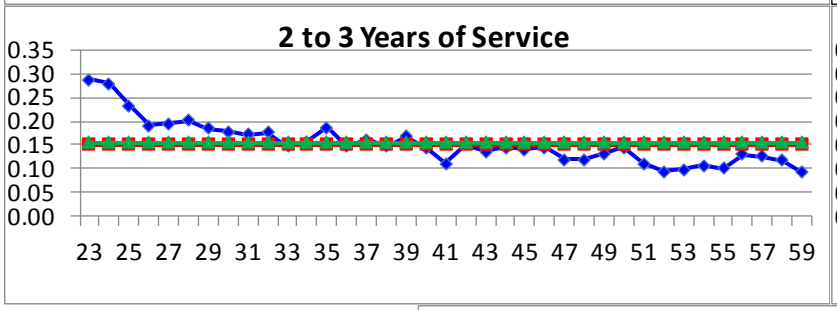
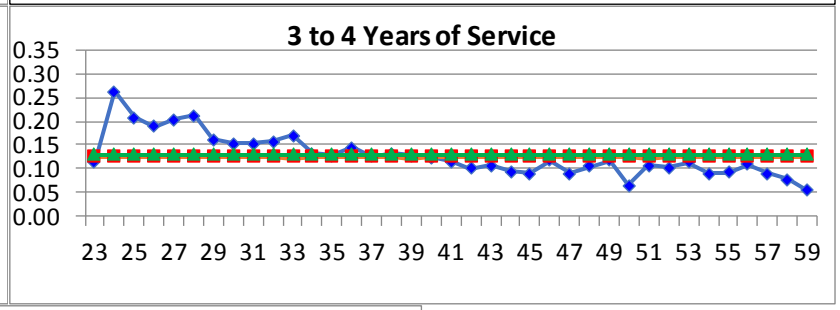
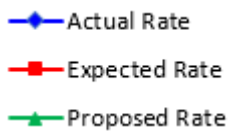
Gender
Males
Females
Males and Females

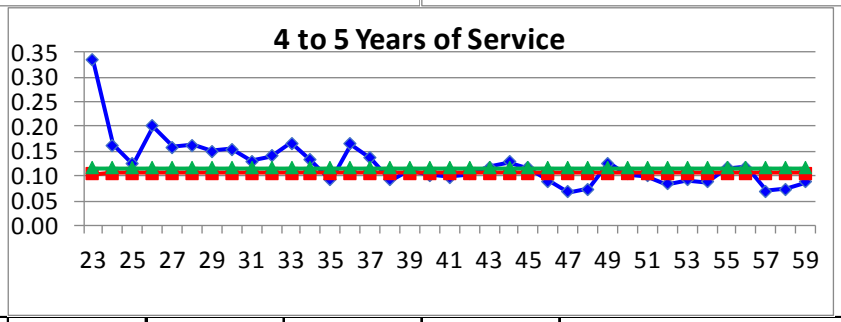












	Actual	Expected	Act to Exp	Proposed	Act to Prop
0-1 years	1,139.00	2,332.17	0.4884	1,251.69	0.9100
1-2 years	4,619.00	4,537.52	1.0180	4,537.05	1.0181
2-3 years	3,372	3,235.35	1.0422	3,343.20	1.0086
3-4 years	2,315	2,202.91	1.0509	2,290.34	1.0108
4-5 years	1,713	1,531.66	1.1184	1,677.74	1.0210
Total	13,158	13,839.61	0.9507	13,100.01	1.0044

Observation: fewer terminations with less than 5 years of service over the period than expected overall other than the following groups: 1-2 years, 2-3 years, 3-4 years, 4-5 years

Recommendation: adjust rates, generally downwards to reflect actual experience

Cost Impact: minimal

Termination (<5 Years of Service)

Plan
TSERS:
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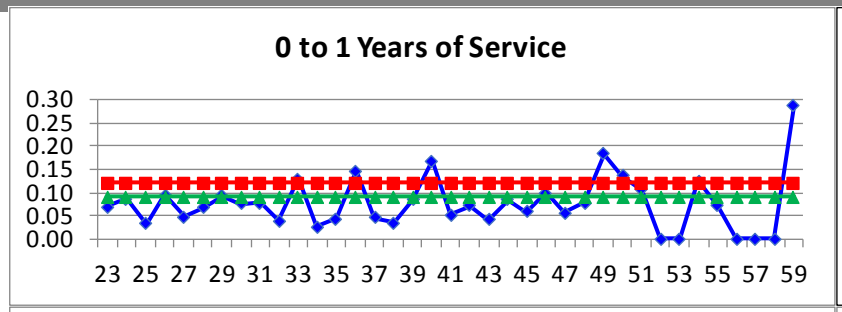
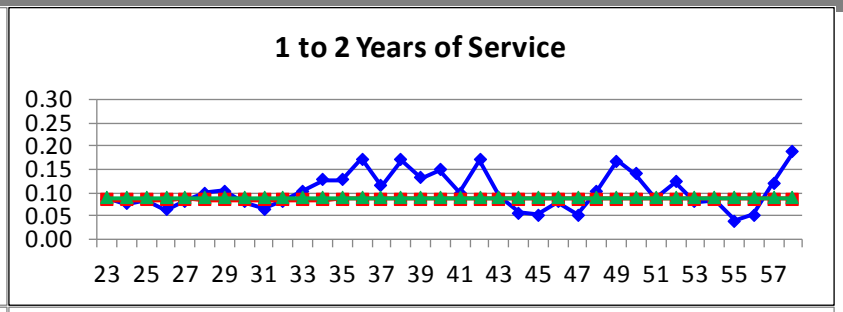
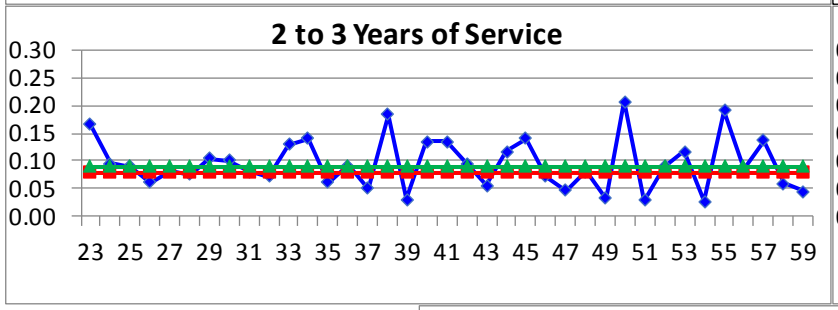
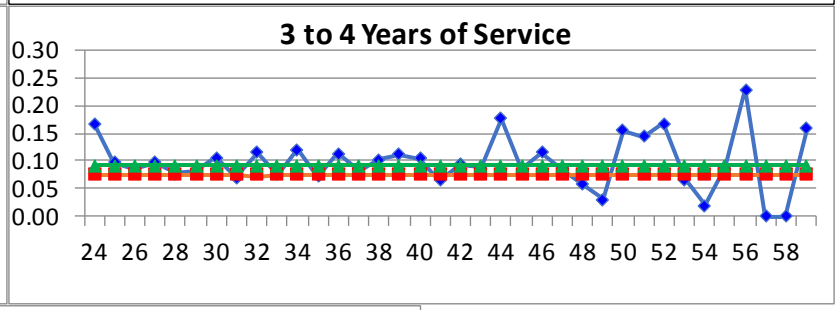
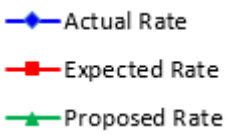
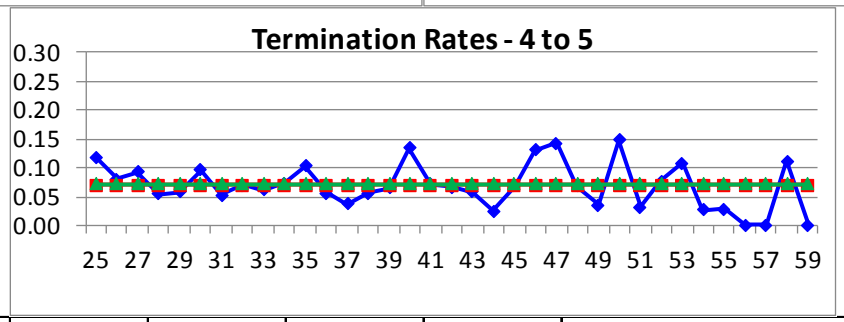








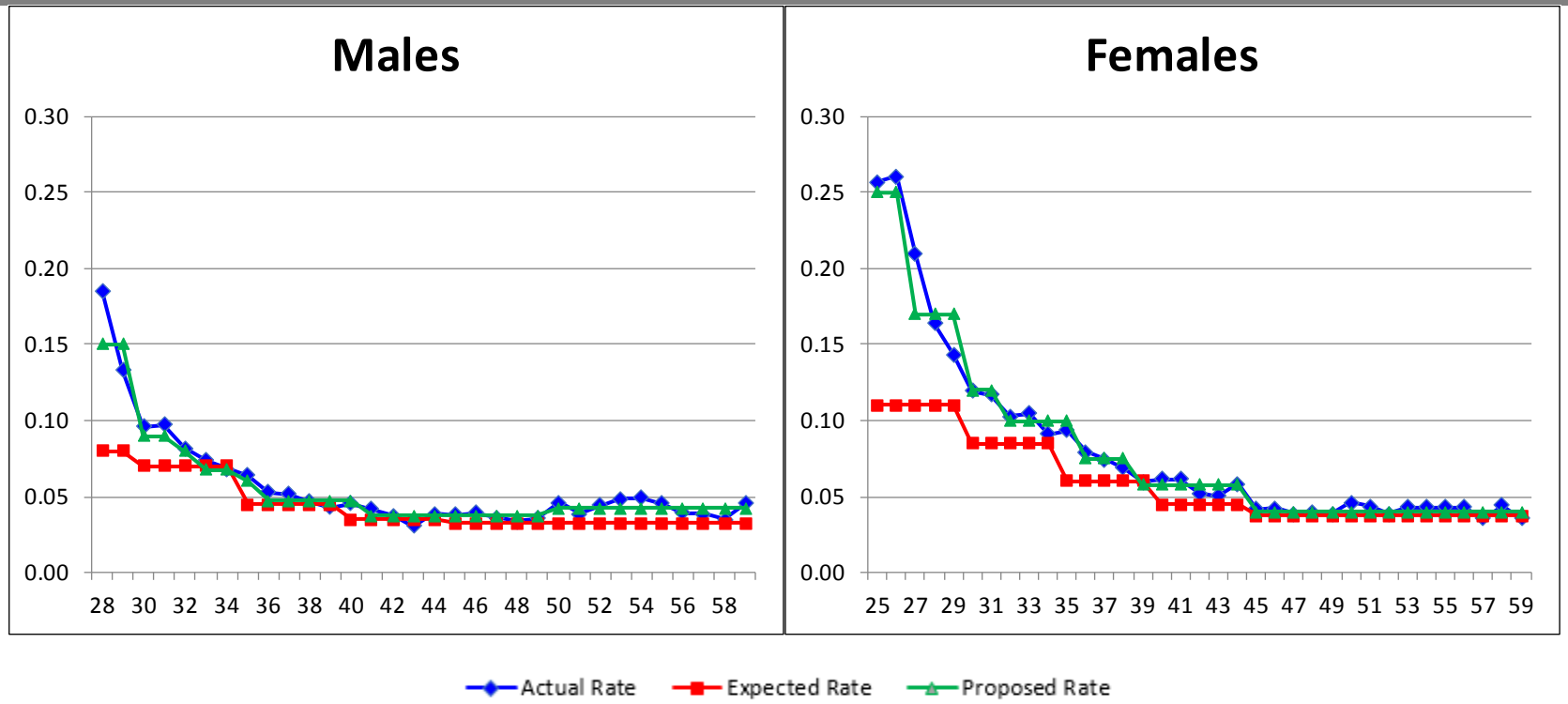




	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more terminations with less than 5 years of service
0-1 years	148.00	242.28	0.6109	181.71	0.8145	over the period than expected overall other than the following groups:
1-2 years	584.00	539.52	1.0824	554.84	1.0526	0-1 years
2-3 years	583	507.36	1.1491	570.78	1.0214	Recommendation: adjust rates, generally upwards, to reflect actual
3-4 years	573	450.08	1.2731	554.54	1.0333	experience
4-5 years	399	380.45	1.0488	394.04	1.0126	Cost Impact: minimal
Total	2,287	2,119.69	1.0789	2,255.90	1.0138	

Termination (5+ Years of Service)

Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
-General Employees
-Fire & Rescue
-Law Enforcement
RODs
Death
Membership
Active
Retiree
Disabled
Beneficiary
Gender
Males
Females
Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop
Males	3,818.00	3,153.41	1.2108	3,762.83	1.0147
Females	15,404.00	13,641.03	1.1292	15,285.14	1.0078
Total	19,222	16,794.44	1.1445	19,047.98	1.0091

Observation: more terminations with more than 5 years of service over the period than expected overall

Recommendation: adjust rates, generally upwards, to reflect actual experience

Cost Impact: decrease

Termination (5+ Years of Service)

Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
-General Employees
-Fire & Rescue
-Law Enforcement
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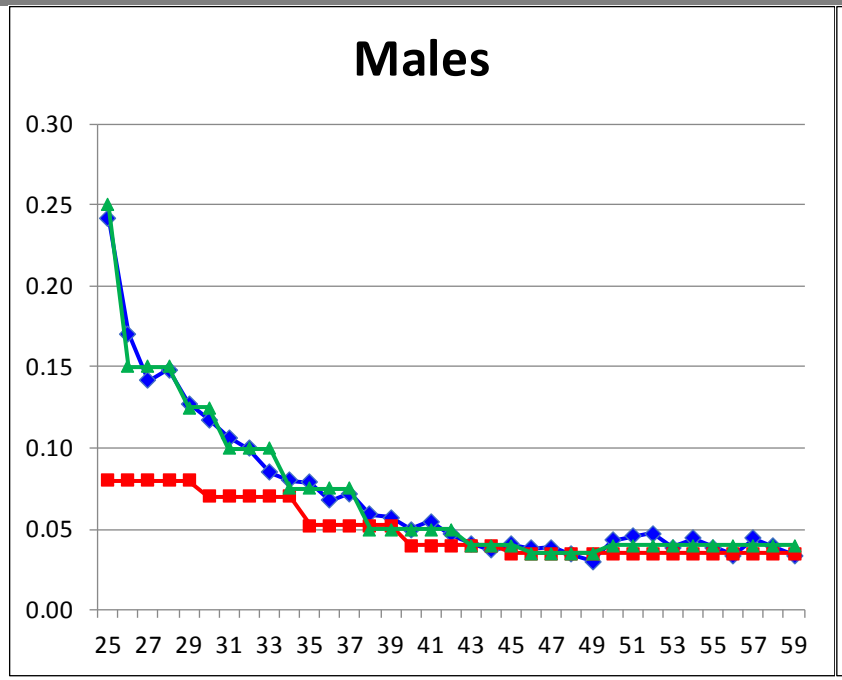
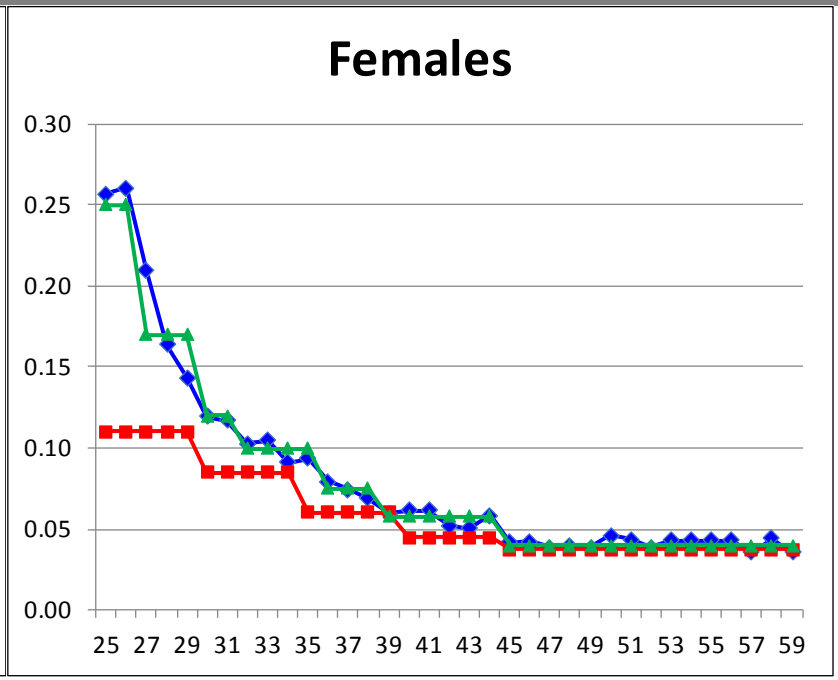
Males and Females





Actual Rate Expected Rate Proposed Rate

	Actual	Expected	Act to Exp	Proposed	Act to Prop
Males	5,521.00	4,577.57	1.2061	5,479.16	1.0076
Females	7,646.00	6,464.54	1.1828	7,636.44	1.0013
Total	13,167	11,042.11	1.1924	13,115.60	1.0039

Observation: more terminations with more than 5 years of service over the period than expected overall

Recommendation: adjust rates, generally upwards, to reflect actual experience

Cost Impact: decrease

Termination (5+ Years of Service)

Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
-General Employees
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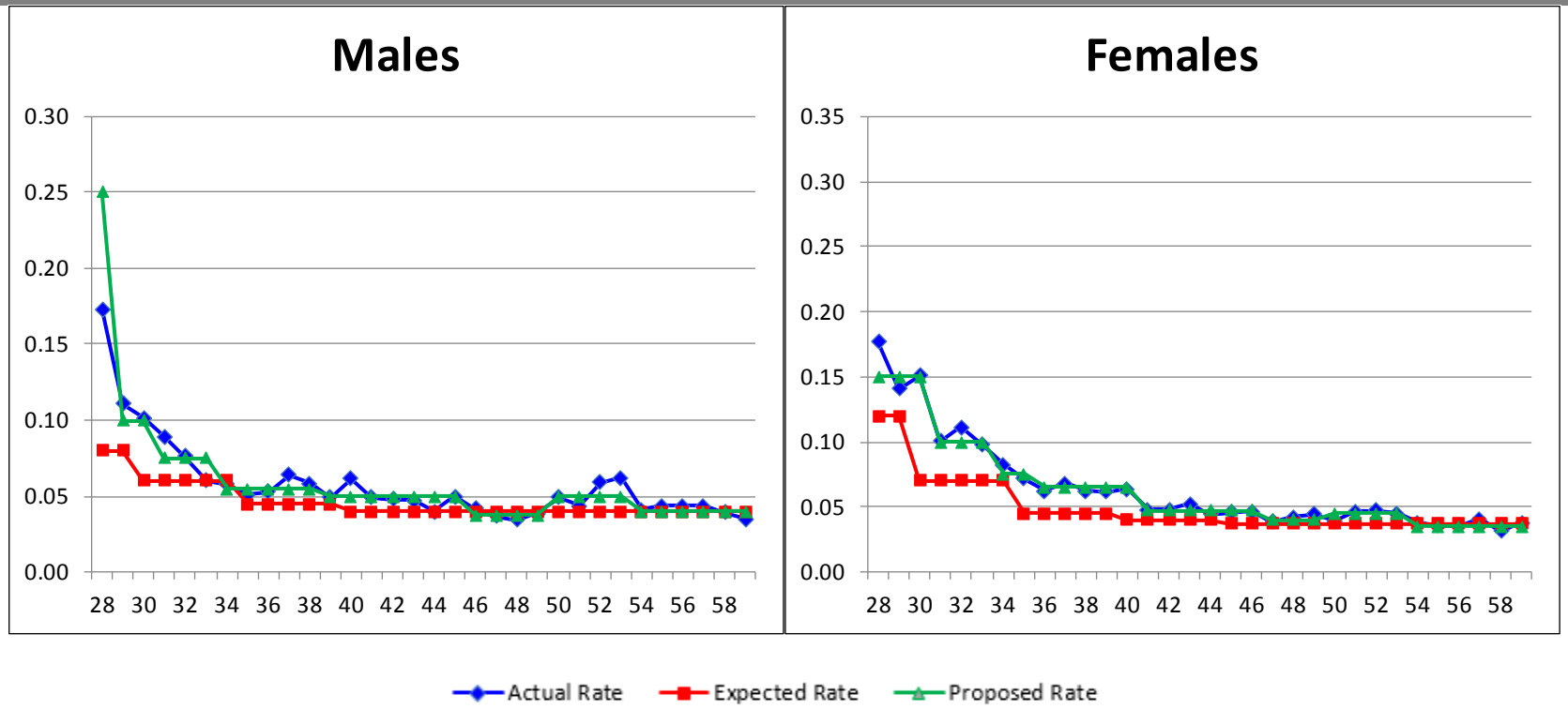
Males
Females
Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop
Males	1,607.00	1,371.04	1.1721	1,589.40	1.0111
Females	3,896.00	3,241.25	1.2020	3,843.31	1.0137
Total	5,503	4,612.29	1.1931	5,432.71	1.0129

Observation: more terminations with more than 5 years of service over the period than expected overall

Recommendation: adjust rates, generally upwards, to reflect actual experience

Cost Impact: decrease

Termination - All Service

Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
-General Employees
-Fire & Rescue
-Law Enforcement
RODs
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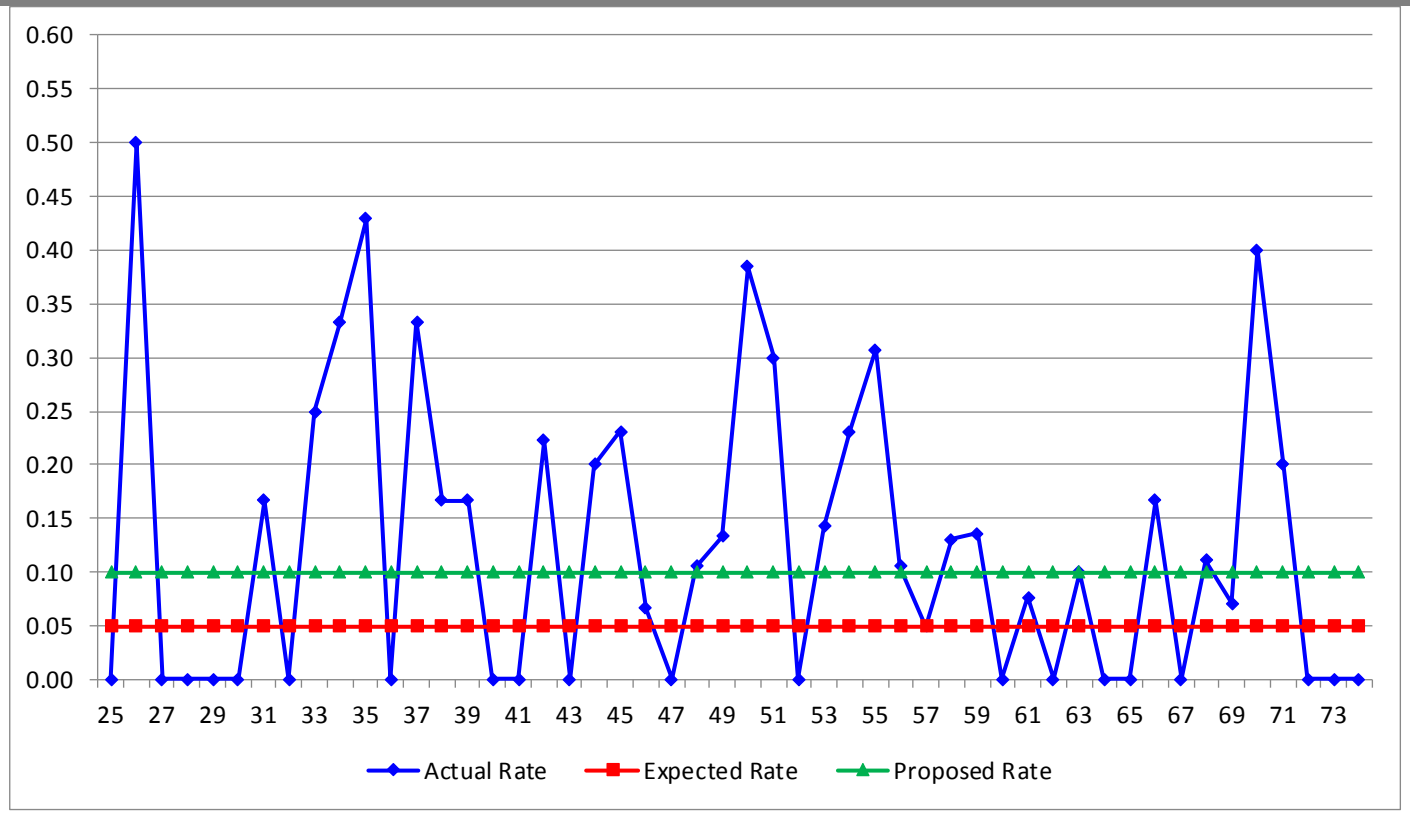
Active
Retiree
Disabled
Beneficiary
Gender
Males
Females
Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop
Total	67.00	26.85	2.4953	53.70	1.2477

Observation: more Termination over the period than expected overall

Recommendation: adjust rates, generally upwards, to reflect actual experience

Cost Impact: minimal

Termination (5+ Years of Service)

Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
-General Employees
-Fire & Rescue
-Law Enforcement
RODs
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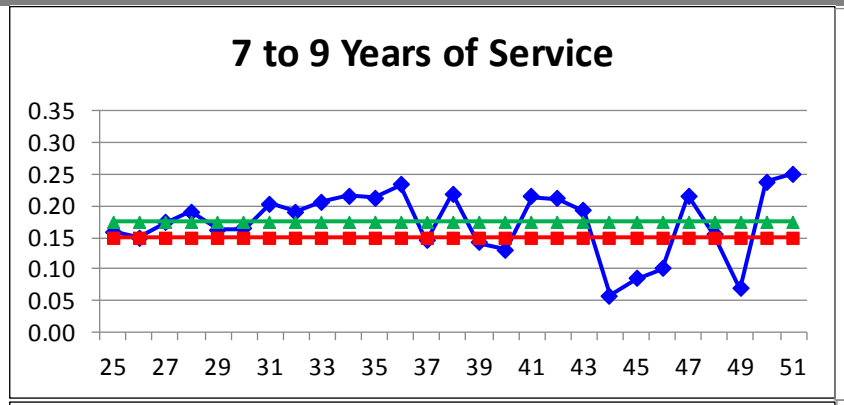
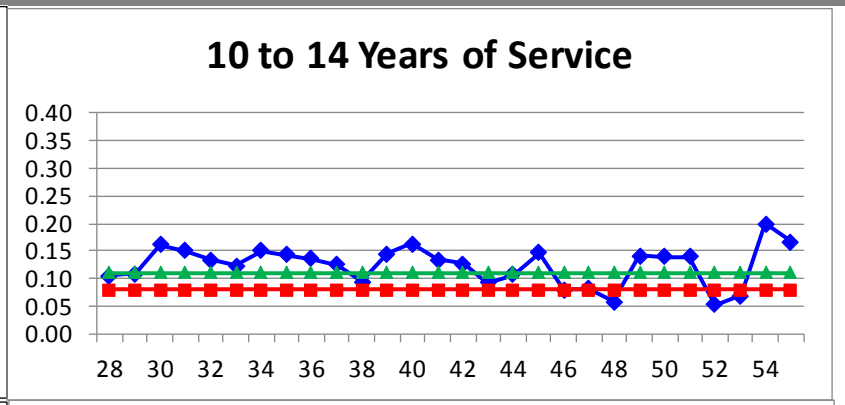
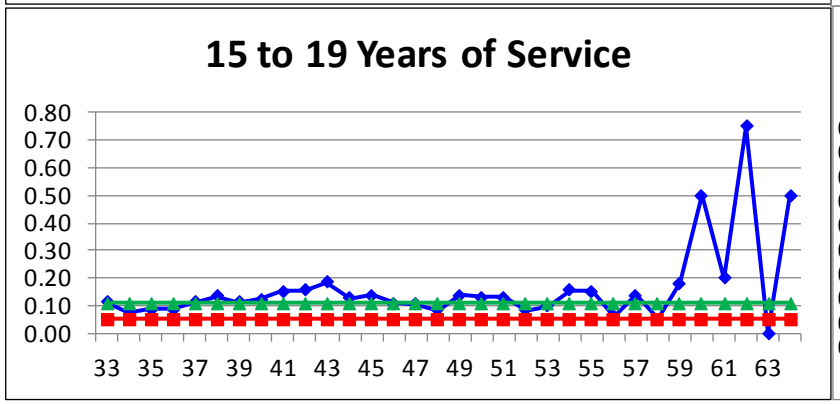
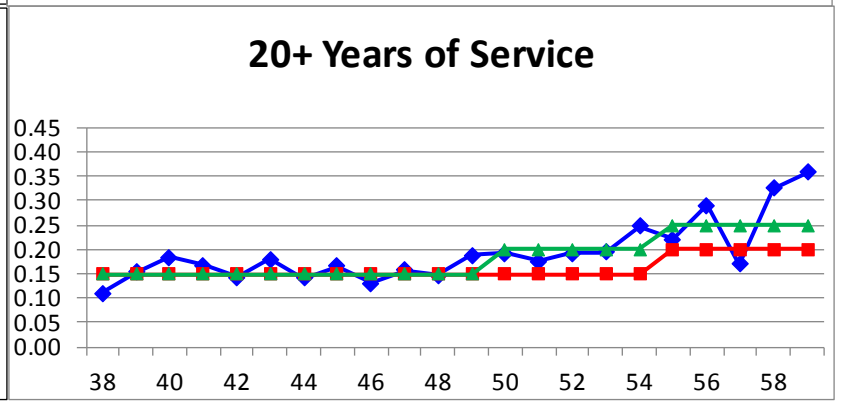
Beneficiary
Gender
Males
Females
Males and Females









Actual Rate Expected Rate Proposed Rate

	Actual	Expected	Act to Exp	Proposed	Act to Prop	Observation: more terminations with more than 5 years of service over the period than expected overall
7 to 9 Years of Service	1,329.00	1,116.00	1.1909	1,302.35	1.0205	
10 to 14 Years of Service	1,098.00	660.24	1.6630	907.83	1.2095	
15 to 20 Years of Service	730	309.05	2.3621	679.91	1.0737	Recommendation: adjust rates, generally upwards, to reflect actual experience
20+ Years of Service	938	839.10	1.1179	904.80	1.0367	
Total	4,095	2,924.39	1.4003	3,794.89	1.0791	Cost Impact: decrease

Termination (5+ Years of Service)

Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
-General Employees
-Fire & Rescue
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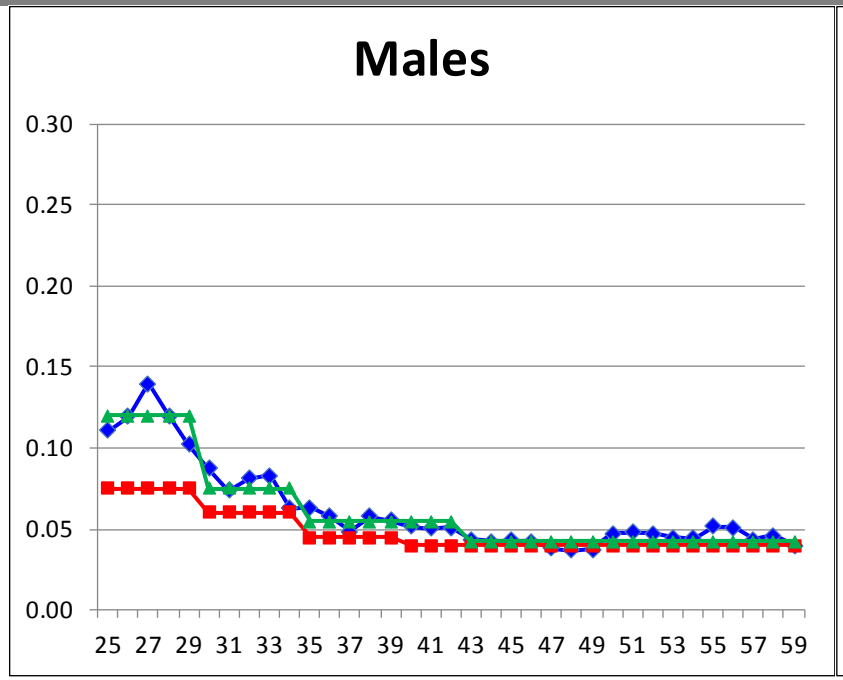
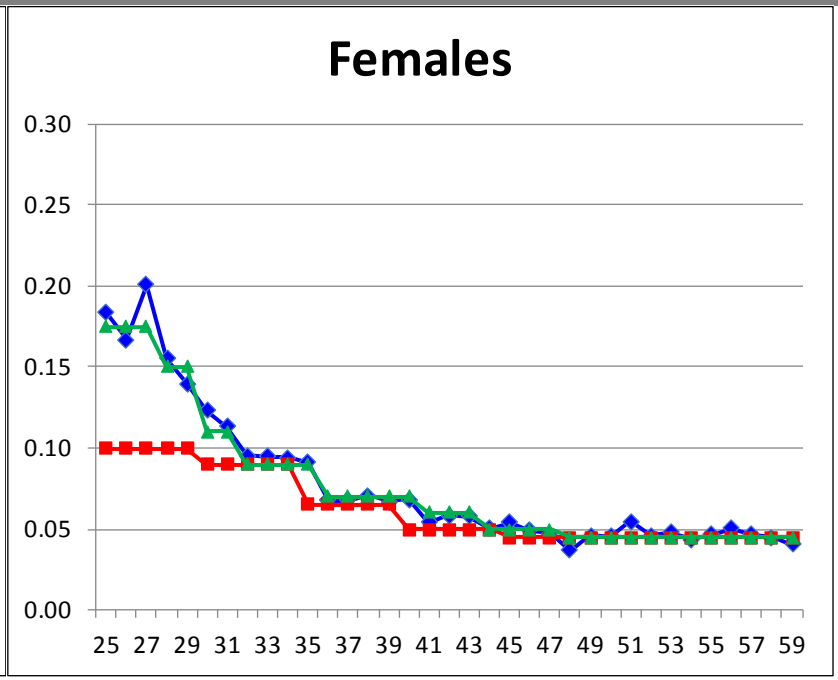
Females
Males and Females





Actual Rate Expected Rate Proposed Rate

	Actual	Expected	Act to Exp	Proposed	Act to Prop
Males	4,925.00	4,174.27	1.1798	4,884.85	1.0082
Females	6,785.00	6,188.16	1.0964	6,770.28	1.0022
Total	11,710	10,362.43	1.1300	11,655.13	1.0047

Observation: more terminations with more than 5 years of service over the period than expected overall

Recommendation: adjust rates, generally upwards, to reflect actual experience

Cost Impact: decrease

Termination (5+ Years of Service)

Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
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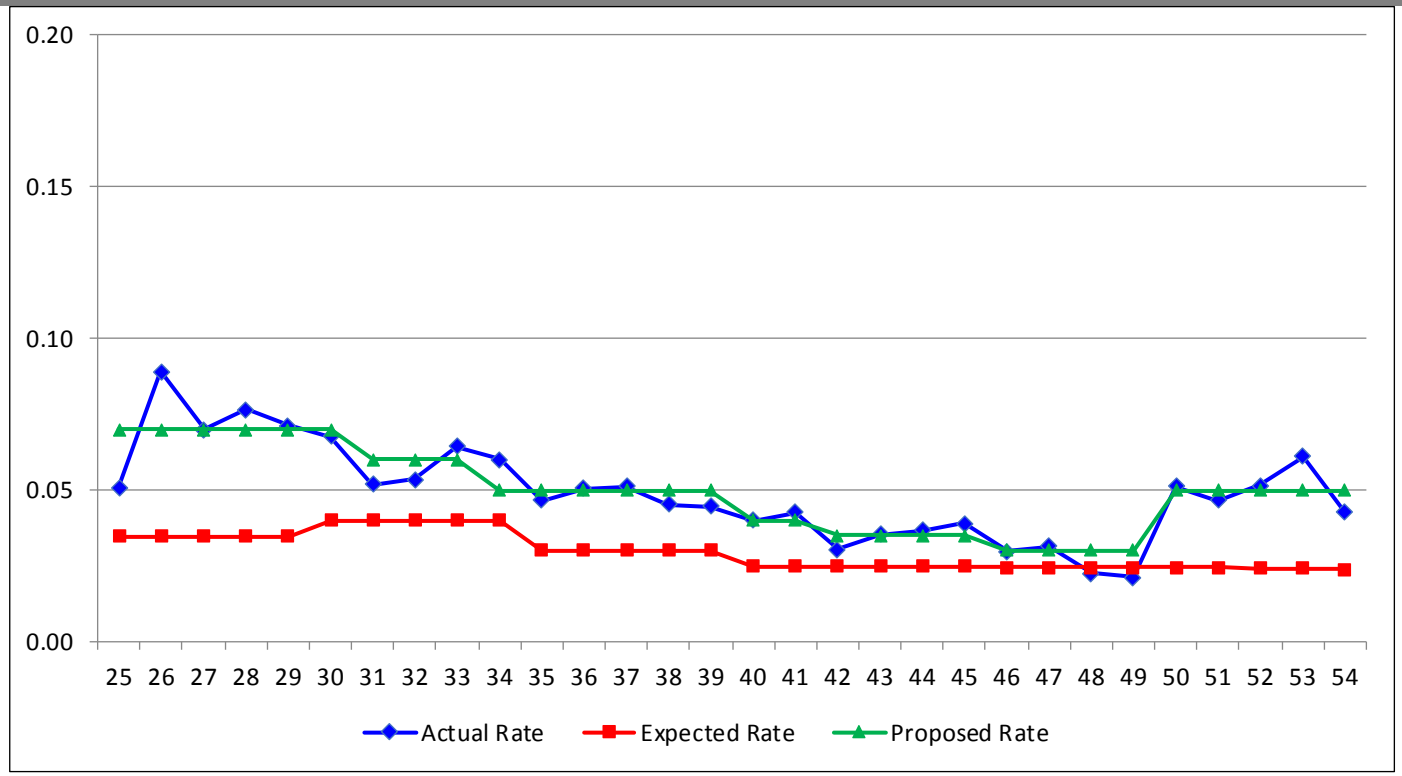
Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop
Total	1,557.00	1,003.31	1.5519	1,573.63	0.9894

Observation: more terminations with more than 5 years of service over the period than expected overall

Recommendation: adjust rates, generally upwards, to reflect actual experience

Cost Impact: decrease

Termination (5+ Years of Service)

Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
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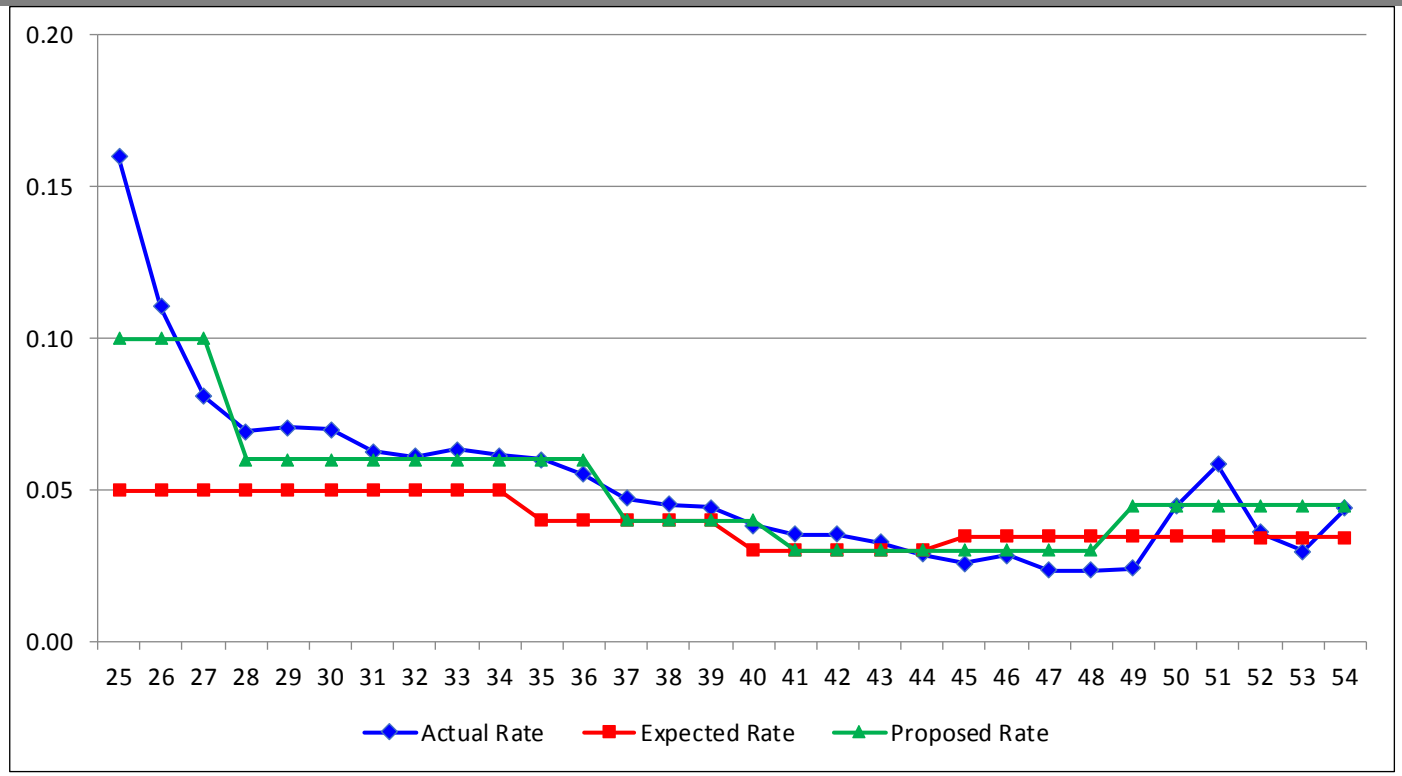
Males and Females



	Actual	Expected	Act to Exp	Proposed	Act to Prop
Total	2,809.00	2,497.43	1.1248	2,817.83	0.9969

Observation: more terminations with more than 5 years of service over the period than expected overall

Recommendation: adjust rates, generally upwards, to reflect actual experience

Cost Impact: minimal

Demographic Assumptions

Other Demographic Assumptions

North Carolina
Total Retirement Plans

Other Demographic Assumptions: Fire & Rescue Lapsed Members

- Assumption in the Fire & Rescue plan for lapsed members to return to work
- The assumed rate in which a lapsed member returns to active service are based on the number of years that member has been lapsed
- Based on a study in 2015, where there was significant data cleanup and analysis, lapsed members with less than 8 years service were shown to have some probability of returning to work
- The current assumptions were established in 2015 with the first two years as a phase in
- Recommend no change to these assumptions. Will analyze in the next experience study when more experience is available

Other Demographic Assumptions: Leave Conversions

- CMC reviewed the previous five years of data to compare actual vs. expected results
- Recommend no change to the Increase in AFC and Eligibility Service assumptions
- Recommend lowering the Credited Service assumptions for all groups except TSERS-LEO, which we recommend not changing.

TSERS	Teachers	General	Other Educators	LEO
Male	0.90	0.85	1.05	1.50
Female	0.70	0.55	0.80	1.50

LGERS	General	LEO	FRW
Male	0.80	1.10	1.20
Female	0.60	1.10	1.20

North Carolina
Total Retirement Plans

Other Demographic Assumptions: National Guard

- The National Guard plan experiences losses due to not accounting for active members with less than 7 years of service due to lack of available data.
- Over the last 3 years, the plan has averaged approximately 750 of these new entrants with past service averaging 8.4 years.
- The increase in accrued liability each year for new entrants has averaged about $725,000.
- There has been significant data clean up in the National Guard plan that is still ongoing.
- We will incorporate new data as it becomes available, but in the meantime, we propose loading the normal cost by $725,000 to anticipate this loss due to new entrants.

Other Demographic Assumptions: Transfers Between Systems

- Periodically members transfer between systems
- Most commonly this happens between LRS/TSERS, CJRS/TSERS and TSERS/LGERS
- These transfers are partially addressed in the annual gain/loss analysis by only counting the ADEC contributions in the reconciliation of UAAL.
- Liability losses are also offset with service purchase and transferred service dollars received by the fund.
- While transfers between TSERS and LGERS are the most common they are likely not material to either system and we recommend no change
- Transfers between LRS/CJRS and TSERS could have an impact on the smaller systems
  - CMC recommends incorporating reciprocity service for CJRS while not assuming any future transferred service will happen
  - LRS was not material and CMC recommends no change

Other Demographic Assumptions: DIPNC

- Disability Claim Termination:
  - Current Assumption: 2012 GLTD table with a 6-month elimination period, including margin and mortality improvement, but no diagnosis definition.
  - Proposed Assumption: 2019 GLTD table with a 6-month elimination period, including margin and mortality improvement, but no diagnosis definition.
- Social Security Disability Approval Rates: recommend no change to the current assumptions due to lack of credible data. We will revisit this assumption at the next experience study.
- Disability Offsets: recommend no change to the current assumptions.

Other Demographic Assumptions: DIPNC & TSERS

- Future Pay for TSERS Disabled Members:
  - Current Assumption: Pay at every future valuation date is the pay the member was receiving at disablement (pay does not increase from valuation to valuation)
  - Proposed Assumption:
    - calculate the number of years from the date of disability (which is currently assumed to be the benefit effective date) to the current valuation date
    - Increase pay by inflation to the valuation date
    - This becomes the pay as of the current valuation date and is then projected forward within the valuation with inflation only.

Other Demographic Assumptions

- CMC reviewed the previous five years of data to compare actual vs expected results for the following assumptions and recommend the following:
  - Marriage Assumption:
    - Current Assumption: Male spouses four years older than female spouses, various percent-married assumptions.
    - Proposed assumptions: Male spouses three years older than female spouses. No change to the percent married assumptions.
  - Line-of-Duty Deaths:
    - No change in the current assumptions due to actual experience being close to the current assumption
    - Fire & Rescue: 10% of deaths are in the line of duty
    - LGERS LEO and Fire/Rescue: 50% of deaths are in the line of duty
  - Contributory Death Benefit Plan Participation Rate:
    - Current Assumption: 50% of non-disabled members elect/ 65% of disabled members elect
    - Proposed assumption: 45% of non-disabled members elect/ 60% of disabled members elect
  - Benefit Commencement Age for Pre-Retirement Terminations:
    - Recommend no change in the current assumptions due to actual experience being close to the current assumption
  - Form of Payment:
    - Currently assumed to be actuarially equivalent to the normal form of payment
    - Recommend no change in the current assumptions
  - CJRS Unremarried Surviving Spouse Benefit:
    - Recommend no change in the current assumptions due to lack of credible data and limited materiality

Items Studied during the Experience Review

Funding Methodology

Funding Methodology

- Actuarial cost method
- Asset valuation method
- Amortization method
- Normal Cost rate
- Administrative expenses
- Terminated Vested valuation
- Employer Contribution Stabilization Policies
- Employer Contribution Phase In Policy
- Plan specific methods

Once the assumptions are determined, the next step is to systematically fund the benefits expected to be paid.

The components of the Funding Methodology define how benefits are systematically funded.

Funding Methodology

- The Funding Methodology is the payment plan for the benefits and is composed of the Actuarial Cost Method, the Asset Valuation Method and Amortization Method.
- The Funding Methodology is rather consistent across the plans except for death benefits. We will focus on plans other than death benefits.
- The Contribution Rate Stabilization Plans will be discussed when the new asset allocation and resulting market expectations are available.
- In general, the Funding Methodology being used is best practice.

The Funding Methodology used by the North Carolina Retirement Systems is a major contributor to NCRS being well funded compared to peers.

Funding Methodology
Actuarial Cost Method

- Actuarial Cost Methods allocate costs to the actuarial accrued liability (i.e. the amount of money that should be in the fund) for past service and normal cost (i.e. the cost of benefits accruing during the year) for current service.
  - The Board of Trustees has adopted Entry Age Normal as its actuarial cost method
  - This method develops normal costs that stay level as a percent of payroll

The actuarial cost method is consistent with GFOA Best Practices.

http://www.gfoa.org/core-elements-funding-policy

Funding Methodology
Asset Valuation Method

- Asset Valuation Methods smooth or average the market value returns over time to alleviate contribution volatility that results from market returns.
  - Asset returns in excess of or less than the expected return on market value of assets reflected over a five-year period
  - Assets corridor: not greater than 120% of market value and not less than 80% of market value

The asset valuation method is consistent with GFOA Best Practices.

http://www.gfoa.org/core-elements-funding-policy

Funding Methodology
Amortization Methods

- Amortization Methods determine the payment schedule for unfunded actuarial accrued liability (i.e. the difference between the actuarial accrued liability and actuarial value of assets)
  - Payment level: the payment is determined as a level dollar amount, similar to a mortgage payment
  - Payment period: a 12-year closed amortization period was adopted for fiscal year ending 2012. A new amortization base is created each year based on the prior years' experience.
- For fiscal years beginning subsequent to January 1, 2017, the sum of the "normal contribution" and the "accrued liability contribution" shall not be less than the employee contribution.

When compared to other Public Sector Retirement Systems in the United States, the funding policy is quite aggressive in that the policy pays down the pension debt over a much shorter period of time (12 years) compared to the national average of around 24 years.

In addition, payments are developed to stay level instead of the increasing policy many systems use which results in lower payments early on.

As such it is a best practice among public retirement systems.

Funding Methodology
Normal Cost for New Entrants

- The Normal Cost is the cost of benefits accruing during the year.
  - Traditionally, and for corporate plans, normal cost has been determined for members in the plan as of the valuation date; the value of benefits for members hired in the year after the valuation date is not included, leading to losses
- In the Public Sector it is becoming more common to include the normal cost for this group
- For the December 31, 2017 actuarial valuation, the first valuation CMC performed, we included 25% of the normal cost for new entrants
- We recommend that 100% of the normal cost for new entrants be included

North Carolina
Total Retirement Plans

Funding Methodology
Administrative Expenses

- An amount is added to the Normal Cost Rate to take into consideration the administrative expenses paid by the plans each year.
- CMC looked at actual administrative expenses paid by each plan over the last five years, compared this to the current assumption and reviewed with staff.
- Based on this analysis we recommend the following administrative expense assumptions:
  - TSERS: we recommend no change to the current assumption of 0.10% of payroll
  - LGERS: we recommend a change from 0.20% of payroll to 0.13% of payroll
  - CJRS: we recommend a change from 0.75% of normal cost to 0.05% of payroll
  - LRS: we recommend no change to the current assumption of 1.00% of payroll
  - RoDS: we recommend a change from 0.15% of MVA to 0.04% of payroll
  - National Guard: we recommend a change from prior year actual expenses to $150,000 per year
  - Fire & Rescue: we recommend no change to the current assumption of prior year actual expenses
  - DIPNC: we recommend no change to the current assumption of 0.01% of payroll

North Carolina Total Retirement Plans

Other Demographic Assumptions: Terminated Vested Valuation

- The data provided in LGERS and TSERS for inactive members does not contain all the elements to calculate the member's deferred benefit.
- The liability for these members is currently estimated to be 200% of the member's accumulated contributions.
- Working with Staff a new assumption is being recommended that estimates earnings and AFC for members whose historical data is unavailable:
  - Estimate is based on available data and available contribution balances, projecting backwards assuming 4% salary growth and 4% interest on contribution balances where necessary
- The liability measured under this new method is less by $1.7B for TSERS and $0.6B for LGERS

Funding Methodology
Employer Contribution Stabilization Policies

- TSERS and LGERS Employer Contribution Rate Stabilization Polices (ECRSP) were adopted in January 2016.
- ECRSP covers six fiscal years from 7/1/2016 – 6/30/2022.
- The FYE 2023 contribution is determined by the 12/31/2020 actuarial valuations and is not covered by ECRSP.
- Without an extension or replacement of ECRSP, the Actuarially Determined Contribution rates determined in the 12/31/2020 actuarial valuations will be the contribution rates for FYE 2023
- We anticipate developing these with staff before the presentation of the December 31, 2020 actuarial valuation

Funding Methodology
Employer Contribution Phase In Policy

- Changes to actuarial assumptions sometimes cause large increases in the employer contribution rates
  - For example, in the 12/31/2017 valuations the decrease in the discount rate increased employer contribution rates significantly
  - To lessen the impact of these changes, Direct Rate Smoothing was implemented to phase in the employer contribution rate increase over three years
- Recommendations from this experience review will increase employer contribution rates for many plans
- We recommend Direct Rate Smoothing over a period of five years
  - The total immediate change in contribution rate will be phased in over five years.

Funding Methodology
Plan Specific Methods

- DIPNC
  - IBNR Claims:
    - IBNR claims are based on the one-year term cost for expected disablements during the year. For long-term disability, a reserve of 14/12 of the term cost is added to account for the waiting time after disability to receive LTD benefits.
    - We recommend no change to this method.
- RoDS
  - For valuation purposes, all members had been valued under provisions for pre-2009 hires due to the immateriality of the difference in benefits
  - Beginning with the 12/31/2020 valuation, all members will be valued under the current provisions

Items Studied during the Experience Review

Administrative Factors

Administrative Factors

- The following assumptions will be updated based on the set of assumptions that are adopted by the Boards at the January 2021 Board meeting:
  - Assumptions used for transfer benefit from Supplemental Retirement Plans
  - Assumptions used for withdrawal liability
  - COLA assumption used in service purchases
  - Mortality and interest used for optional forms of benefit
- These assumptions will be first effective January 1, 2022

While not intuitive, these items are reviewed during the experience review.

They tend to be based on the recommendations made for the actuarial valuations, with some adjustments.

Administrative Factors: Contribution Based Benefit Cap

- CBBC Cap Factor
  - Session Law 2014-88 enacted an “Anti-Pension-Spiking Contribution-Based Benefit Cap”
  - These factors were first enacted in October 2015
  - At the October 2020 Board meeting the Boards adopted to continue use of the current factors:
    - 4.5 for TSERS
    - 4.7 for LGERS

APPENDIX

Summary of Assumptions

- Summary of the following assumptions for each plan
  - Mortality
  - Retirement
  - Termination
  - Disability
  - Salary Merit Scale

- Parameters for assumption application:
  - All decrements are assumed to happen in the middle of the year
  - Age and service are determined as of the valuation date and rounded.

Summary of Assumptions

Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
-General Employees
-Fire & Rescue
-Law Enforcement
RODs
Death

Mortality

Post-Retirement and Vested Termination:

Group	Gender	Table	Set Back	Set Forward
Teachers	Male	Pub-2010 Teachers Retirees Below Median		

Adjustments:

Age	Factor
< 83	96%
83	98%
84	100%
85	102%
86	104%
87 +	106%

Group	Gender	Table	Set Back	Set Forward
Teachers	Female	Pub-2010 Teachers Retirees Below Median		

Adjustments:

Age	Factor
< 81	100%
81	101%
82	102%
83	103%
84	104%
85 +	105%

Post - Disablement

Group	Gender	Table	Set Back	Set Forward
Teachers/General/Other Edu	Male	Pub-2010 General Disabled Retirees		3 years
Teachers/General/Other Edu	Female	Pub-2010 General Disabled Retirees	1 year	

Contingent Annuitant

Group	Gender	Table	Set Back	Set Forward
All	Male	Pub-2010 Teachers Contingent Annuitant Below Median		3 years
All	Female	Pub-2010 Teachers Contingent Annuitant Below Median		1 year

Pre-Retirement

Group	Gender	Table	Set Back	Set Forward
Teachers/General/Other Edu	Male/Female	Pub-2010 General Employees		

All mortality tables are benefits weighted

Summary of Assumptions

Sample Rates of:

Retirement

Male	Service						
Age	5	10	15	20	25	30	35
50				3.0%	3.0%	70.0%	70.0%
55				4.5%	3.0%	40.0%	45.0%
60	8.5%	8.0%	10.0%	10.0%	30.0%	40.0%	30.0%
65	17.5%	22.5%	25.0%	32.5%	40.0%	30.0%	25.0%
70	17.5%	22.5%	25.0%	25.0%	25.0%	15.0%	30.0%
75	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Female	Service						
Age	5	10	15	20	25	30	35
50				5.0%	4.5%	65.0%	75.0%
55				5.0%	4.5%	40.0%	37.5%
60	8.0%	10.0%	10.0%	13.0%	25.0%	50.0%	37.5%
65	25.0%	30.0%	25.0%	35.0%	47.5%	45.0%	40.0%
70	22.5%	25.0%	30.0%	30.0%	30.0%	40.0%	32.5%
75	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Termination

Service	Male	Female
0	5.00%	3.50%
1	17.50%	16.50%
2	15.50%	15.50%
3	14.50%	13.75%
4	11.50%	11.50%

After 5 years of membership in the system:

Age	Male	Female
25	30.00%	35.00%
30	9.00%	10.00%
35	6.00%	5.75%
40	4.75%	4.00%
45	3.75%	3.50%
50	4.25%	4.00%
55	4.25%	4.00%
60	4.25%	4.00%

Summary of Assumptions

Plan

TSERS:
- Teachers
- **General Employees**
- **Other Education**
- Law Enforcement

CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
- General Employees
- Fire & Rescue
- Law Enforcement

RODs
Death

Mortality

Post-Retirement and Vested Termination:

Group	Gender	Table	Set Back	Set Forward
General/Other Educators	Male	Pub-2010 General Retirees		

Adjustments:

Age	Factor
All	105.50%

Group	Gender	Table	Set Back	Set Forward
General/Other Educators	Female	Pub-2010 General Retirees		

Adjustments:

Age	Factor
< 76	95%
76	96%
77	97%
78	98%
79	99%
80	100%
81	101%
82	102%
83	103%
84	104%
85	105%
86	106%
87	107%
88	108%
89	109%
90+	110%

Post - Disablement

Group	Gender	Table	Set Back	Set Forward
Teachers/General/Other Edu	Male	Pub-2010 General Disabled Retirees		3 years
Teachers/General/Other Edu	Female	Pub-2010 General Disabled Retirees	1 year	

Contingent Annuitant

Group	Gender	Table	Set Back	Set Forward
All	Male	Pub-2010 Teachers Contingent Annuitant Below Median		3 years
All	Female	Pub-2010 Teachers Contingent Annuitant Below Median		1 year

Pre-Retirement

Group	Gender	Table	Set Back	Set Forward
Teachers/General/Other Edu	Male/Female	Pub-2010 General Employees		

All mortality tables are benefits weighted

Summary of Assumptions

Sample Rates of:

Retirement

Male	Service						
Age	5	10	15	20	25	30	35
50				3.0%	4.0%	60.0%	60.0%
55				3.0%	4.0%	40.0%	35.0%
60	9.0%	7.0%	7.0%	10.0%	22.5%	40.0%	27.0%
65	18.0%	25.0%	25.0%	30.0%	40.0%	27.5%	30.0%
70	18.0%	25.0%	22.5%	22.5%	25.0%	30.0%	30.0%
75	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Female	Service						
Age	5	10	15	20	25	30	35
50				3.5%	4.0%	40.0%	40.0%
55				4.0%	4.0%	40.0%	25.0%
60	7.0%	8.0%	9.0%	9.5%	20.0%	40.0%	25.0%
65	20.0%	25.0%	30.0%	30.0%	35.0%	35.0%	30.0%
70	15.0%	20.0%	22.5%	25.0%	35.0%	30.0%	30.0%
75	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Termination

Service	Male	Female
0	9.00%	9.00%
1	17.00%	17.50%
2	15.00%	15.75%
3	12.50%	14.00%
4	11.00%	11.50%

After 5 years of membership in the system:

Age	Male	Female
25	25.00%	25.00%
30	12.50%	12.00%
35	7.50%	10.00%
40	5.00%	5.75%
45	4.00%	4.00%
50	4.00%	4.00%
55	4.00%	4.00%
60	4.00%	4.00%

Summary of Assumptions

Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
-General Employees
-Fire & Rescue
-Law Enforcement
RODs
Death

Sample Rates of:

Retirement

Male	Service						
Age	5	10	15	20	25	30	35
50				3.5%	4.5%	50.0%	50.0%
55				4.0%	5.0%	30.0%	30.0%
60	8.0%	7.0%	10.0%	9.0%	20.0%	30.0%	27.5%
65	10.0%	25.0%	25.0%	30.0%	27.5%	25.0%	27.5%
70	10.0%	25.0%	25.0%	22.5%	30.0%	25.0%	35.0%
75	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Female	Service						
Age	5	10	15	20	25	30	35
50				4.5%	4.5%	40.0%	50.0%
55				4.5%	6.0%	30.0%	30.0%
60	7.0%	9.0%	10.0%	10.0%	30.0%	37.5%	30.0%
65	17.5%	25.0%	25.0%	30.0%	35.0%	30.0%	35.0%
70	15.0%	20.0%	22.5%	20.0%	27.5%	20.0%	35.0%
75	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Termination

Service	Male	Female
0	9.00%	7.00%
1	19.00%	17.50%
2	17.00%	15.50%
3	13.00%	12.50%
4	11.00%	10.75%

After 5 years of membership in the system:

Age	Male	Female
25	25.00%	25.00%
30	10.00%	15.00%
35	5.50%	7.50%
40	5.00%	6.50%
45	5.00%	4.75%
50	5.00%	4.50%
55	4.00%	3.50%
60	4.00%	3.50%

Summary of Assumptions

Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
-General Employees
-Fire & Rescue
-Law Enforcement
RODs
Death

Mortality

Post-Retirement and Vested Termination:

Group	Gender	Table	Set Back	Set Forward
LEO	Male/Female	Pub-2010 Safety Retirees		1 year

Adjustments:

Age	Factor
All	97.00%

We combined the experience of the TSERS LEOs, LGERS LEOs and LGERS Fire/Safety to come up with the public safety rates.

Post - Disablement

Group	Gender	Table	Set Back	Set Forward
LEO	Male/Female	Pub-2010 General Disabled Retirees	3 years	

Contingent Annuitant

Group	Gender	Table	Set Back	Set Forward
All	Male	Pub-2010 Teachers Contingent Annuitant Below Median		3 years
All	Female	Pub-2010 Teachers Contingent Annuitant Below Median		1 year

Pre-Retirement

Group	Gender	Table	Set Back	Set Forward
LEO	Male/Female	Pub-2010 Safety Employees		

All mortality tables are benefits weighted

Summary of Assumptions

Sample Rates of:

Retirement

	Service						
Age	5	10	15	20	25	30	35
50			4.0%	5.0%	5.0%	90.0%	80.0%
55	20.0%	20.0%	35.0%	35.0%	50.0%	90.0%	65.0%
60	10.0%	20.0%	12.5%	25.0%	25.0%	50.0%	50.0%
65	15.0%	45.0%	25.0%	25.0%	25.0%	50.0%	50.0%
70	25.0%	15.0%	25.0%	25.0%	25.0%	25.0%	50.0%
75	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Termination

Service	Rate
0	3.50%
1	9.25%
2	9.25%
3	9.50%
4	8.00%

After 5 years of membership in the system:

Age	Rate
25	7.50%
30	7.50%
35	3.50%
40	2.50%
45	2.00%
50	2.00%

Summary of Assumptions

Sample Rates for:

Salary Merit Scale

Service	Teachers	General	Other Educators	LEO
0	4.05%	3.00%	4.25%	4.80%
5	2.87%	1.80%	2.65%	3.10%
10	2.04%	1.10%	1.85%	2.00%
15	1.13%	0.60%	1.33%	0.80%
20	0.00%	0.50%	0.83%	0.80%
25	0.00%	0.40%	0.33%	0.80%
30	0.00%	0.00%	0.00%	0.40%
>=35	0.00%	0.00%	0.00%	0.00%

Summary of Assumptions

Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
-General Employees
-Fire & Rescue
-Law Enforcement
RODs
Death

Mortality

Post-Retirement and Vested Termination:

Group	Gender	Table	Set Back	Set Forward
	Male/Female	Pub-2010 General Retirees Above Median		

Post - Disablement

Group	Gender	Table	Set Back	Set Forward
	Male/Female	Pub-2010 General Disabled Retirees		

Contingent Annuitant

Group	Gender	Table	Set Back	Set Forward
	Male/Female	Pub-2010 General Contingent Annuitant		

Pre-Retirement

Group	Gender	Table	Set Back	Set Forward
	Male/Female	Pub-2010 General Employees		

All mortality tables are benefits weighted

Summary of Assumptions

Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
-General Employees
-Fire & Rescue
-Law Enforcement
RODs
Death

Sample Rates of:

Retirement

	Service					
Age	5	10	15	20	24	25+
50	2%	2%	2%	2%	15%	9%
55	2%	2%	2%	2%	5%	9%
60	4%	4%	4%	4%	20%	17%
65	12%	12%	12%	12%	12%	12%
70	25%	25%	25%	25%	25%	25%
72	100%	100%	100%	100%	100%	100%

Termination

Age	Rate
20	2.00%
25	2.00%
30	2.00%
35	2.00%
40	2.00%
45	2.00%
50	2.00%
55	2.00%
60	2.00%
65	2.00%
70	2.00%

Disability

Age	Rate
25	0.002%
30	0.003%
35	0.008%
40	0.017%
45	0.035%
50	0.059%
55	0.119%
60	0.192%

Salary Merit Scale

Service	Rates
0	1.50%
5	1.00%
10	0.50%
>=15	0.00%

Summary of Assumptions

Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
-General Employees
-Fire & Rescue
-Law Enforcement
RODs
Death

Mortality

Post-Retirement and Vested Termination:

Group	Gender	Table	Set Back	Set Forward
	Male/Female	Pub-2010 General Retirees Above Median		

Post - Disablement

Group	Gender	Table	Set Back	Set Forward
	Male/Female	Pub-2010 General Disabled Retirees		

Contingent Annuitant

Group	Gender	Table	Set Back	Set Forward
	Male/Female	Pub-2010 General Contingent Annuitant		

Pre-Retirement

Group	Gender	Table	Set Back	Set Forward
	Male/Female	Pub-2010 General Employees		

All mortality tables are benefits weighted

Summary of Assumptions

Sample Rates of:

Retirement

Age	Rate
60	10%
65	10%
70	13%
75	15%
80	100%

Termination

Age	Rate
25	10%
30	10%
35	10%
40	10%
45	10%
50	10%
55	10%
60	10%
65	10%
70	10%
75+	10%

Disability

Age	Rate
25	0.01%
30	0.04%
35	0.10%
40	0.29%
45	0.49%
50	0.84%
55	1.44%
60	0.00%

Summary of Assumptions

Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
-General Employees
-Fire & Rescue
-Law Enforcement
RODs
Death

Mortality

Post-Retirement and Vested Termination:

Group	Gender	Table	Set Back	Set Forward
	Male	Pub-2010 General Retirees		

Adjustments:

Age	Factor
All	105.50%

Group	Gender	Table	Set Back	Set Forward
	Female	Pub-2010 General Retirees		

Adjustments:

Age	Factor
< 76	95%
76	96%
77	97%
78	98%
79	99%
80	100%
81	101%
82	102%
83	103%
84	104%
85	105%
86	106%
87	107%
88	108%
89	109%
90+	110%

Post - Disablement

No disabled mortality rates in this plan

Contingent Annuitant

Group	Gender	Table	Set Back	Set Forward
	Male	Pub-2010 Teachers Contingent Annuitant Below Median		3 years
	Female	Pub-2010 Teachers Contingent Annuitant Below Median		1 year

Pre-Retirement

Group	Gender	Table	Set Back	Set Forward
	Male/Female	Pub-2010 General Employees		

All mortality tables are benefits weighted

Summary of Assumptions

Sample Rates of:

Retirement

Age	Rate
50	15%
55	25%
60	50%
65	100%

Termination

Service	Rate
7-9 years	17.5%
10-14 years	11.0%
15-19 years	11.0%
20+ years	15.0%

Summary of Assumptions

DIPNC - uses all of the assumptions from TSERS except for Disability

Sample Rates of Disability:

Age	Male	Female
25	0.00018	0.00014
30	0.00029	0.00064
35	0.00059	0.00072
40	0.00084	0.00120
45	0.00123	0.00176
50	0.00230	0.00256
55	0.00230	0.00336
60	0.00346	0.00336

Summary of Assumptions

Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
-General Employees
-Fire & Rescue
-Law Enforcement
RODs
Death

Mortality

Post-Retirement and Vested Termination:

Group	Gender	Table	Set Back	Set Forward
	Male/Female	Pub-2010 Safety Retirees		1 year

Adjustments:

Ages	Factor
All	97.00%

We combined the experience of the TSERS LEOs, LGERS LEOs and LGERS Fire/Safety to come up with the public safety rates.

Post - Disablement

Group	Gender	Table	Set Back	Set Forward
	Male/Female	Pub-2010 General Disabled Retirees	3 years	

Contingent Annuitant

Group	Gender	Table	Set Back	Set Forward
	Male	Pub-2010 Teachers Contingent Annuitant Below Median		3 years
	Female	Pub-2010 Teachers Contingent Annuitant Below Median		1 year

Pre-Retirement

Group	Gender	Table	Set Back	Set Forward
	Male/Female	Pub-2010 Safety Employees		

All mortality tables are benefits weighted

Summary of Assumptions

Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
-General Employees
-Fire & Rescue
-Law Enforcement
RODs
Death

Sample Rates of:

Retirement

	Service	
Age	20	21+
55	85%	85%
56+	75%	60%

Termination

	Service		
Age	< 5	5-19	20+
< 55	3.00%	1.50%	100%
55	10.00%	7.50%	100%

Disability

Age	Rate
25	0.050%
30	0.050%
35	0.080%
40	0.180%
45	0.210%
50	0.300%
55	0.360%
60	0.610%

Summary of Assumptions

Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
-General Employees
-Fire & Rescue
-Law Enforcement
RODs
Death

Mortality

Post-Retirement and Vested Termination:

Group	Gender	Table	Set Back	Set Forward
General	Male	Pub-2010 General Retirees		2 years

Adjustments:

Age	Factor
< 81	96.00%
81	96.80%
82	97.60%
83	98.40%
84	99.20%
85 +	100.00%

Group	Gender	Table	Set Back	Set Forward
General	Female	Pub-2010 General Retirees		

Adjustments:

Age	Factor
< 92	100.00%
92	102.50%
93	105.00%
94	107.50%
95 +	110.00%

Post - Disablement

Group	Gender	Table	Set Back	Set Forward
General	Male	Pub-2010 General Disabled Retirees		3 years
General	Female	Pub-2010 General Disabled Retirees	1 year	

Contingent Annuitant

Group	Gender	Table	Set Back	Set Forward
General/LEO/FRW	Male	Pub-2010 Teachers Contingent Annuitant Below Median		3 years
General/LEO/FRW	Female	Pub-2010 Teachers Contingent Annuitant Below Median		1 year

Pre-Retirement

Group	Gender	Table	Set Back	Set Forward
General	Male/Female	Pub-2010 General Employees		

All mortality tables are benefits weighted

Summary of Assumptions

Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
-General Employees
-Fire & Rescue
-Law Enforcement
RODs
Death

Sample Rates of:

Retirement

Male	Service						
Age	5	10	15	20	25	30	35
50				3.0%	5.5%	40.0%	40.0%
55				3.0%	5.5%	35.0%	25.0%
60	8.0%	7.0%	7.0%	7.5%	20.0%	40.0%	22.5%
65	25.0%	25.0%	27.5%	32.5%	30.0%	35.0%	30.0%
70	20.0%	25.0%	20.0%	27.5%	30.0%	35.0%	30.0%
75	25.0%	20.0%	30.0%	27.5%	30.0%	35.0%	30.0%
80+	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Female	Service						
Age	5	10	15	20	25	30	35
50				3.5%	5.0%	40.0%	45.0%
55				5.0%	5.5%	30.0%	30.0%
60	8.0%	9.0%	7.0%	10.0%	25.0%	37.5%	25.0%
65	25.0%	25.0%	35.0%	35.0%	35.0%	35.0%	30.0%
70	20.0%	25.0%	22.5%	30.0%	20.0%	30.0%	25.0%
75	20.0%	20.0%	22.5%	30.0%	20.0%	25.0%	25.0%
80+	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Termination

Service	Male	Female
0	11.00%	11.00%
1	17.50%	17.50%
2	15.00%	15.50%
3	12.50%	13.00%
4	10.50%	11.50%

After 5 years of membership in the system:

Age	Male	Female
25	12.00%	17.50%
30	7.50%	11.00%
35	5.50%	9.00%
40	5.50%	7.00%
45	4.25%	5.00%
50	4.25%	4.50%
55	4.25%	4.50%
60	4.25%	4.50%

Disability

Age	Male	Female
25	0.04%	0.05%
30	0.05%	0.05%
35	0.05%	0.05%
40	0.10%	0.05%
45	0.20%	0.15%
50	0.30%	0.30%
55	0.50%	0.45%
60	0.65%	0.45%

Summary of Assumptions

Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
-General Employees
-Fire & Rescue
-Law Enforcement
RODs
Death

Mortality

Post-Retirement and Vested Termination:

Group	Gender	Table	Set Back	Set Forward
LEO/FRW	Male/Female	Pub-2010 Safety Retirees		1 year

Adjustments:

Age	Factor
All	97.00%

We combined the experience of the TSERS LEOs, LGERS LEOs and LGERS Fire/Safety to come up with the public safety rates.

Post - Disablement

Group	Gender	Table	Set Back	Set Forward
LEO/FRW	Male/Female	Pub-2010 General Disabled Retirees	3 years	

Contingent Annuitant

Group	Gender	Table	Set Back	Set Forward
General/LEO/FRW	Male	Pub-2010 Teachers Contingent Annuitant Below Median		3 years
General/LEO/FRW	Female	Pub-2010 Teachers Contingent Annuitant Below Median		1 year

Pre-Retirement

Group	Gender	Table	Set Back	Set Forward
LEO/FRW	Male/Female	Pub-2010 Safety Employees		

All mortality tables are benefits weighted

Summary of Assumptions

Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
-General Employees
-Fire & Rescue
-Law Enforcement
RODs
Death

Sample Rates of:

Retirement

	Service						
Age	5	10	15	20	25	30	35
50				3.25%	4.25%	55.00%	50.00%
55	12.00%	5.75%	5.75%	3.25%	4.25%	55.00%	40.00%
60	10.00%	5.75%	5.75%	12.50%	35.00%	60.00%	40.00%
65	10.00%	25.00%	25.00%	25.00%	35.00%	50.00%	32.50%
70	32.00%	25.00%	25.00%	25.00%	35.00%	50.00%	32.50%
75+	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Termination

Service	Rate
0	7.50%
1	12.50%
2	11.00%
3	10.00%
4	10.00%

After 5 years of membership in the system:

Age	Rate
25	7.00%
30	7.00%
35	5.00%
40	4.00%
45	3.50%
50	5.00%
55	5.00%

Disability

Age	Male	Female
25	0.06%	0.06%
30	0.10%	0.09%
35	0.07%	0.24%
40	0.40%	0.38%
45	0.40%	0.48%
50	0.80%	0.76%
55	1.20%	1.76%
60	1.50%	2.76%

Summary of Assumptions

Plan
TSERS:
-Teachers
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-Other Education
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CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
-General Employees
-Fire & Rescue
-Law Enforcement
RODs
Death

Sample Rates of:

Retirement

	Service						
Age	5	10	15	20	25	30	35
50			4.0%	3.3%	3.0%	90.0%	82.5%
55	17.5%	22.5%	30.0%	37.5%	55.0%	90.0%	50.0%
60	17.5%	15.0%	12.5%	25.0%	25.0%	35.0%	25.0%
65	35.0%	20.0%	25.0%	25.0%	25.0%	35.0%	30.0%
70	15.0%	35.0%	40.0%	25.0%	40.0%	35.0%	27.5%
75+	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Termination

Service	Rate
0	9.00%
1	8.75%
2	9.00%
3	9.25%
4	7.25%

After 5 years of membership in the system:

Age	Rate
25	10.00%
30	6.00%
35	6.00%
40	4.00%
45	3.00%
50	4.50%
55	0.00%

Disability

Age	Male	Female
25	0.06%	0.25%
30	0.10%	0.30%
35	0.20%	0.40%
40	0.30%	0.50%
45	0.40%	0.60%
50	0.40%	0.70%
55	0.40%	0.70%
60	0.40%	0.70%

Summary of Assumptions

Sample Rates for:
Salary Merit Scale

Service	General	LEO	FRW
0	5.00%	4.50%	4.75%
5	2.70%	2.60%	2.65%
10	1.73%	1.81%	1.68%
15	1.08%	1.36%	1.03%
20	0.69%	1.10%	0.64%
25	0.55%	0.85%	0.50%
30	0.55%	0.60%	0.50%
35	0.00%	0.35%	0.50%
>=40	0.00%	0.00%	0.00%

Summary of Assumptions

Plan
TSERS:
-Teachers
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CJRS
LRS
National Guard
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RODs
Death

Mortality

Post-Retirement and Vested Termination:

Group	Gender	Table	Set Back	Set Forward
	Male	Pub-2010 General Retirees		2 years

Adjustments:

Age	Factor
< 81	96.00%
81	96.80%
82	97.60%
83	98.40%
84	99.20%
85 +	100.00%

Group	Gender	Table	Set Back	Set Forward
	Female	Pub-2010 General Retirees		

Adjustments:

Age	Factor
< 92	100.00%
92	102.50%
93	105.00%
94	107.50%
95 +	110.00%

Post - Disablement

Group	Gender	Table	Set Back	Set Forward
	Male	Pub-2010 General Disabled Retirees		3 years
	Female	Pub-2010 General Disabled Retirees	1 year	

Contingent Annuitant

Group	Gender	Table	Set Back	Set Forward
	Male	Pub-2010 Teachers Contingent Annuitant Below Median		3 years
	Female	Pub-2010 Teachers Contingent Annuitant Below Median		1 year

Pre-Retirement

Group	Gender	Table	Set Back	Set Forward
	Male/Female	Pub-2010 General Employees		

All mortality tables are benefits weighted

Summary of Assumptions

Plan
TSERS:
-Teachers
-General Employees
-Other Education
-Law Enforcement
CJRS
LRS
National Guard
DIPNC
FRSWPF
LGERS:
-General Employees
-Fire & Rescue
-Law Enforcement
RODs
Death

Sample Rates of:

Retirement

Male	Service						
Age	5	10	15	20	25	30	35
50				3.0%	5.5%	40.0%	40.0%
55				3.0%	5.5%	35.0%	25.0%
60	8.0%	7.0%	7.0%	7.5%	20.0%	40.0%	22.5%
65	25.0%	25.0%	27.5%	32.5%	30.0%	35.0%	30.0%
70	20.0%	25.0%	20.0%	27.5%	30.0%	35.0%	30.0%
75	25.0%	20.0%	30.0%	27.5%	30.0%	35.0%	30.0%
80+	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Female	Service						
Age	5	10	15	20	25	30	35
50				3.5%	5.0%	40.0%	45.0%
55				5.0%	5.5%	30.0%	30.0%
60	8.0%	9.0%	7.0%	10.0%	25.0%	37.5%	25.0%
65	25.0%	25.0%	35.0%	35.0%	35.0%	35.0%	30.0%
70	20.0%	25.0%	22.5%	30.0%	20.0%	30.0%	25.0%
75	20.0%	20.0%	22.5%	30.0%	20.0%	25.0%	25.0%
80+	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Disability

Age	Male	Female
25	0.04%	0.05%
30	0.05%	0.05%
35	0.05%	0.05%
40	0.10%	0.05%
45	0.20%	0.15%
50	0.30%	0.30%
55	0.50%	0.45%
60	0.65%	0.45%

Termination

Service	Male	Female
0	11.00%	11.00%
1	17.50%	17.50%
2	15.00%	15.50%
3	12.50%	13.00%
4	10.50%	11.50%

After 5 years of membership in the system:

Age	Male	Female
25	12.00%	17.50%
30	7.50%	11.00%
35	5.50%	9.00%
40	5.50%	7.00%
45	4.25%	5.00%
50	4.25%	4.50%
55	4.25%	4.50%
60	4.25%	4.50%

Salary Merit Scale

Service	Rate
0	5.00%
5	2.70%
10	1.73%
15	1.08%
20	0.69%
25	0.55%
30	0.55%
35	0.00%
>=40	0.00%

Summary of Assumptions

The Death Benefits Plan uses the assumptions from the underlying plans