



Dallas Police and Fire Pension System

Review of Actuarial Experience

For the Period January 1, 2015 to December 31, 2019

May 14, 2020

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| Agenda

Overview

Changes in Recent Years

Experience Gains and Losses in Study Period

Summary of Findings

Summary of Proposed Assumption Changes

Impact on Proposed Assumption Changes

Demographic Assumptions

Economic Assumptions

Actuarial Methods

Overview: Purpose of an Experience Study

Why Conduct an Experience Study?

- Review funding and asset methods
- Review recent experience and trends; compare against current actuarial assumptions and methods
- Develop information to establish recommended assumptions and methods for use in future valuations
- Avoid unnecessary contribution and accounting volatility
- Mitigate chances of inadequate funding
- Meet current industry standards
- Fiduciary responsibilities



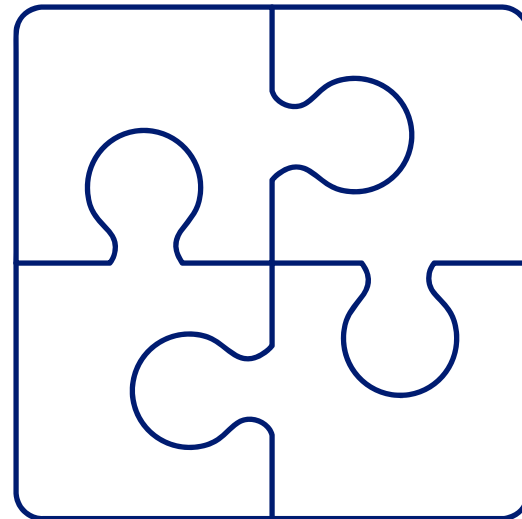
Overview: Purpose of an Experience Study

- An experience study provides the basis for developing recommended assumptions to be used in the annual actuarial valuation
 - Performed on a periodic basis
 - Last full experience study was conducted in 2016 for the five-year period ended December 31, 2014
 - Current study is based on the period January 1, 2015 through December 31, 2019
- Actuarial Standards of Practice Statements 27 and 35 provide guidance on best practices for performing assumption-setting analysis
 - Each assumption should be the actuary's best estimate
- Segal's role is to make appropriate "best estimate" recommendations to the Board for each assumption
- The assumptions that are adopted will apply to both the Combined and Supplemental Plans

The assumptions are the Board's assumptions, and the Board can adopt all, none or some of the recommendations of the actuary.

Overview: How Assumptions Are Set

- Review past experience
- Compare past experience (“actual”) with assumptions (“expected”)
- Determine trends – make judgments about future
- Develop component parts of each assumption
 - Maintain linkage with investments
 - Maintain internal consistency
- Keep in mind
 - No “right” answer – best estimate
 - Assumptions are long-term



Overview: Actuarial Assumptions and Methods



Demographic

- Death in active service
- Death after retirement
 - Non-disabled
 - Disabled
 - Contingent survivor
- Withdrawal
- Disability
- Retirement
 - DROP
 - Non-DROP
- Percent Married/Spouse Age



Economic

- Inflation
- Discount rate (Investment rate of return)
- Salary increases
- Payroll growth rate
- Administrative expenses
- COLA
- DROP annuitization rate



Methods

- Cost method
- Amortization method
- Asset method

Changes In Recent Years

Changes With Last Experience Study

- The last experience study was completed for the period January 1, 2010 to December 31, 2014; changes were implemented in the January 1, 2016 valuation.

Valuation	Assumption/Method Changes
January 1, 2016	Updated mortality tables and added generational projection Changed to service-based turnover rates Revised disability rates, changed to one set for all Revised retirement rates, changed to separate rates for Police & Fire Percent married lowered from 80% to 75% Youngest child age raised from 1 to 10 years old Revised salary scale; changed to separate rates for Police & Fire Payroll growth assumption lowered from 4% to 2.75% Added explicit assumption for administrative expenses of \$10 million per year Asset smoothing period transitioned from 10 years to 5 years

Changes In Recent Years

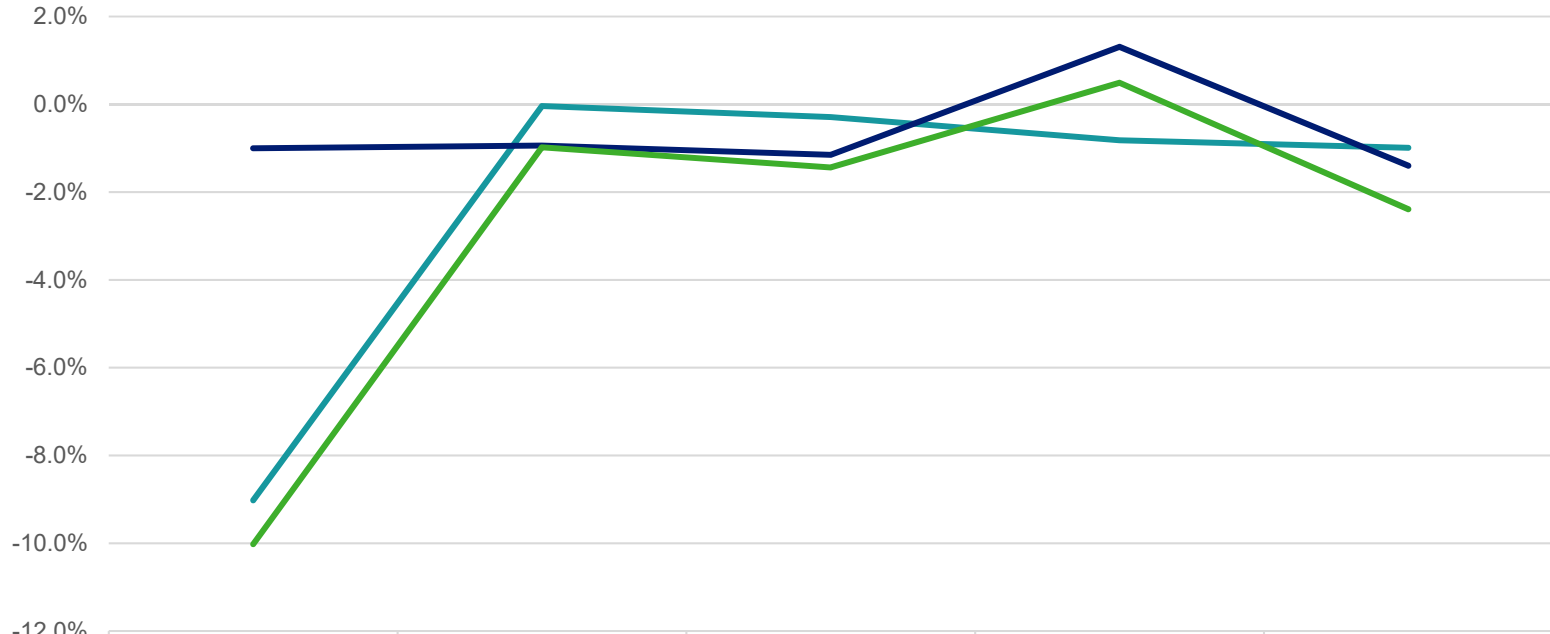
Changes Since Last Experience Study

- The following summarizes the assumption, plan, and method changes implemented since January 1, 2017.

Valuation	Assumption/Method Changes	Plan Changes
January 1, 2017	<p>Revision to retirement rates, change to separate rates for DROP and non-DROP</p> <p>DROP utilization assumed to be 0% for future retirees</p> <p>Separate retirement age added for new terminated vested participants</p> <p>Revision to salary scale</p> <p>Administrative expenses updated to be the greater of \$10 million per year or 1% of computation pay</p> <p>Interest on DROP account balances as of September 1, 2017 decreased from 6% to 2.75%</p> <p>COLA assumed to begin October 1, 2049</p>	<p>NRA increased to age 58</p> <p>ERA increased to age 53</p> <p>Benefit multiplier for future service lowered from 3% to 2.5%</p> <p>Benefit multiplier retroactively increased to 2.5% for members hired on or after March 1, 2011</p> <p>Benefit multipliers for 20 & Out benefit lowered and begin at later ages</p> <p>Maximum benefit reduced from 96% of computation pay to 90%</p> <p>Average computation pay changed from 36 months to 60 months for future service</p> <p>COLA discontinued for all members</p> <p>Restructured DROP benefit</p> <p>Member contribution rate increased to 13.5%</p> <p>City's contribution rate increased to minimum of 34.5%</p>
January 1, 2018	<p>Administrative expenses lowered to the greater of \$8.5 million per year or 1% of computation pay</p> <p>Interest on DROP account balances as of September 1, 2017 increased from 2.75% to 3%</p> <p>COLA beginning date moved back to October 1, 2053</p>	<p>DROP revocation window opened from September 1, 2017 through February 28, 2018</p>
January 1, 2019	<p>Revision to salary scale</p> <p>COLA beginning date moved forward to October 1, 2050</p>	<p>None</p>

Experience Gains and Losses in Study Period

Gain/(Loss) Experience for Years Ending December 31, 2015 to 2019



	2015*	2016	2017	2018	2019**
Investment	-9.02%	-0.04%	-0.29%	-0.82%	-0.99%
Non-Investment	-1.00%	-0.94%	-1.15%	1.31%	-1.40%
Total	-10.02%	-0.98%	-1.44%	0.49%	-2.39%

Investment Non-Investment Total

*2015 investment results reflect one-time write-downs in asset values

**2019 results based on preliminary financial statements

Summary of Findings

- Preliminary December 31, 2019 market value of assets were used for purposes of the study; results will change once assets are finalized.
- Due to the plan changes implemented in 2017 and the run-up to those changes in 2016 and 2017, turnover and retirement experience during that timeframe was greater than normal.
- Over the five-year period, DROP retirement experience was close to expected, with DROP retirements in 2016 and 2017 much greater than expected, and DROP retirements in 2018 and 2019 much less than expected.
- Mortality experience in total was close to expected.
- Prior to any assumption or method changes, preliminary January 1, 2020 actuarial valuation results show a 2.85% increase in the actuarial accrued liability (AAL), a 9.58% increase in the total normal cost (NC), and a 5.64% (\$8.6M) increase in the actuarially determined contribution (ADC).
- If all assumption and method changes recommended in this experience review are adopted, *prior to any discount rate changes*, the AAL increases by 1.69% and the NC increases by 3.97%. With the current 2.75% payroll growth assumption, the ADC increases by 4.15% (\$6.7M); once the payroll growth assumption drops to 2.50%, the ADC increases by an additional 2.54% (\$4.2M).
- The 2019 ADC was \$152.1M, the preliminary 2020 ADC is \$160.7M, and the ADC with all recommended assumption changes, *prior to any discount rate changes*, is \$171.6M.
- Each 25 basis point drop in the discount rate equates to approximately a \$124 - \$136 Million increase in AAL, a \$4.1 - \$4.8 Million increase in Total Normal Cost, and a \$7.4 - \$8.1 Million increase in the ADC.

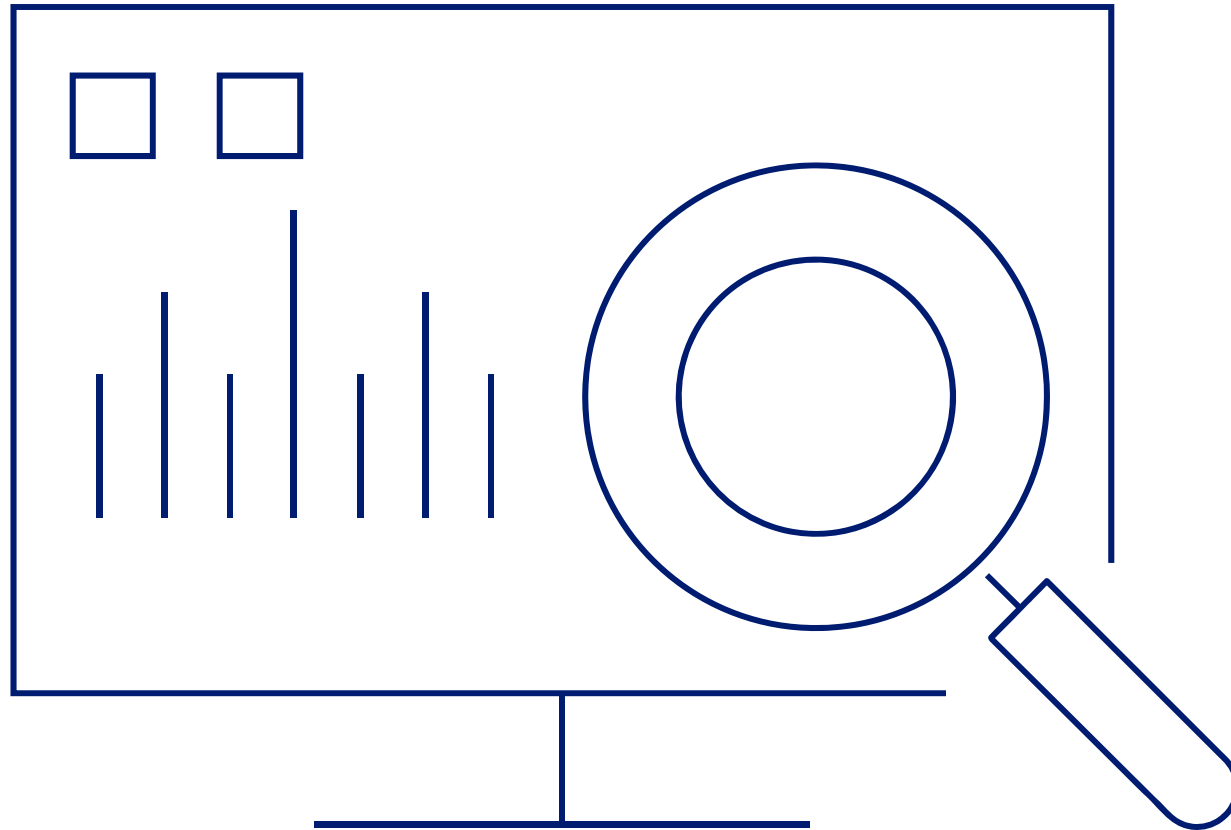
Summary of Proposed Assumption Changes

Assumption	Current Assumption	Proposed Assumption
Healthy Retiree & Dependent Spouse Mortality	RP-2014 Blue Collar Healthy Annuitant Mortality Table, set forward two years for females	Pub-2010 Public Safety Retiree Amount-weighted Mortality Table, set back one year for females
Contingent Beneficiary Mortality	RP-2014 Blue Collar Healthy Annuitant Mortality Table, set forward two years for females	Pub-2010 Public Safety Contingent Survivor Amount-weighted Mortality Table, set back one year for females
Disabled Life Mortality	RP-2014 Disabled Retiree Mortality Table, set back three years for males and females	Pub-2010 Public Safety Disabled Retiree Amount-weighted Mortality Table, set forward four years for males and females
Pre-Retirement Mortality	RP-2014 Employee Mortality Table, set back two years for males	Pub-2010 Public Safety Employee Amount-weighted Mortality Table, set forward five years for males
Mortality Improvement	Projected generationally with Scale M-2015	Projected generationally with Scale M-2019
Turnover	Separate service-based rates for Fire and Police; rates zero out after 37 years of service	Modify existing service-based rates for both Fire and Police; new rates zero out after 24 years of service
Disability	Age-based rates; rates zero out after age 54	No change
Service-Related Disability	100% of disabilities assumed service-related	No change
DROP Retirement	Separate age-based rates for Fire and Police, with 100% retirement at age 67 or after eight years in DROP	Increase existing age-based rates for most ages, move up 100% retirement to age 65 and move back 100% retirement to ten years in DROP
DROP Utilization	No members are assumed to elect to enter the DROP	No change

Summary of Proposed Assumption Changes

Assumption	Current Assumption	Proposed Assumption
DROP Annuitization Interest	3.00% on account balances as of September 1, 2017, payable upon retirement	2.75% on account balances as of September 1, 2017, payable upon retirement
Non-DROP Retirement	Three separate age-based rates based on hire date and service, with 100% retirement at age 62 or after benefit multiplier hits 90% maximum	Decrease the existing age-based rates for most ages; simplify rates from three separate rates to two
Terminated Vested Retirement	Age 50 if terminate pre-September 1, 2017; Age 58 if terminate on or after September 1, 2017	No change to retirement ages; in addition, an assumption has been added that 75% of those who terminate with a vested benefit prior to age 40 will take a cash out at age 40
Percent Married	75% for Males and Females	No change
Spousal Age Difference	Females three years younger than males	No change
Inflation	2.75%	2.50%
Investment Return	7.25%	Between 6.50% - 7.25%
Payroll Growth	2.75%	2.50%
Salary Scale	Separate service-based salary scales based on rank, with rates ranging from 0.00% to 5.00% with an ultimate rate of 2.00%	Separate salary scales based on rank as stated in the 2019 Meet and Confer agreement with an ultimate rate of 2.50%
Administrative Expenses	Greater of \$8,500,000 per year or 1% of computation pay	No change
Cost-of-Living Adjustment (COLA)	2.00% per year beginning the year System is projected to be 70% funded on a market value basis (currently, October 1, 2050)	No change; Segal will revisit once financials are finalized and funding projections are updated

Impact of Proposed Assumption Changes



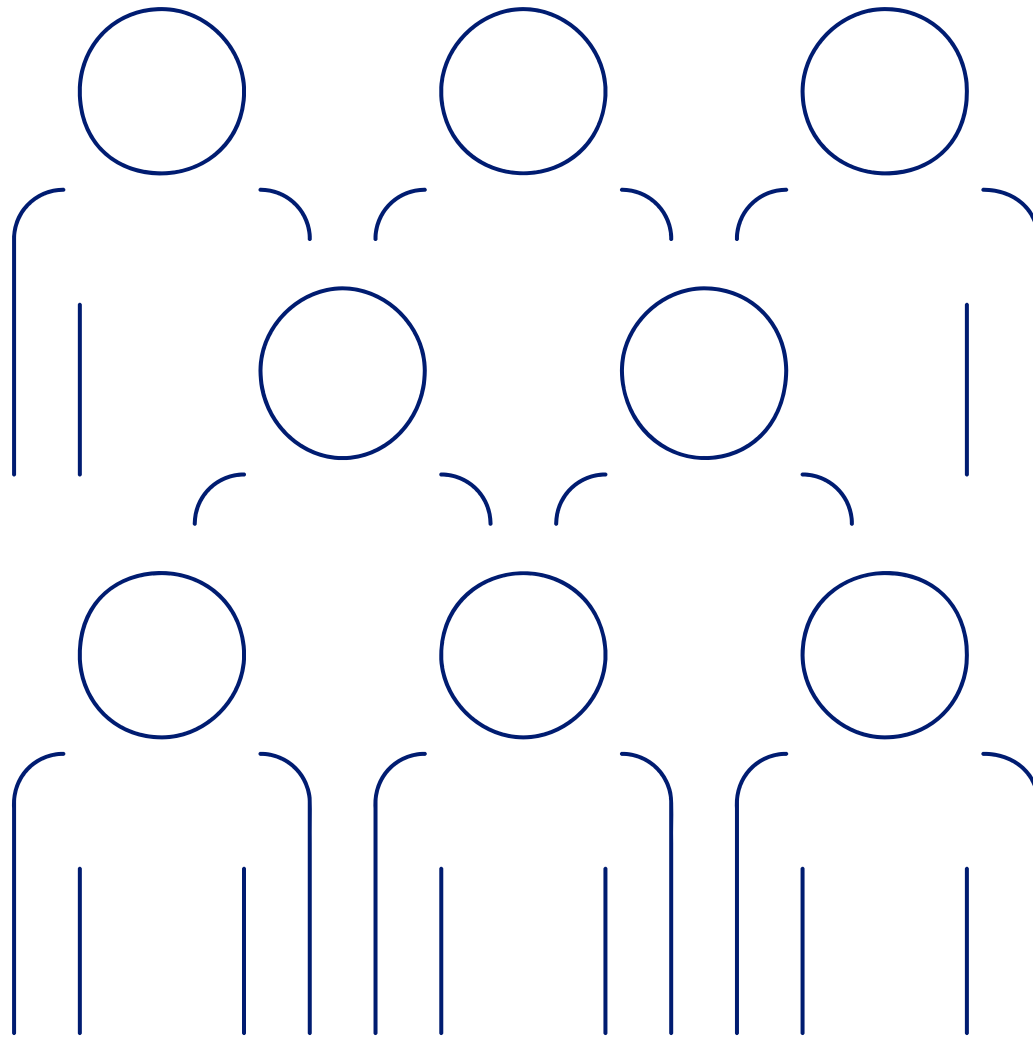
Impact of Proposed Assumption Changes

The following chart provides the estimated impact of the assumption and method changes, based on the preliminary January 1, 2020 valuation results; results will change once final assets are available.

Description	January 1, 2019 Valuation Results	January 1, 2020 Preliminary Valuation Results	Recommended Demographic and Salary Scale Changes	Recommended Demographic, Salary Scale, and Inflation/Payroll Growth Changes	Recommended Changes with Discount Rate Change to 7.00%	Recommended Changes with Discount Rate Change to 6.75%	Recommended Changes with Discount Rate Change to 6.50%
1 Actuarial Accrued Liability (AAL)	\$4,494,822,503	\$4,622,977,965	\$4,700,999,452	\$4,700,999,452	\$4,825,477,065	\$4,955,810,580	\$5,092,348,320
2 Actuarial Value of Assets (AVA)	<u>2,161,899,662</u>	<u>2,160,773,330</u>	<u>2,160,773,330</u>	<u>2,160,773,330</u>	<u>2,160,773,330</u>	<u>2,160,773,330</u>	<u>2,160,773,330</u>
3 Unfunded Actuarial Accrued Liability (UAAL) [(1) - (2)]	\$2,332,922,841	\$2,462,204,635	\$2,540,226,122	\$2,540,226,122	\$2,664,703,735	\$2,795,037,250	\$2,931,574,990
4 Employer Normal Cost	11,579,396	12,369,896	14,280,748	14,280,748	18,353,799	22,774,772	27,577,091
5 Payment on UAAL	135,274,585	142,770,993	147,295,070	151,402,406	154,692,797	157,971,527	161,238,556
Total Recommended Contribution adjusted for Timing [(4) + (5) + Interest]	\$152,084,297	\$160,666,349	\$167,330,464	\$171,584,085	\$179,000,791	\$186,746,881	\$194,855,552
7 Recommended Contribution as a % of Projected Payroll	41.88%	40.73%	42.13%	43.20%	45.07%	47.02%	49.06%
8 Projected Payroll	\$363,117,415	\$394,431,301	\$397,161,078	\$397,161,078	\$397,161,078	\$397,161,078	\$397,161,078
9 Funded Ratio – AVA Basis	48.10%	46.74%	45.96%	45.96%	44.78%	43.60%	42.43%
10 Funded Ratio – MVA Basis*	45.43%	44.58%	43.84%	43.84%	42.71%	41.59%	40.47%

*Based on market value of assets of \$2,041,914,130 for 2019 and \$2,060,965,120 for 2020

Demographic Assumptions

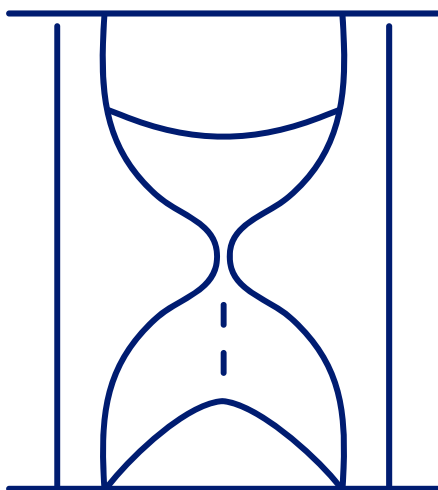


Demographic Assumptions

Mortality

➤ **Current Assumptions**

- **Healthy Pre-Retirement:** RP-2014 Employee Mortality Table, set back two years for males
- **Healthy Post-Retirement:** RP-2014 Blue Collar Healthy Annuitant Mortality Table, set forward two years for females
- **Disabled Lives:** RP-2014 Disabled Retiree Mortality Table, set back three years for males and females



Demographic Assumptions

Mortality

➤ Findings

- **Post-Retirement Mortality**

- Most important component of mortality assumptions; determines duration over which retirement benefits are paid
- **368 retiree deaths** compared to **368 expected deaths**; actual deaths were 100% of the expected count
- **168 beneficiary deaths** compared to **215 expected deaths**; actual deaths were 78% of the expected count

- **Disabled Life Mortality**

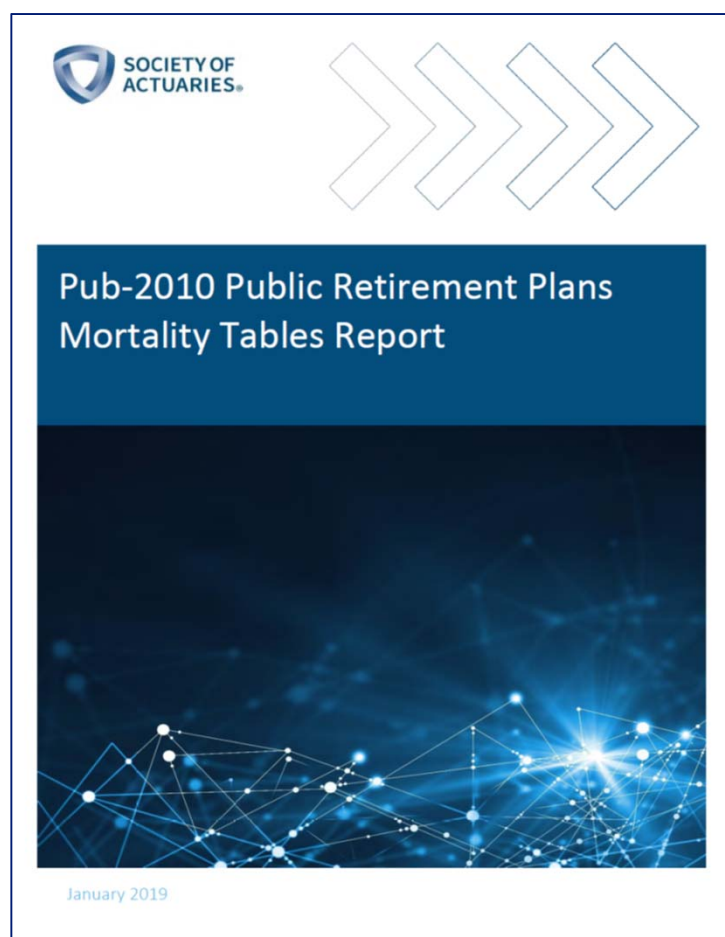
- **38 deaths** compared to **29 expected deaths**; actual deaths were 131% of the expected count

- **Pre-Retirement Mortality**

- **40 deaths** compared to **25 expected deaths**; actual deaths were 160% of the expected count

Demographic Assumptions

Mortality



- In January 2019, the Society of Actuaries released new mortality tables for public sector employees. This Pub-2010 family of tables includes separate mortality rates for General Employees, Teachers, and Public Safety.
- Within each Pub-2010 subgroup, there are separate tables for employees, retirees, disabled retirees, and contingent beneficiaries.

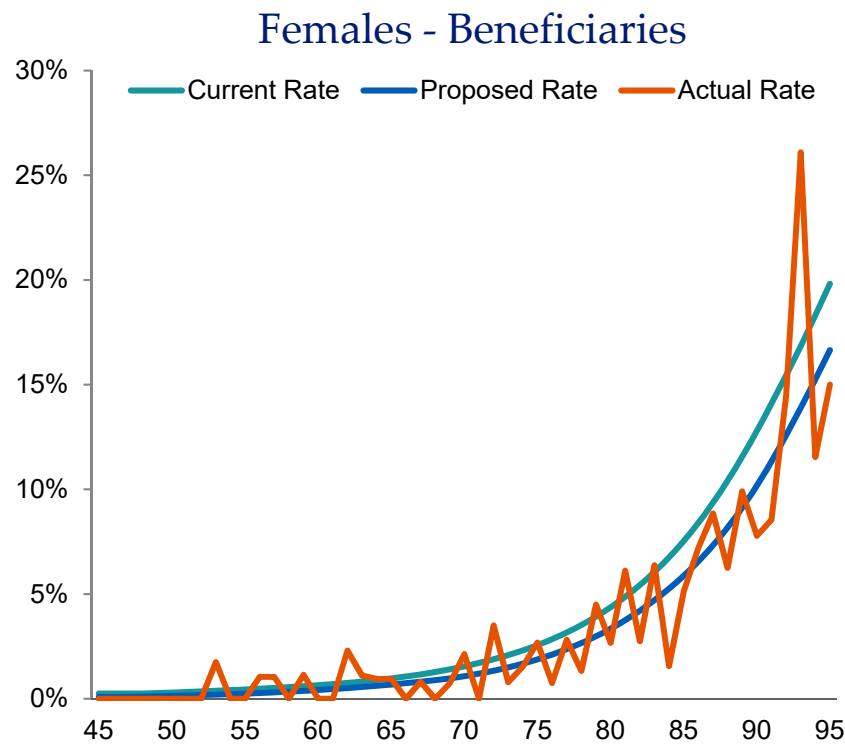
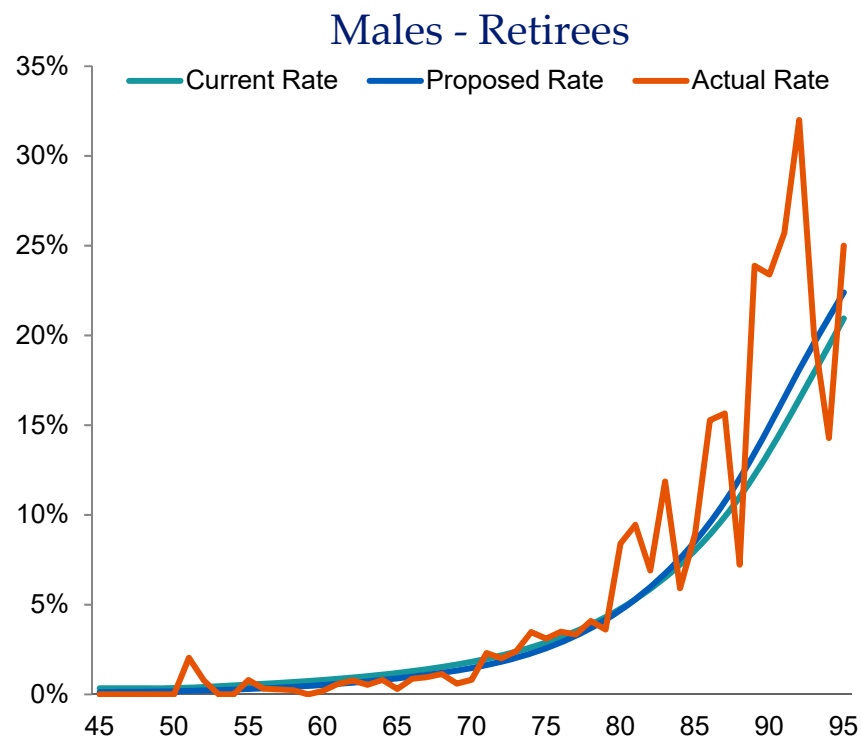
Demographic Assumptions

Mortality

- **Recommendations** – Updates to base mortality tables and generational projection scales
 - **Healthy Pre-Retirement:** Pub-2010 Public Safety Employee Amount-weighted Mortality Table, set forward five years for males
 - **Healthy Post-Retirement**
 - Retiree & Dependent Spouse: Pub-2010 Public Safety Retiree Amount-weighted Mortality Table, set back one year for females
 - Contingent Beneficiary: Pub-2010 Public Safety Contingent Survivor Amount-weighted Mortality Table, set back one year for females
 - **Disabled Lives:** Pub-2010 Public Safety Disabled Retiree Amount-weighted Mortality Table, set forward four years for males and females
- **Methodology for Setting Assumption**
 - Based on a Public Policy Practice Note released by the American Academy of Actuaries entitled “Selecting and Documenting Mortality Assumptions for Pensions,” Segal used the Pub-2010 Headcount-Weighted tables to establish a reasonable match of proposed mortality rates to actual death rates.
 - The corresponding Amount-Weighted tables are set as the assumptions upon which the liabilities are based.

Demographic Assumptions

Mortality – Illustration of current and proposed post-retirement assumptions



As noted previously, the post-retirement mortality assumption is the most crucial of the mortality assumptions, and for Dallas Police and Fire, most of the retirees are male. The new assumption for retirees takes the most current published tables into account, but does not differ significantly from the assumption already in use, which accurately predicted the number of deaths during the study period. The new retiree rates are lower at younger ages, and higher at later ages. The new beneficiary tables assume lower death rates, to better align with experience.

Demographic Assumptions

Mortality Improvement

➤ **Current Assumptions**

- Actuarial Standards of Practice require a provision to allow for improvements in mortality
- All assumed mortality tables for Dallas Police and Fire are projected generationally the MP-2015 projection scale
- Generational projection adjusts the mortality rates each year, so that participants with later birth dates are expected to live longer

➤ **Findings**

- The Society of Actuaries has updated the MP scales annually, based on updated national experience
- In general, the expectation for longevity improvement has declined over the last five years

➤ **Recommendation**

- We recommend that the MP-2019 projection scale be applied to the new Pub-2010 tables

Demographic Assumptions

Turnover Rates

- **Current Assumptions**

- Service-based rates with rates decreasing with longer service
- Rates differ for Fire and Police
- Rates for Police higher than for Fire
- No termination assumed for active participants in DROP
- Rates do not apply once eligible for normal retirement
- Terminating participants are assumed to take a deferred annuity if they are eligible unless their contribution refund has greater actuarial value



- **Findings**

- **Fire: 229 terminations** compared to **102 expected**
- **Police: 593 terminations** compared to **346 expected**
- Data continues to support a purely service-based assumption
- High turnover during 2016-2017 skews overall results
- The refund assumption has limited impact, due to the low level of turnover

Demographic Assumptions

Turnover Rates

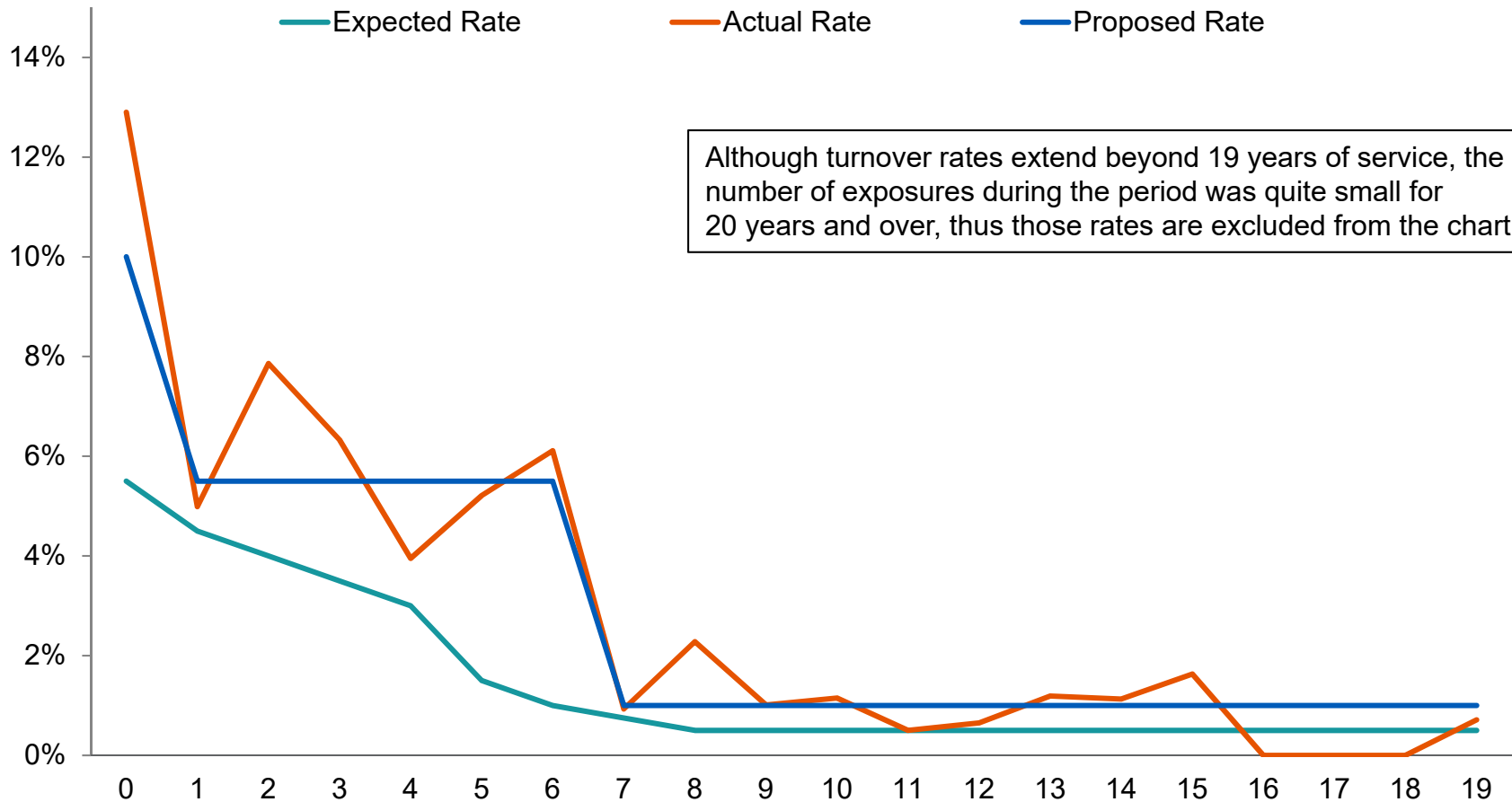
• Recommendations

- Maintain service-based format for the assumption
- For both groups, lower ultimate year turnover assumed from 38 years of service to 25 years of service
- For **Fire**, increase the rates for the first 24 years
- For **Police**, increase the rates for the first 15 years, with a slight decrease for participants with one year of service
- Maintain the current assumption that all terminated participants elect an annuity or refund based on which has the greater actuarial value
- The following graphs shows current expected rates, actual rates during the study period, and the proposed rates for the Fund for both Fire and Police

Service	Current Fire Rates	Proposed Fire Rates	Current Police Rates	Proposed Police Rates
0	5.50%	10.00%	14.00%	20.00%
1	4.50%	5.50%	6.00%	5.50%
2	4.00%	5.50%	5.50%	5.50%
3	3.50%	5.50%	5.00%	5.50%
4	3.00%	5.50%	4.50%	5.50%
5	1.50%	5.50%	4.00%	5.50%
6	1.00%	5.50%	3.50%	3.50%
7	0.75%	1.00%	3.00%	3.50%
8	0.50%	1.00%	2.50%	3.50%
9	0.50%	1.00%	2.00%	3.50%
10	0.50%	1.00%	1.00%	3.50%
11 – 14	0.50%	1.00%	1.00%	2.00%
15 – 24	0.50%	1.00%	1.00%	1.00%
25 – 37	0.50%	0.00%	1.00%	0.00%
38 & over	0.00%	0.00%	0.00%	0.00%

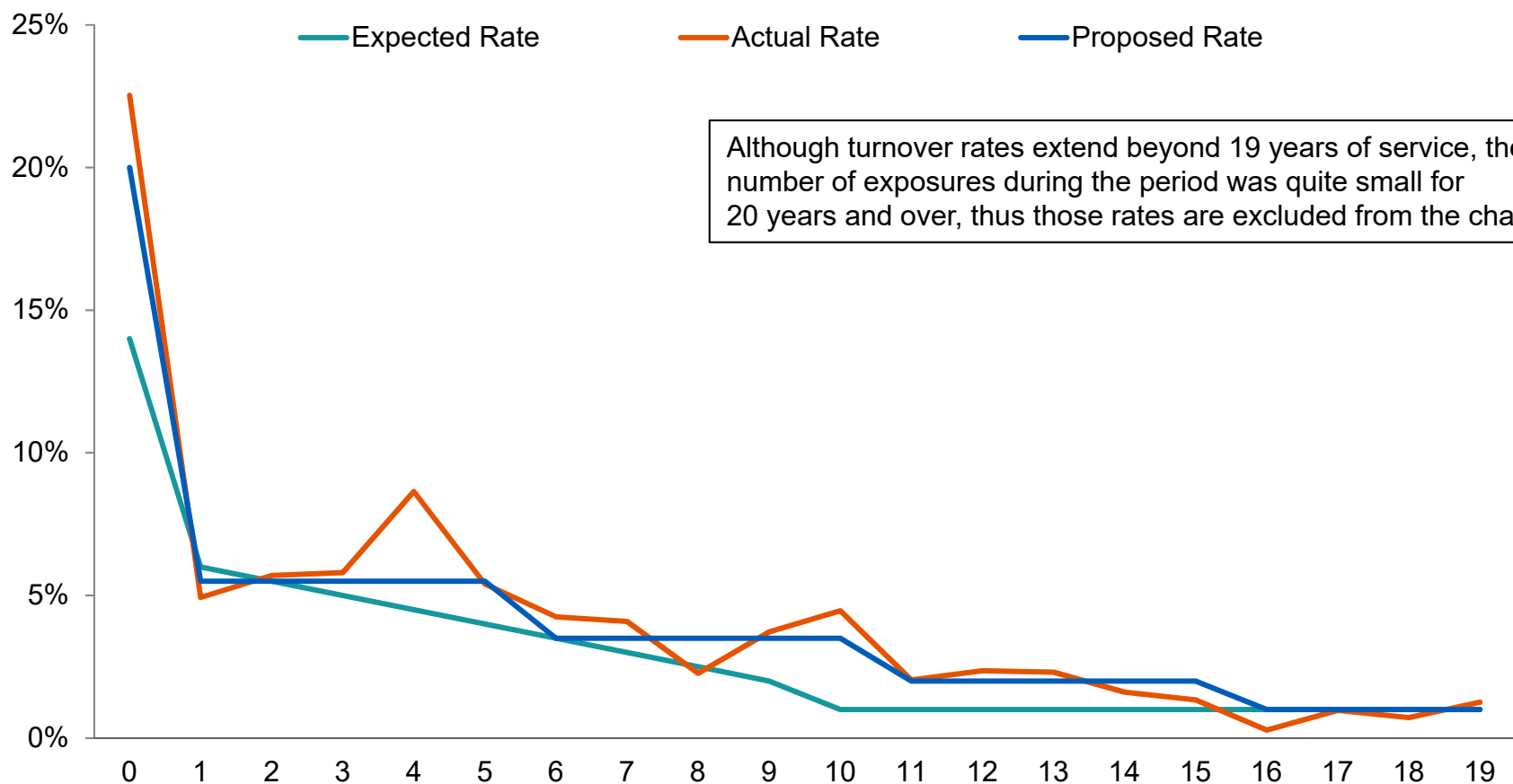
Demographic Assumptions

Turnover Rates by Service – Fire



Demographic Assumptions

Turnover Rates by Service - Police



Demographic Assumptions

Disability Rates


- **Current Assumptions**

- The current rates are age-based
- 100% of disabilities are assumed to be service-related

- **Findings**

- The actual disability awards have been the same as expected
- 7 actual** disabilities compared to **7 expected**; actual 100% of expected

- **Recommendations**

- Maintain current disability rates and service-related percentage
- A summary of the current rates are listed 
- These rates are in line with disability rates for other Texas public safety plans, including San Antonio and Fort Worth

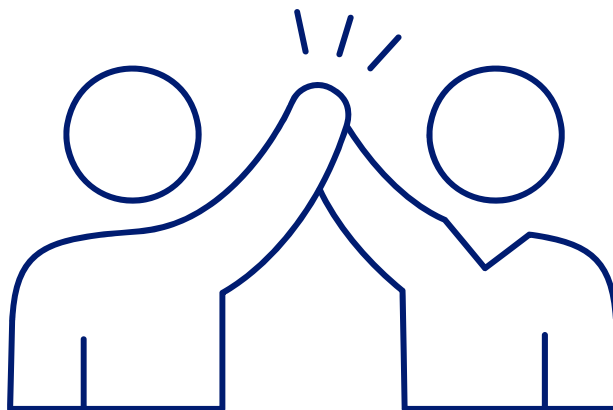
Age	Current Rates
20	0.010%
25	0.015%
30	0.020%
35	0.025%
40	0.030%
45	0.035%
50	0.040%

Demographic Assumptions

Retirement Rates

• **Current Assumptions**

- Five separate sets of retirement rates; separate rates for DROP and non-DROP participants
- Currently, applicable rates are age-based
- For DROP participants:
 - Separate rates for Fire and Police
 - The retirement rate is set to 100% after eight years in DROP
- For non-DROP participants:
 - Same rates for Fire and Police
 - The retirement rate is set to 100% once benefit multiplier hits 90% maximum



Demographic Assumptions

Retirement Rates

• Findings for DROP participants

- Retirement experience lower than expected for Fire but greater than expected for Police
 - **Fire: 346 actual** retirements compared to **392 expected**
 - **Police: 555 actual** retirements compared to **494 expected**
- Much greater than expected retirement in 2017 followed by much lower than expected retirement during 2018 and 2019 skewed overall results
- 35% of retirements during the five year period occurred during 2017
- Heavier emphasis placed on experience in 2018 and 2019 when setting rates

• Findings for non-DROP participants

- Retirement experience lower than expected
 - **228 actual** retirements compared to **282 expected**
- Much greater than expected retirement in 2016 skewed overall results
- 45% of retirements during the five-year period occurred during 2016

Demographic Assumptions

Retirement Rates

- **Recommendations for DROP participants**

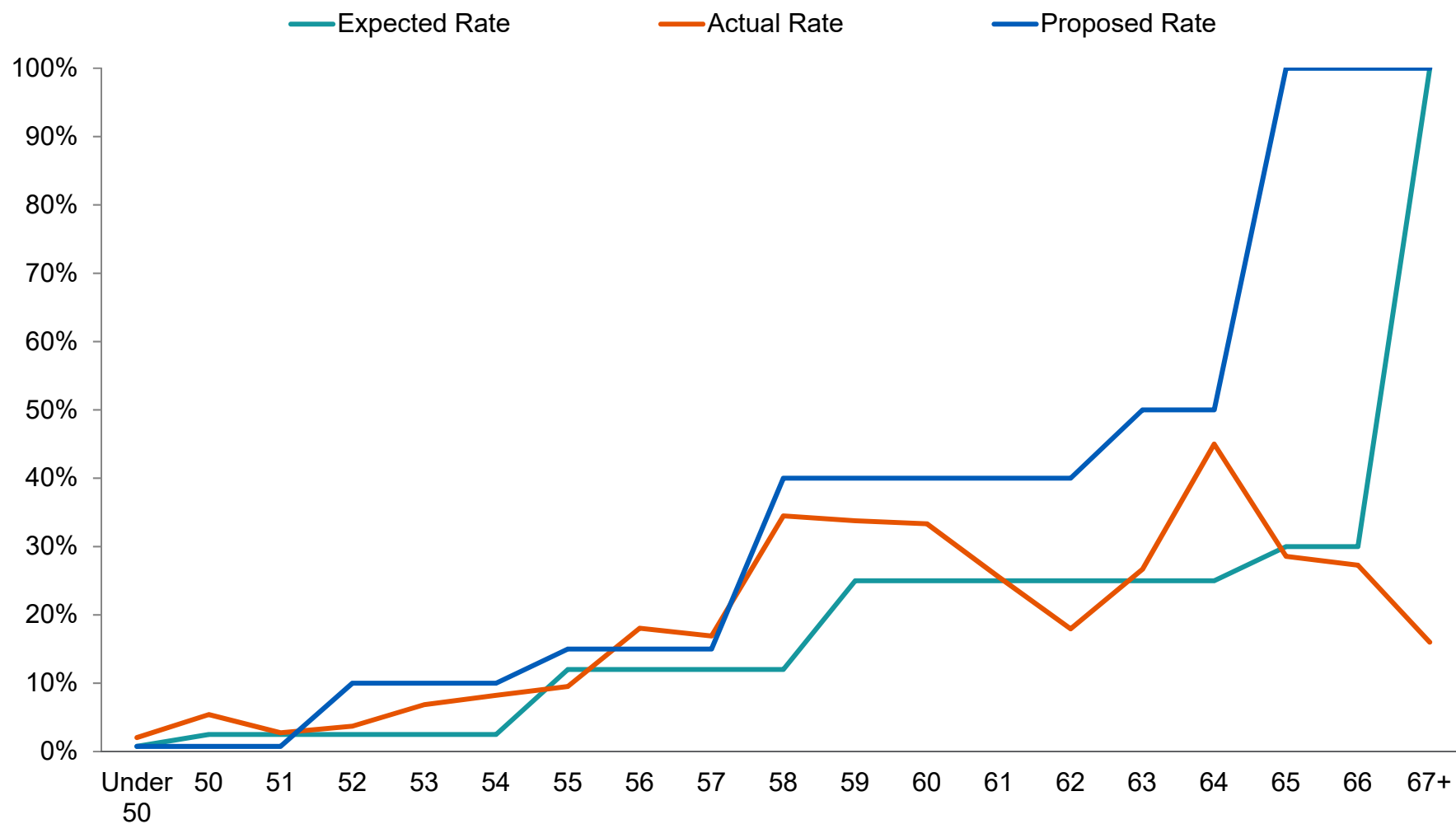
- Increase retirement rates for most ages and move up 100% retirement to age 65
- Move back 100% retirement rate from eight years in DROP to ten years in DROP
- The current and proposed assumed retirement rates for active participants in DROP are provided below

Age	Current Fire Rates	Proposed Fire Rates
Under 50	0.75%	0.75%
50 – 51	2.50%	0.75%
52 – 54	2.50%	10.00%
55 – 57	12.00%	15.00%
58	12.00%	40.00%
59 – 62	25.00%	40.00%
63 – 64	25.00%	50.00%
65 – 66	30.00%	100.00%
67	100.00%	100.00%

Age	Current Police Rates	Proposed Police Rates
Under 50	1.00%	1.00%
50	3.00%	10.00%
51 – 52	3.00%	15.00%
53	7.00%	15.00%
54	7.00%	25.00%
55	15.00%	25.00%
56 – 57	20.00%	25.00%
58 – 62	25.00%	30.00%
63	25.00%	40.00%
64	25.00%	50.00%
65-66	50.00%	100.00%
67	100.00%	100.00%

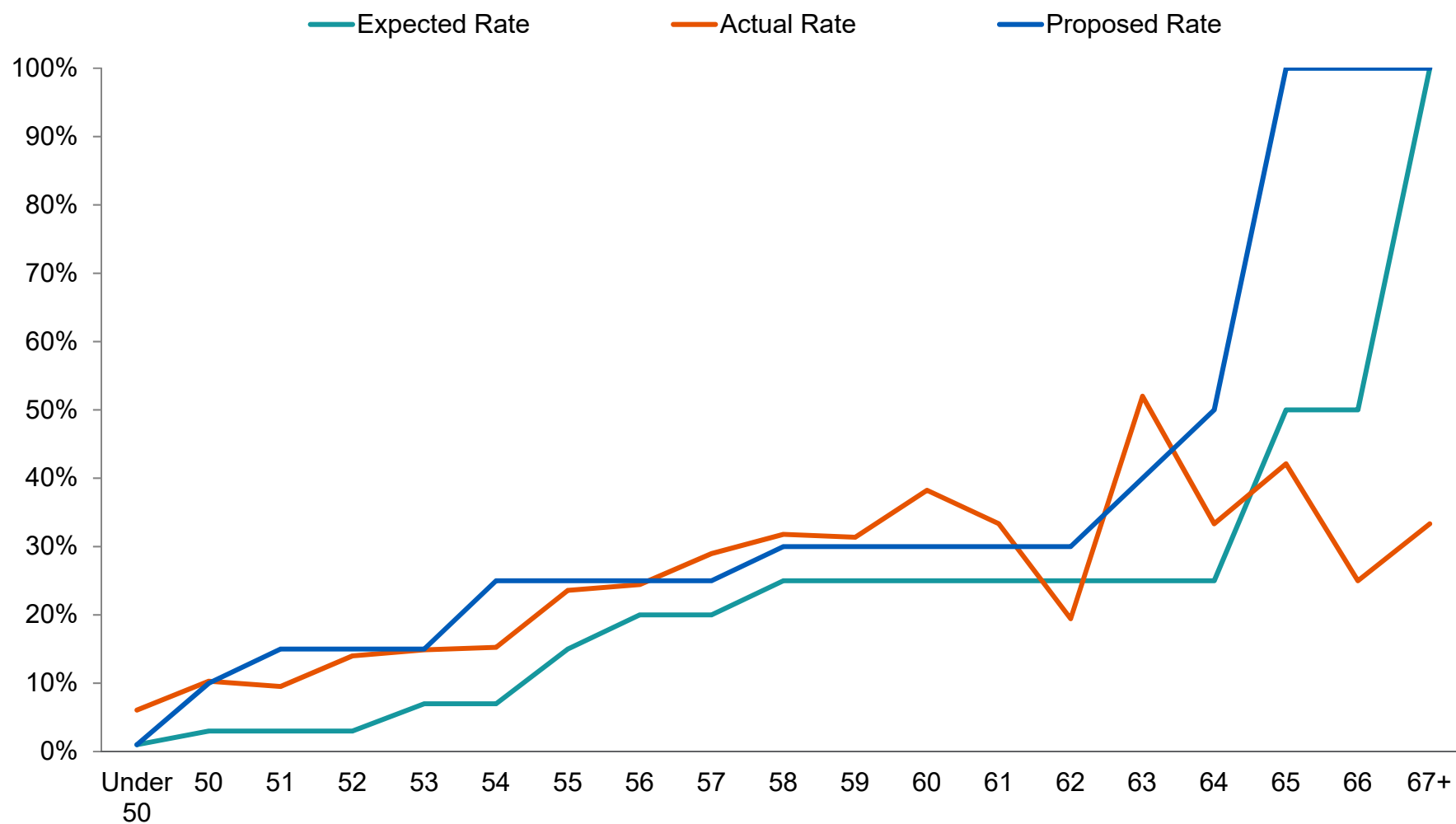
Demographic Assumptions

Retirement Rates – Fire in DROP



Demographic Assumptions

Retirement Rates – Police in DROP



Demographic Assumptions

DROP Utilization and Annuitization Interest



- **DROP Utilization**

- Current Assumption: No members are assumed to elect to enter the DROP
- In 2018 and 2019, new DROP entrants were primarily participants who have already reached their maximum years of pensionable service
- Recommendation: Maintain current assumption

- **DROP Annuitization Interest**

- Current Assumption: 3.00% on account balances as of September 1, 2017, payable upon retirement
- Recommendation: Change to 2.75%; assumption reviewed annually and changed as necessary based on feedback from the Fund Office

Demographic Assumptions

Retirement Rates

- **Recommendations for non-DROP participants**

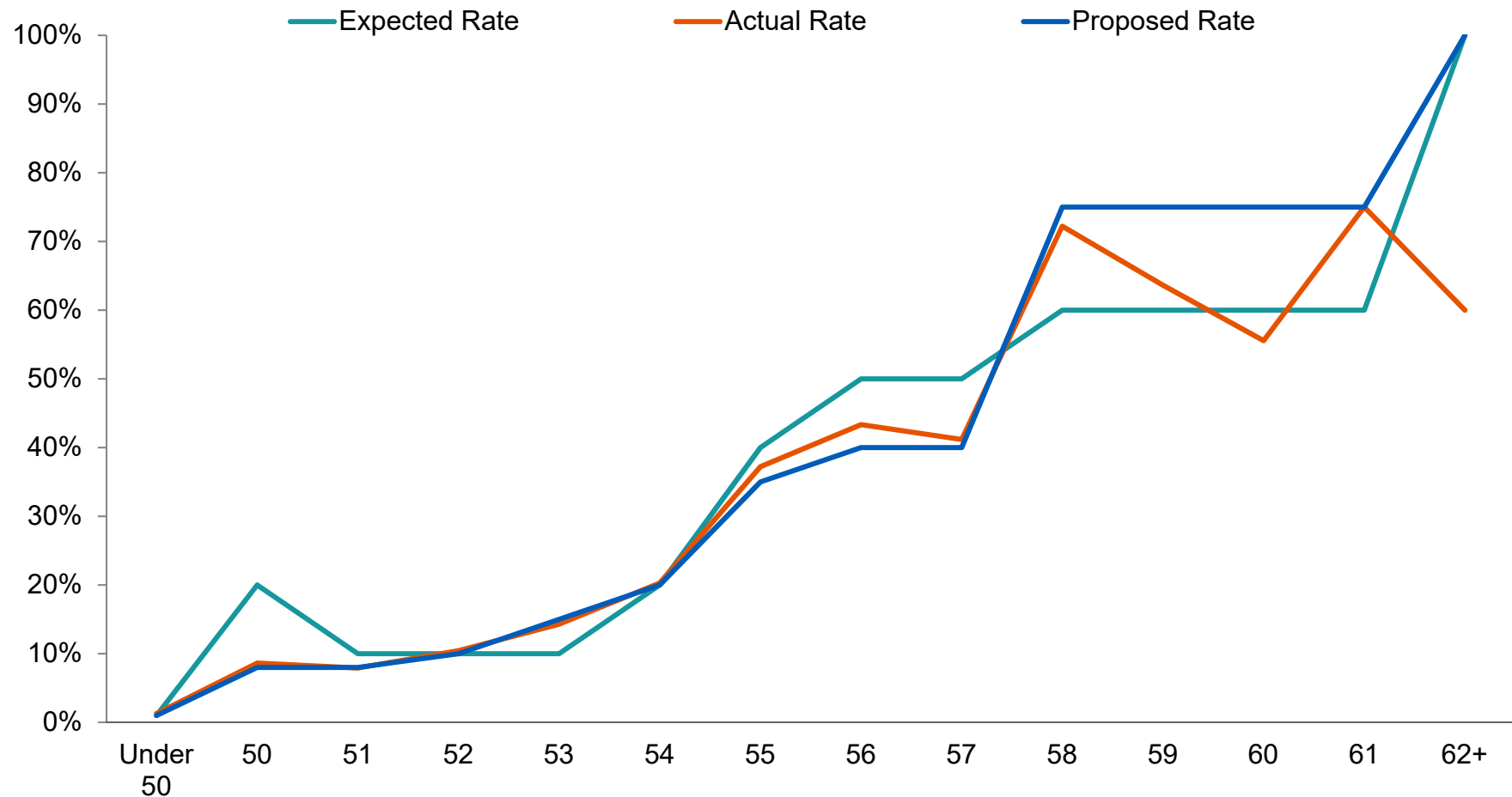
- Decrease retirement rates for most ages
- The current and proposed assumed retirement rates for active participants not in the DROP are provided below; no one hired on or after March 1, 2011 retired during the study period

Members hired prior to March 1, 2011 with at least 20 years of service as of September 1, 2017		
Age	Current Rates	Proposed Rates
Under 50	1.00%	1.00%
50	20.00%	8.00%
51	10.00%	8.00%
52	10.00%	10.00%
53	10.00%	15.00%
54	20.00%	20.00%
55	40.00%	35.00%
56 – 57	50.00%	40.00%
58 – 61	60.00%	75.00%
62	100.00%	100.00%

Members hired prior to March 1, 2011 with less than 20 years of service as of September 1, 2017 & Members hired on or after March 1, 2011			
Age	Hired prior to March 1, 2011 Current Rates	Hired on or after March 1, 2011 Current Rates	Proposed Rates
Under 50	0.00%	1.00%	1.00%
50	10.00%	5.00%	2.00%
51 – 53	5.00%	5.00%	2.00%
54	5.00%	10.00%	2.00%
55	15.00%	20.00%	2.00%
56	10.00%	30.00%	2.00%
57	5.00%	40.00%	2.00%
58	60.00%	50.00%	25.00%
59 – 60	50.00%	50.00%	25.00%
61	50.00%	50.00%	50.00%
62	100.00%	100.00%	100.00%

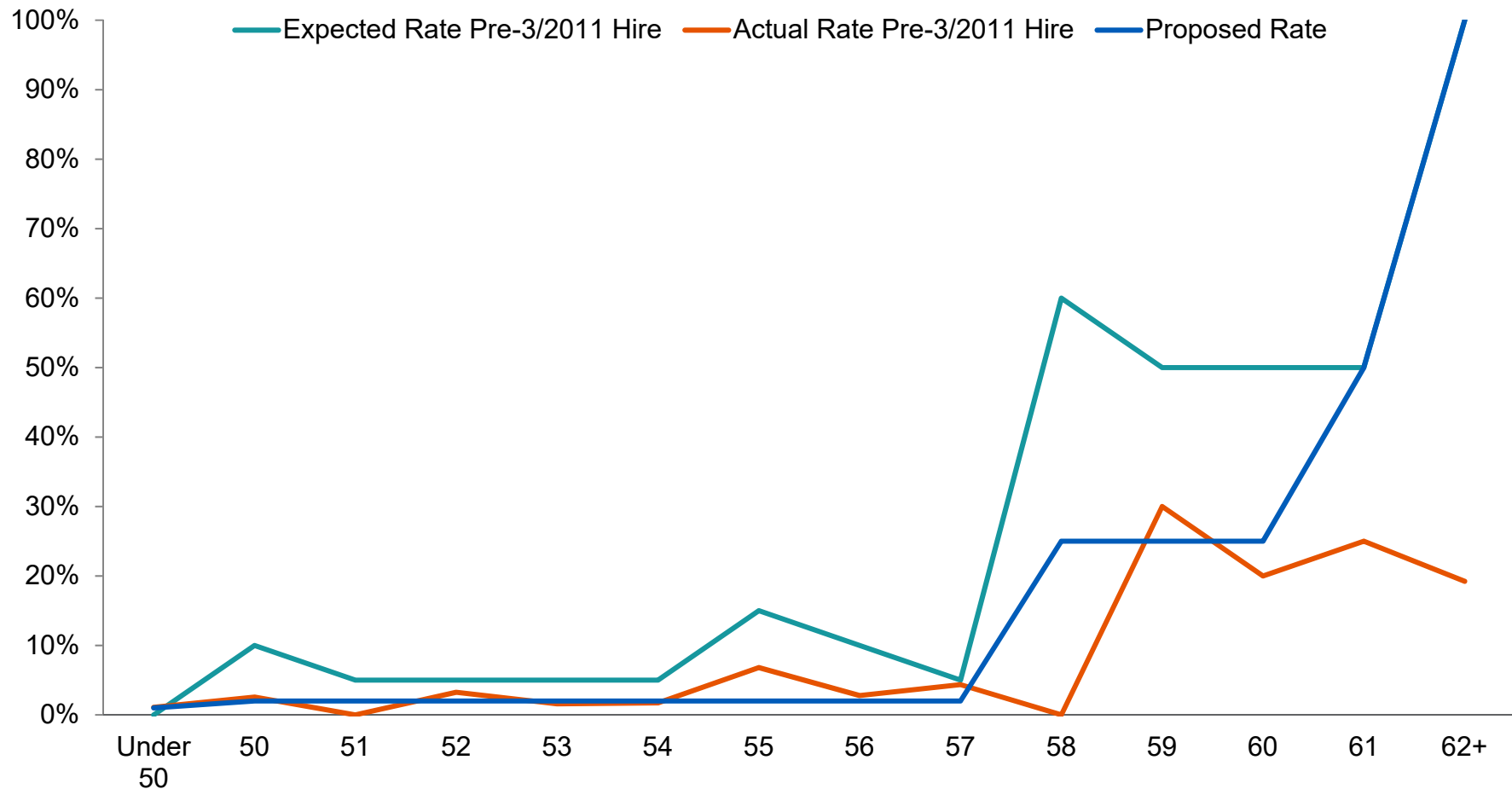
Demographic Assumptions

Retirement Rates – Members hired prior to March 1, 2011 with at least 20 years of service as of September 1, 2017



Demographic Assumptions

Retirement Rates – Members hired prior to March 1, 2011 with less than 20 years of service as of September 1, 2017



Demographic Assumptions

Retirement Rates – Terminated Vested Participants

• Current Assumptions

- Members who terminated prior to September 1, 2017 retire at age 50
- Members who terminated on or after September 1, 2017 retire at age 58

• Findings

- 147 terminated vested participants either retired or cashed out during the study period
 - 39, or 26.5%, retired at average age 50
 - 108, or 73.5%, cashed out at average age 38

• Recommendations

- Maintain same age 50 and 58 retirement assumptions
- As participants begin to terminate with a vested benefit with most of their service earned beginning on or after September 1, 2017, it is believed they will retire at a later age in accordance with the plan provisions that were effective September 1, 2017
- Add an assumption that 75% of those who terminate with a vested benefit prior to age 40 take a lump sum cash out at age 40

Demographic Assumptions

Spousal Assumptions

- **Current Assumptions**

- 75% of participants, regardless of sex, are assumed to have a spouse upon retirement or death from active status
- Males are assumed to be three years older than their spouses at retirement

- **Findings**

- Approximately 78% of participants were married at the time of retirement
- The beneficiaries of male participants were approximately 2.6 years younger, while the beneficiaries of female participants were approximately 0.5 years older
- The 2017 results appear to be an anomaly; the beneficiaries of female participants were 2.3 years older, on average, for the other four years
- The number of female exposures is significantly lower than male exposures

- **Recommendations**

- Maintain the percent married assumption of 75%
- Maintain the assumption males are three years older than their spouses at retirement



Economic Assumptions

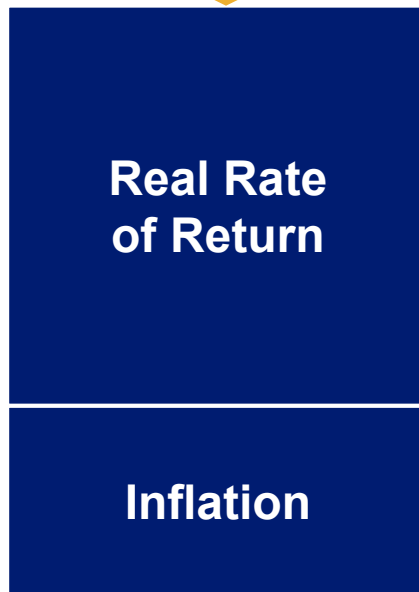


Economic Assumptions

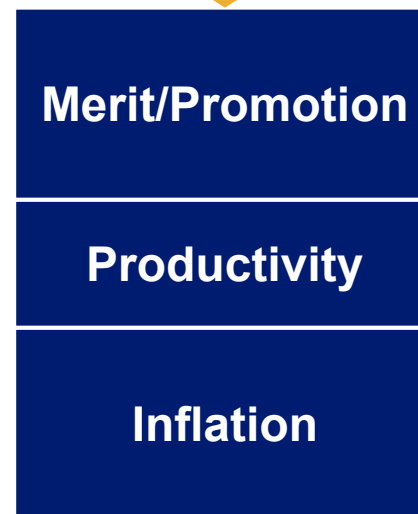
Building Blocks

These economic assumptions have two or three components (or building blocks).

**INVESTMENT RATE
OF RETURN
(Discount Rate)**



**SALARY
INCREASES**



**PAYROLL
GROWTH**



Building blocks must be consistent across all economic assumptions.

Economic Assumptions

Inflation

- **Current Assumption:** 2.75%
- 2019 OASDI Trustees Report: 2.0% for high-cost projection and 3.2% for low-cost projection
- Historical (through December 2019):

Average Annual Change in CPI-U	
Last 5 Years	1.82%
Last 10 Years	1.75%
Last 20 Years	2.14%
Last 30 Years	2.40%
Last 100 Years	2.64%



–Reasonable Range Based on OASDI Study and Other Public Sector Plans:
2.00% – 2.75%

- **Recommendation**

–Lower to 2.50%

Economic Assumptions

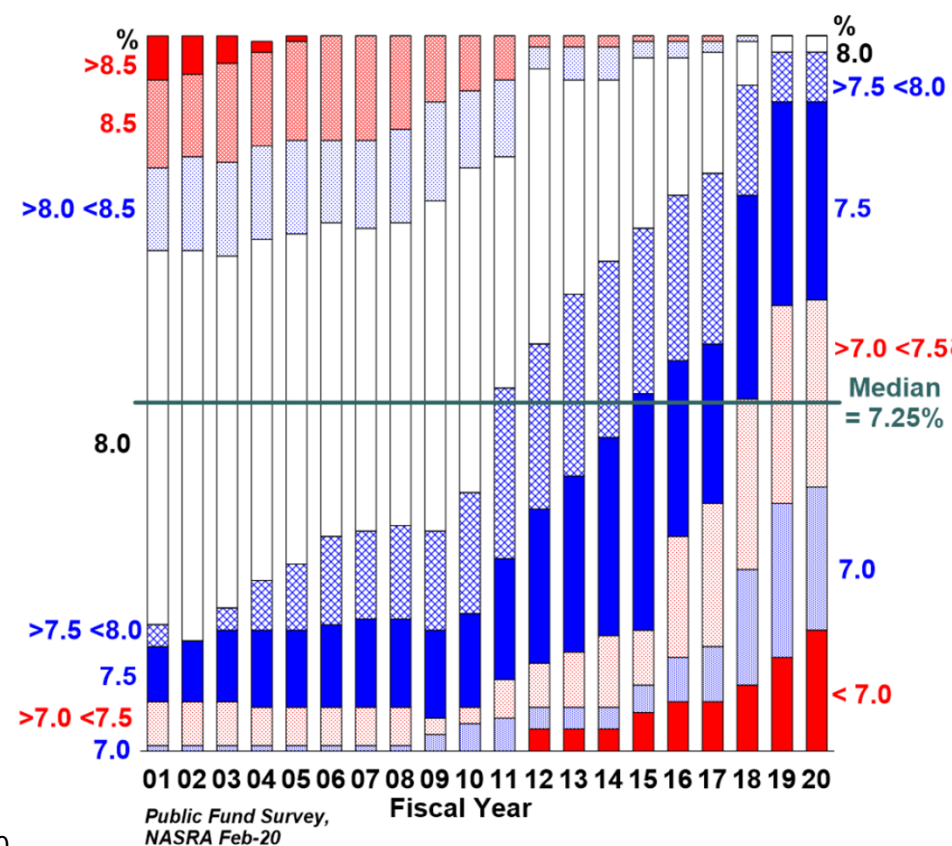
Investment Return

- **Current Assumption:** 7.25%
- NASRA Survey, February 2020
 - Less than 35% now have assumptions at 7.50% or above (was 50% two years ago)
 - Median has decreased to 7.25% (was 7.50% two years ago and 8.00% in 2010)
 - Average assumption is 7.22%

NASRA Issue Brief: Public Pension Plan Investment Return Assumptions

Updated February 2020

Change in Distribution of Public Pension Investment Return Assumptions, FY 01 to FY 20



Source: Compiled by NASRA based on Public Fund Survey, February 2020

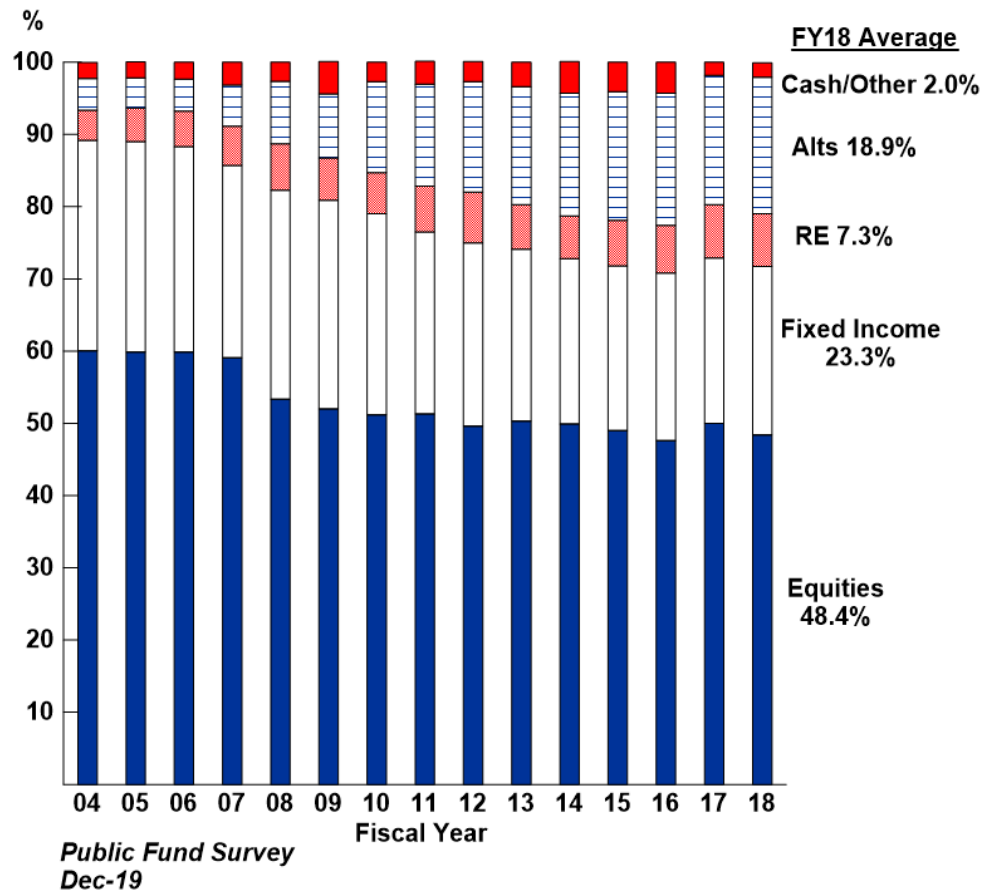
Economic Assumptions

Investment Return

NASRA Public Fund Survey: Summary of Findings for FY 2018

Updated December 2019

Change in Average Asset Allocations, FY 04 to FY 18



Source: Compiled by NASRA based on Public Fund Survey, December 2019

Economic Assumptions

Investment Return

- The chart below shows actuarial value and market value investment returns over the five-year period ending December 31, 2019
- As shown below, the Fund's returns as recognized under the asset smoothing method have generally fallen short of return expectations over the prior five years

Year Ended	Actuarial Value Investment Return	Market Value Investment Return	Assumed Return
December 31, 2015	-24.03%*	-8.47%	7.25%
December 31, 2016	7.16%	6.82%	7.25%
December 31, 2017	6.63%	4.74%	7.25%
December 31, 2018	5.48%	2.09%	7.25%
December 31, 2019	5.08%	6.41%	7.25%
Average	-7.17%	1.51%	

*Includes re-setting of actuarial value of assets to market value of assets as of December 31, 2015; prior to the re-set, the actuarial value investment return was -9.24%.

Economic Assumptions

Investment Return

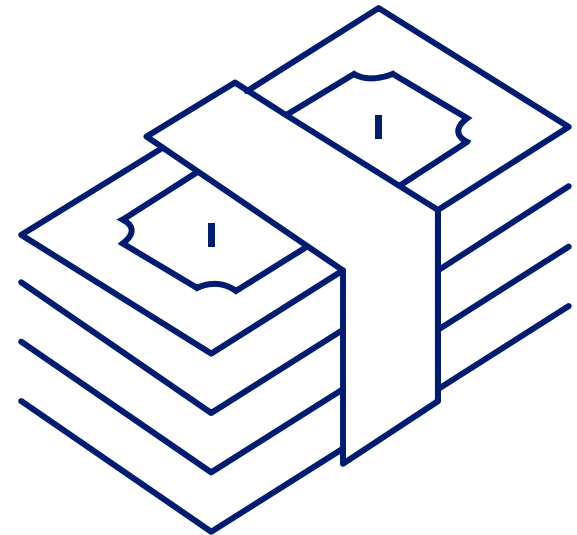
- Reasonable range based on inflation assumption of 2.00% to 2.75% and target asset allocation is 6.50% to 7.25%
- There is currently a 4.50% point spread between the inflation assumption of 2.75% and the return assumption of 7.25%
- This spread does not have to be maintained; however, note that if the spread increases this implies the real rate of return on assets has increased
- **Recommendation**
 - Based on target asset allocation and projected future earnings, we recommend a discount rate between 6.50% and 7.25%



Economic Assumptions

Payroll Growth

- **Current Assumption:** 2.75% overall payroll growth
- **Comments**
 - Used to determine the amortization payment on the Unfunded Actuarial Accrued Liability (UAAL)
 - Payment on UAAL expected to increase at payroll growth rate
 - Usually equivalent to inflation assumption or inflation plus productivity
- **Recommendation**
 - Decrease long-term payroll growth assumption to 2.50% alongside reduction in inflation assumption



Economic Assumptions

Payroll Growth

Valuation Date	City's Hiring Plan Payroll	Percent Change in Hiring Plan Payroll	Projected Valuation Payroll	Percent Change in Valuation Payroll
January 1, 2015			\$383,006,330	
January 1, 2016			365,210,426	-4.65%
January 1, 2017	\$372,000,000		357,414,472	-2.13%
January 1, 2018	364,000,000	-2.15%	346,036,690	-3.18%
January 1, 2019	383,000,000	5.22%	363,117,415	4.94%
January 1, 2020	396,000,000	3.39%	397,161,078	9.38%
Average growth over past five years				0.73%

Economic Assumptions

Salary Scale

• **Current Assumptions**

- Service-based table with rates ranging from 0.00% to 5.00% with an ultimate rate of 2.00%
- Separate rates for each rank
- Based on 2016 Meet and Confer Agreement, as amended in 2018

• **Recommendation**

- Updated rates based on 2019 Meet and Confer agreement
- Tables on the next page show the current assumption and the proposed assumption
- Bargaining assumed to occur again after three years, and the long-term rates are assumed to be lower than the current agreement for some members



Economic Assumptions

Salary Scale

Current Rates

Years of Service	Officers & Officer Trainees	Corporals, Drivers & Senior Officers	Sergeants, Lieutenants, Captains & Majors	Deputy Chiefs	Assistant Chiefs	Chiefs
1	0.00%	0.00%	5.00%	5.00%	5.00%	5.00%
2	0.00%	2.75%	5.00%	5.00%	5.00%	5.00%
3	2.75%	5.00%	5.00%	5.00%	5.00%	5.00%
4 – 6	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
7	5.00%	5.00%	5.00%	2.00%	5.00%	5.00%
8	2.00%	5.00%	2.00%	2.00%	5.00%	5.00%
9 – 11	2.00%	2.00%	2.00%	2.00%	5.00%	5.00%
12 – 14	2.00%	2.00%	2.00%	2.00%	2.00%	5.00%
15+	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%

Proposed Rates

Year	Officers	Corporals, Drivers, Senior Officers & Chiefs	Sergeants, Lieutenants, Captains, Majors, Deputy Chiefs & Assistant Chiefs
2020 – 2022	3.25%	3.00%	2.50%
2023+	2.50%	2.50%	2.50%

Economic Assumptions

Administrative Expenses

- **Current Assumption:** Greater of \$8,500,000 per year or 1% of computation pay
- **Comments**
 - GASB Statements 67 and 68 require an explicit assumption for accounting purposes
 - Administrative expenses have been lower than assumed over the past four years
- **Recommendation**
 - Maintain the current assumption, based on feedback from the Fund Office

Four-year administrative expense history

Year Ended	Administrative Expenses	Assumption
December 31, 2016	\$9,492,445	\$10,000,000
December 31, 2017	8,089,584	Greater of \$10M or 1% comp. pay
December 31, 2018	5,861,410	Greater of \$8.5M or 1% comp. pay
December 31, 2019	6,413,696	Greater of \$8.5M or 1% of comp. pay

Economic Assumptions

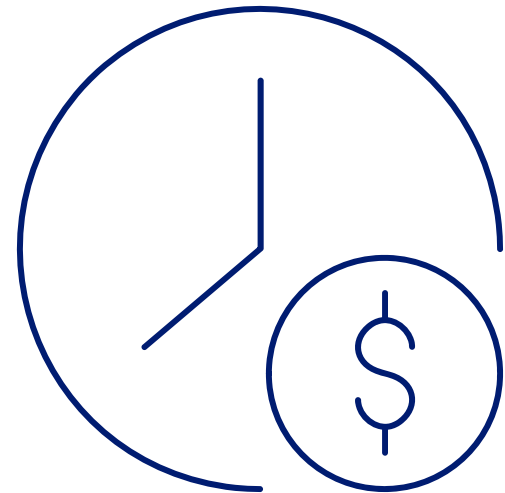
Cost-of-Living Adjustment (COLA)

- **Current Assumption**

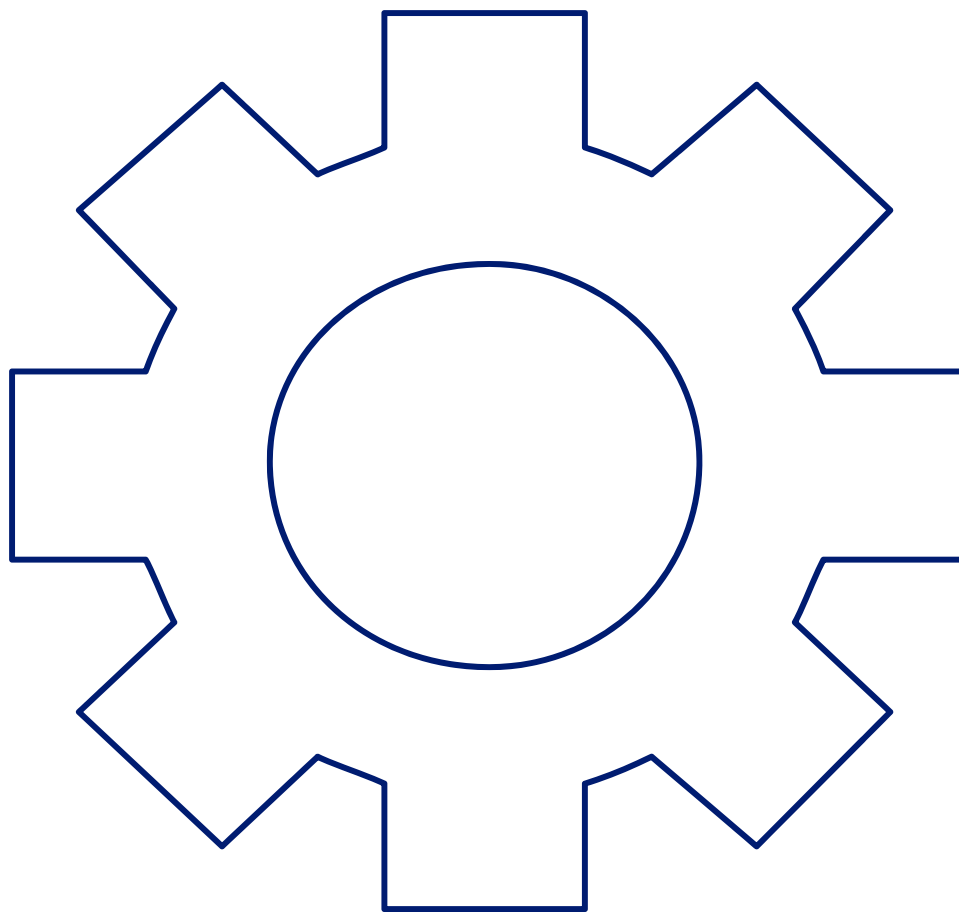
- 2.00% increase per year beginning in the year the System is projected to be 70% funded on a market value basis after the COLA is reflected (currently, October 1, 2050)
- Updated annually

- **Recommendation**

- Current assumption maintained for purposes of the experience study
- Will update once financials are finalized and funding projections are updated



Actuarial Methods



Actuarial Methods

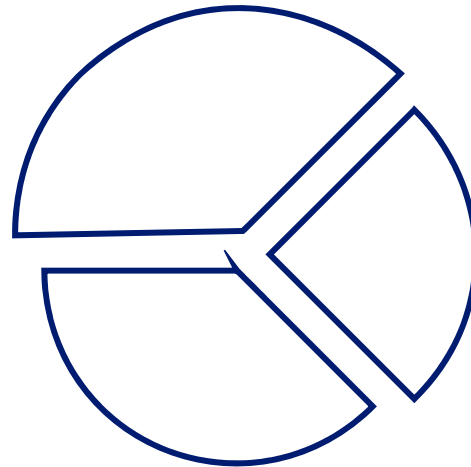
Funding Method

- **Current Method**

- Current method is Traditional Entry Age
- Traditional Entry Age is the most common method used for public sector plans in the U.S., and is required for GASB 67 and 68 calculations

- **Recommendation**

- Maintain current method



Actuarial Methods

Asset Smoothing Method

- **Current Method**

- 5-year straight-line amortization of each year's market investment gain or loss
- 20% corridor around market
- Treats realized and unrealized losses equally
 - Sale of assets does not affect actuarial value
- GFOA funding policy guidelines recommend a recognition period of five years or less with recognition occurring over fixed periods.
- A corridor is recommended by GFOA if the period is greater than five years.
- Actuarial Standard of Practice No. 44 requires the use of a method that is “rational, systematic, and produces an actuarial value of assets that is expected to converge toward market value...assuming constant asset returns in future periods.”
- The current asset method follows these recommendations.
- **Recommendation**
 - Maintain current method

Actuarial Methods

Amortization Method

• Current Method

- The Pension System is funded based on statutory contributions, rather than the results of the actuarial valuation.
- However, Texas Code Section 802.101 requires actuarial valuations of public sector retirement systems to include a recommended contribution rate based on an amortization period not to exceed 30 years.
- The actuarially determined contribution (ADC) shown in the valuation is calculated based on a 30-year amortization period using the level percent-of-payroll method.
- GFOA funding policy guidelines recommend that amortization periods should not exceed 25 years and ideally fall in the 15-20 year range.
- GFOA funding policy guidelines recommend a “layered” amortization approach with different periods for changes in liability incurred in different years.

• Recommendation

- Maintain current method for purposes of satisfying Texas Code Section 802.101
- If the City chooses to fund the System based on the ADC, or the System’s effective amortization period based on the statutory contributions drops below 30 years, a change in method will be considered.

Thank You!

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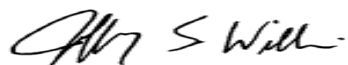
Actuarial Certification

We are pleased to submit this presentation on the actuarial experience of the Dallas Police and Fire Pension System for the period January 1, 2015 through December 31, 2019. This investigation is the basis for our recommendation of the assumptions and methods to be used for the January 1, 2020 actuarial valuation. The experience review was completed under our supervision, with the assistance of Caitlin Grice.

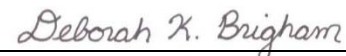
All current actuarial assumptions and methods were reviewed as part of this study. The study was based on data provided by the System for the last six actuarial valuations. Our analysis was conducted in accordance with generally accepted actuarial principles as prescribed by the Actuarial Standards Board (ASB) and the American Academy of Actuaries. Additionally, the development of all assumptions contained herein is in accordance with ASB Actuarial Standard of Practice (ASOP) No. 27 (*Selection of Economic Assumptions for Measuring Pension Obligations*) and ASOP No. 35 (*Selection of Demographic and Other Non-Economic Assumptions for Measuring Pension Obligations*).

The undersigned actuaries are experienced with performing experience studies for large public-sector pension plans and are qualified to render the opinions contained in this report.

Sincerely,



Jeffrey S. Williams, FCA, ASA, MAAA, EA
Vice President and Actuary



Deborah K. Brigham, FCA, ASA, MAAA, EA
Senior Vice President and Actuary