

# Austin Firefighters Retirement Fund



## Experience Study

March 25, 2024

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# Agenda



- Overview
- Demographic Assumptions
- Economic Assumptions
- Roadmap



Assumptions impact the *timing* of costs  
not the *ultimate* cost of the Fund

$$C + I = B + E$$



Currently, Actuarial Standards of Practice (ASOP) Nos. 27 and 35 guide pension actuaries in setting assumptions

ASOP 27: Selection of Economic Assumptions

ASOP 35: Selection of Demographic and Other Noneconomic Assumptions



An updated version of ASOP No. 27 adopted combining the current 27 and 35, but it has not yet been released



ASOP 27 & 35 require the actuary to select reasonable assumptions and defines an assumption as reasonable if it has the following characteristics:

- Is appropriate for the measurement's purpose
- Reflects the actuary's professional judgement
- Takes into account current and historical data relevant to selecting the assumption
- Reflects the actuary's estimate of future experience
- Expects to have no significant bias (not significantly optimistic or pessimistic)

The ASOPs also indicate the actuary may consider several different assumptions reasonable and different actuaries may apply different professional judgment and may choose different reasonable assumptions.



**Valuation model should provide a reasonable and appropriate basis for evaluating the Fund**

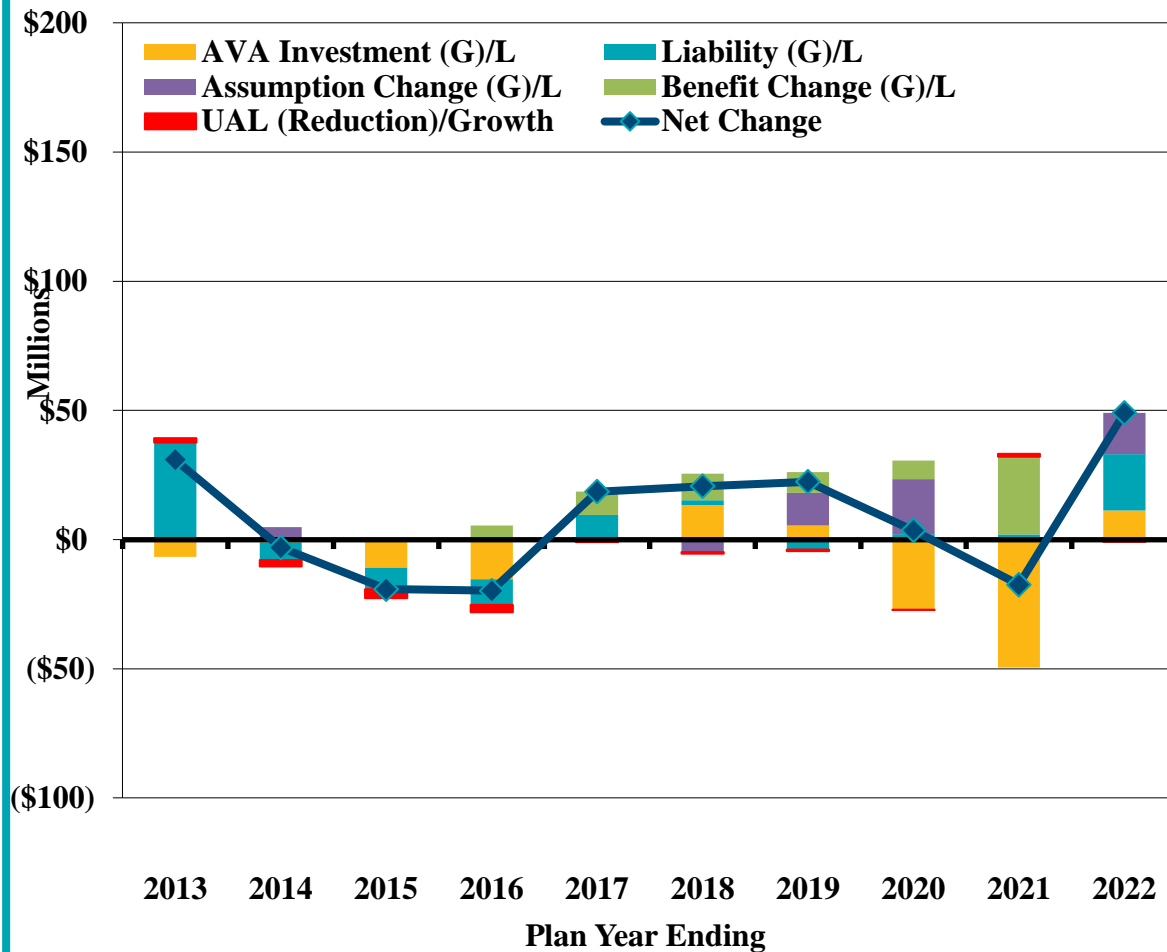
- **Actual** experience determines the ultimate benefits cost
- Expected experience affects valuation results, which estimate the Fund's financial condition
- While assumption updates do not directly alter the benefits paid or their costs, they should aim to minimize future gains and losses

**Model will never be exactly right, but ideal is relatively small gains and losses from deviations with an offsetting pattern**

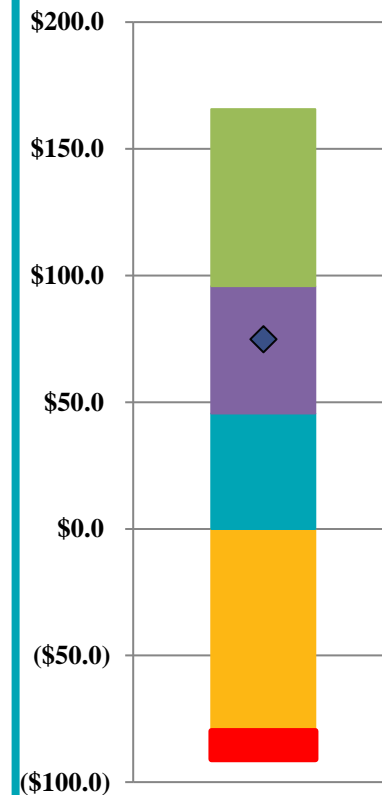
# Gain/Loss Trends



### Changes in Unfunded Actuarial Liability (UAL) History



### Cumulative UAL Changes 2013-2022



March 25, 2024



# Demographic Assumptions

Salary Increases

Mortality Rates

Retirement Rates

Termination Rates

Disability Rates

Other Demographic Assumptions



# Total Salary Increases



- Total salary increases incorporate wage inflation, merit, and promotional increases
- Merit (including promotional) salary increases are the individual salary increases above wage inflation
- Current merit salary increases vary by service and reflect step increases at certain levels of service

# Total Salary Increases



- Recent agreements between the City of Austin and Austin Firefighters Association Local 975 included the following increases in base pay rates:

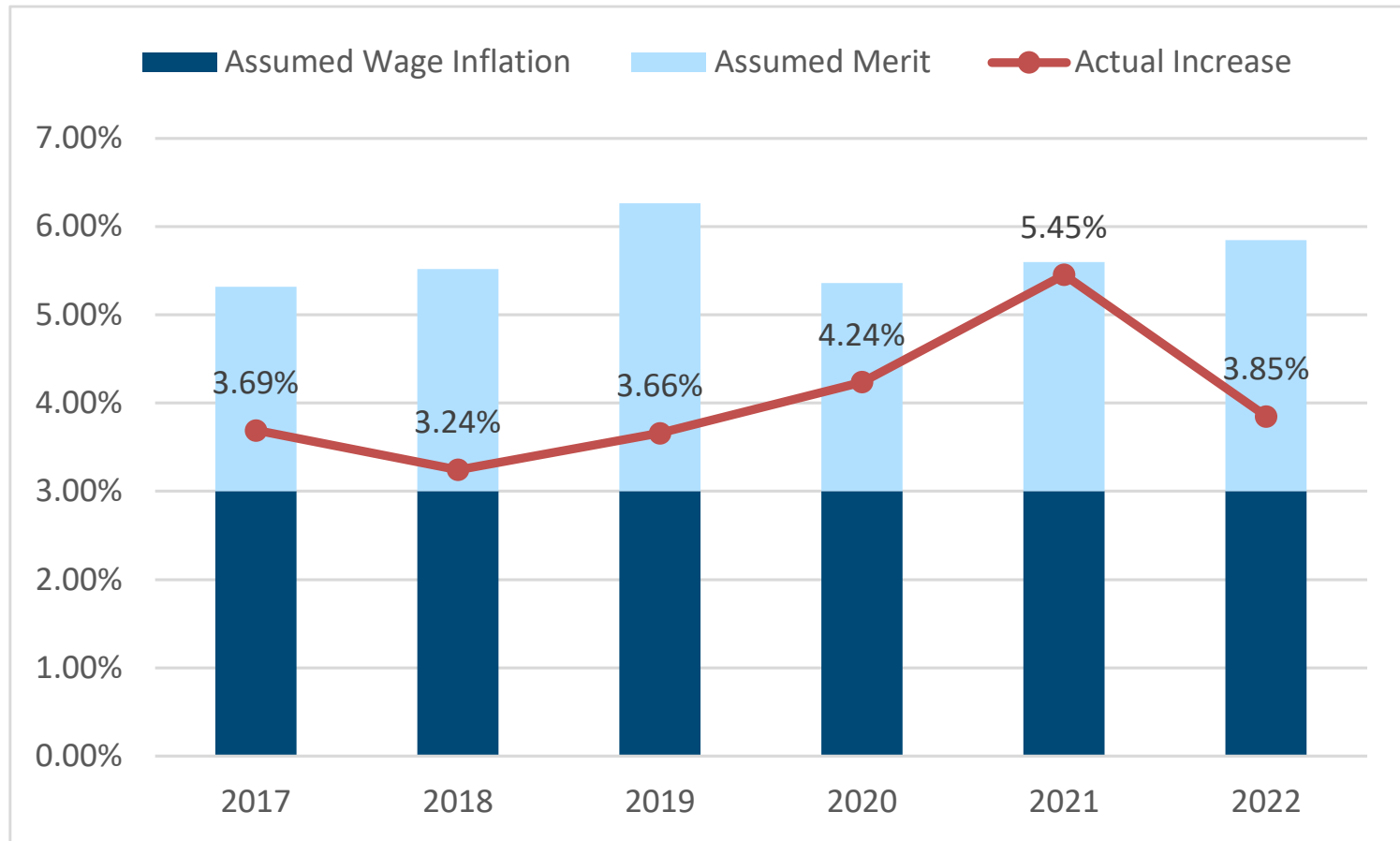
Fiscal Year	Increase to Base Pay
2019	0.50%
2020	1.00%
2021	2.00%
2022	2.50%
2023	0.00%
2024	8.16%
2025	4.00%

- Arithmetic average increase over the period is 2.6%

# Total Salary Increases



Study years all had actual total salary increases less than the current assumption



# Total Salary Increases



## Proposed Changes:

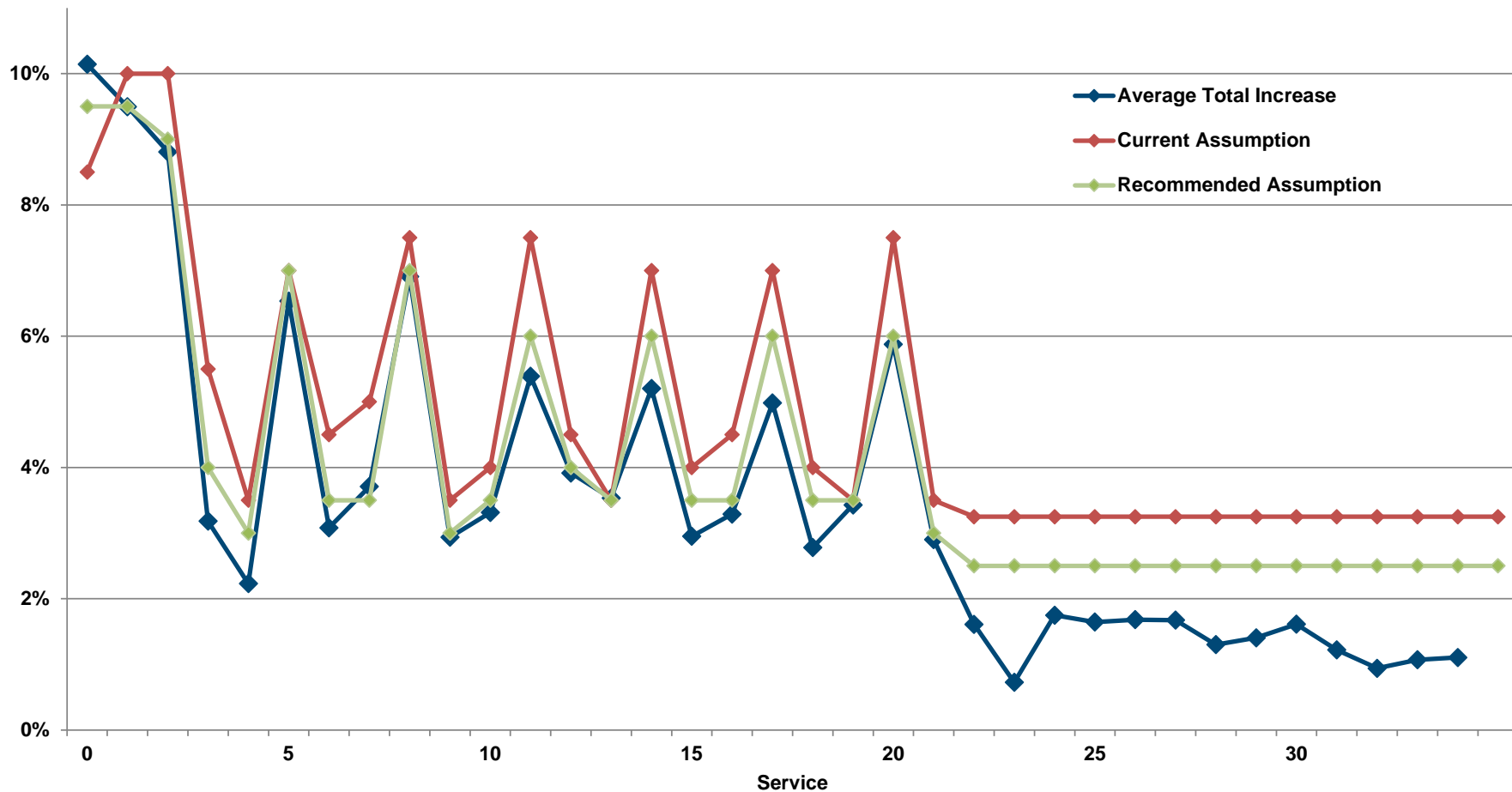
- Wage Inflation: 2.50%
  - Common practice to set wage inflation to price inflation
  - Avoid illusion of precision, wage inflation expectation is not materially different than price inflation
- Aggregate Payroll Growth: 2.50%
- Reflect the recent contract increases for near-term base pay increases
  - 8.16% for fiscal 2024 and 4.00% for fiscal 2025
- Refine the merit scale to reflect recent experience

The total salary increase assumption for fiscal 2026+ is shown on the following page by service

# Total Salary Increases by Service



Total Salary Increase by Service





- Compare **actual** occurrences of each decrement to those **expected** by what the assumption predicted
  - Changes should move the A/E ratio closer to 1.0
- Examine any external influences on each assumption
- Account for potential future trends (e.g., mortality improvement)
- Propose adjustments to each of the demographic assumptions for Board consideration
- Credibility – addresses the question of:
  - Whether there is enough information to discern an actual change in trend
  - The more experience, the more credible the results



- Current base assumptions based on PubS-2010 mortality tables
  - Mortality rates were changed from above-median PubS(A)-2010 table to PubS-2010 table for the December 31, 2022 actuarial valuation report
  - Pub-2010 tables based on a study conducted by the Society of Actuaries for public employees that provides information based on employee type (Teacher, Public Safety, and General) and salary/benefit levels (All, Above-Median (A), Below-Median (B))
- Mortality rates are projected generationally using Scale MP-2021
  - Previously projected five years past the valuation date
  - Changed to projected generationally for the December 31, 2022 actuarial valuation report



- Society of Actuaries' Retirement Plans Experience Committee (RPEC) has issued updated projection ("MP") scales for years 2015-2021
- RPEC did not issue a new mortality projection scale for 2022 or 2023 due to the impact of COVID-19 experience on recent mortality rates
- Latest projection model (MIM-2021-V4) allows the actuary to reflect mortality loads



# Mortality Improvement Rates



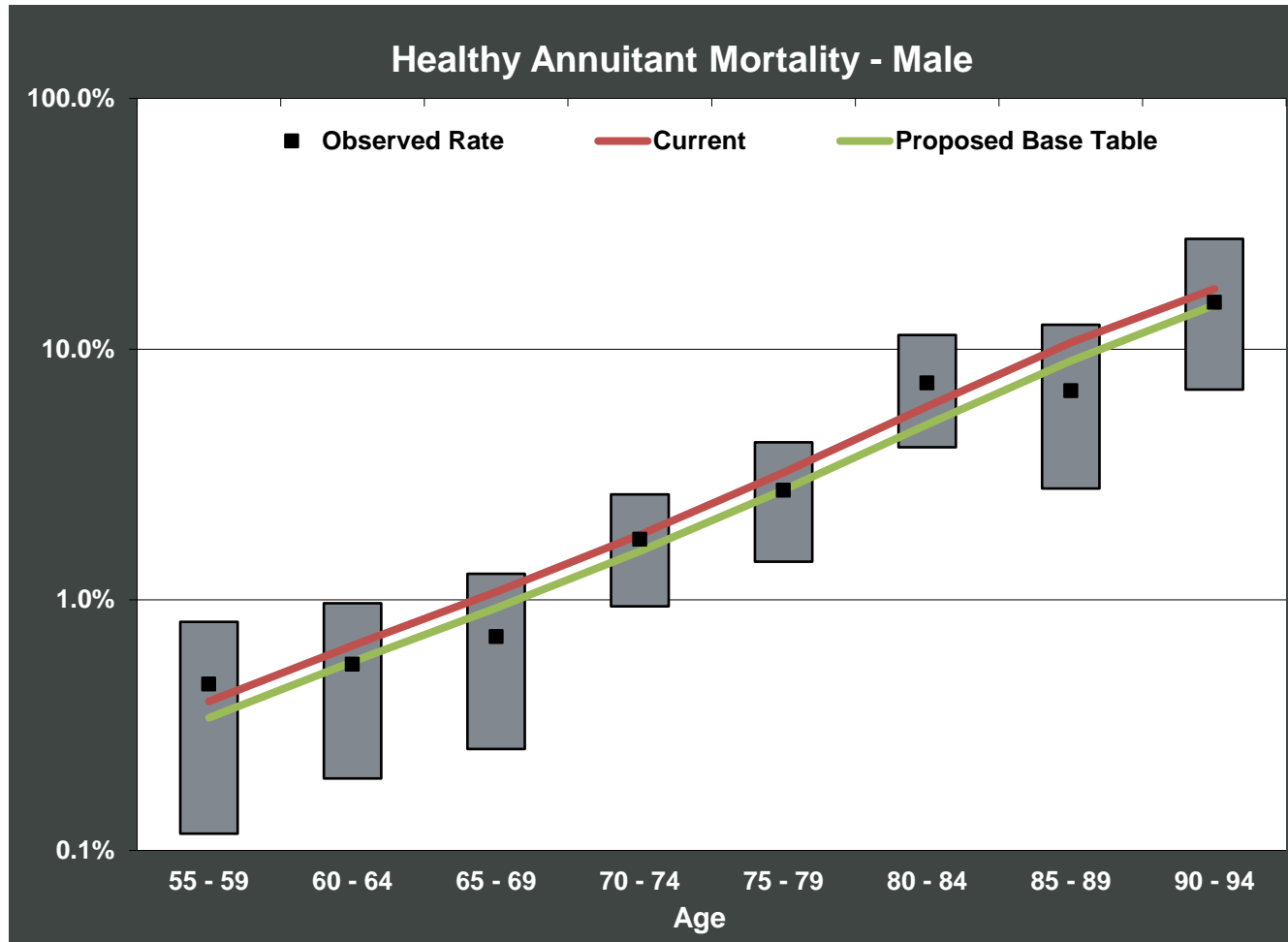
Important considerations with adding loads the projection model include:

- COVID-19 deaths were disproportionately high among the segment of the population with existing health conditions so remaining population might be “healthier” on average and have lower than average mortality
- An Expert Opinion Survey published by the Society of Actuaries issued in August 2022 and updated in August 2023 indicates:
  - Respondents expect the average excess mortality from COVID for pension plan participants to be lower than that of the U.S. general population
  - Excess mortality from COVID is expected to be largely phased out by 2030
- The SSA is assuming all excess mortality to be phased out by 2025



- Limited data and credibility due to size of participant population
- PubS-2010, above median income, amount weighted is the best fit based on available data for healthy male retirees
  - Current assumption  $A/E = 0.90$
  - PubS-2010 above median income  $A/E = 1.05$
- Not enough data for other participant classifications, so recommending using PubS(A) tables as published

# Mortality Rates



Age Band	Weighted Exposures	Weighted Deaths			A/E Ratios	
		Actual	Current	Proposed	Current	Proposed
<b>Total</b>	\$ 254,053,567	\$ 3,237,145	\$ 3,605,664	\$ 3,097,612	90%	105%



## Base Mortality Assumption

- Propose using PubS(A)-2010 tables
  - Above median, amount weighted for all participants (non-annuitant, healthy, contingent survivors, and disabled)
  - As published, without adjustment factors
- PubS-2010 tables would also be reasonable

## Mortality Improvement Scale

- Propose continuing projecting mortality improvements generationally with MP-21
- Propose no COVID adjustments for excess mortality in the future



- Current retirement rates vary by when the member is first eligible for retirement
  - Currently assume that all participants retire within 18 years of first eligibility
- During study period, 12/31/2016 to 12/31/2022
  - Actual retirements numbered 229
  - 192 expected from current assumptions
  - $A/E = 229/192 = 1.19$

# Retirement Rates – Proposed



- Propose to change the structure of retirement rates to be based on age instead of service
  - Studied both ways and age appears to be a better indicator of retirement
  - Weighted expected retirement age decreases from 56.4 to 55.5 and aligns closer with recent experience where the average retirement age is 54.7
  - Current assumption  $A/E = 1.19$
  - Proposed assumption  $A/E = 1.01$
- The table on the following page provides the proposed rates by age

# Retirement Rates – Proposed



Age	Proposed Rates
42 and under	0.0%
43-48	3.0%
49-51	4.0%
52-53	7.0%
54	12.0%
55-57	20.0%
58-60	35.0%
61-62	50.0%
63+	100.0%

Rates are only applicable for members eligible for early or normal retirement (those either aged 45+ with 10+ years of service or with 20+ years of service at any age)

# Termination Rates



- Current termination rates vary by service
- Suggest to keep service-based structure with minor changes to specific termination rates
  - Current assumption  $A/E = 1.34$
  - Proposed assumption  $A/E = 0.99$
- Rates only apply when member is not eligible for retirement

Service	Current Rates	Proposed Rates
0-4 years	1.00%	1.50%
5-7 years	1.00%	0.75%
8-13 years	0.50%	0.75%
14 years	0.00%	0.75%
15+ years	0.00%	0.00%



# Disability Rates



- Current disability rates vary by age
- Actual incidence has been less than expected, but limited credibility
- Propose to lower rates for all ages by a third

# DROP Balance Payment Assumption



- Existing DROP balances are assumed to be withdrawn as of the valuation date
- New retirees are assumed to take full DROP balance upon retirement

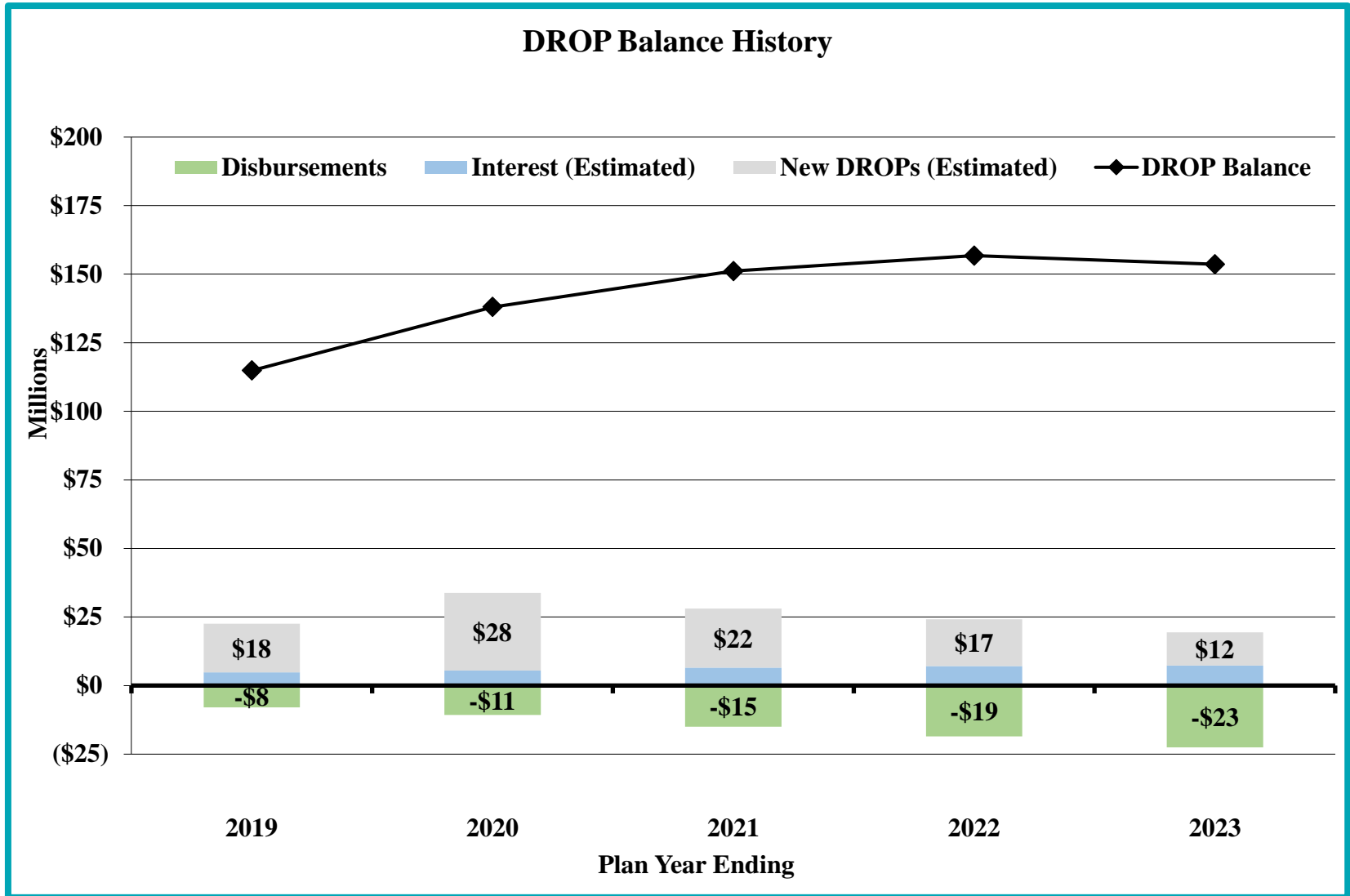
# DROP – Recent Retirement Experience



- 2019-2023 retirement experience provides the following insights:
  - 186 retirements during this 5-year period

DROP Period	Number of Retirees	% of Retirees
No DROP	36	19%
1 – 2 years	21	11%
3 – 4 years	1	11%
5 – 6 years	18	10%
7 years	90	48%
Total	186	100%

# DROP Balance Payment Assumption





- Given the size of DROP balances to overall assets and recent experience, propose adopting a schedule that assumes existing DROP balances will be paid out evenly over the next eight years
  - Modified as necessary to assume no payouts assumed later than age 70 ½
  - Anticipate this model will better approximate future experience
- New DROP balances withdrawal schedule only recognized after actual retirement



- Current assumption is that participants will select the DROP period (0-7 years) that maximizes the present value of benefits
  - Not enough data to develop creditable assumption
  - Builds in conservatism, so more likely to experience gains for DROP feature
  - Will better capture the impact of previously granted COLAs
- Propose retaining current assumption and collecting data prospectively to monitor participant behavior for the next experience study

# Beneficiary Age Assumption



- Current assumption is males are four years older than females
- Based on the December 31, 2022 retiree population with a 75% joint and survivor benefit form, the average age difference is:
  - Male participants are 3.0 years older than females
  - Female participants are 1.4 years younger than males
- Recommend to update the assumption to be:
  - Male participants are 3.0 years older than females
  - Female participants are 1.0 years younger than males

# Payment Form



- Current assumption is that all participants elect the normal form, Life Annuity with 75% continued to the beneficiary (Option 1)
- Based on the December 31, 2022 retiree population, 75% of the population elects Option 1

Payment Form	Number of Retirees	Percentage of Total
Life Annuity with 75% continued to beneficiary	591	75%
Life Annuity with 75% continued to beneficiary with 10 Years Certain	149	19%
Single Life Annuity	52	6%
Single Life Annuity with 10 Years Certain	1	> 1%
Total	793	100%

- Since 75% elect Option 1 and the other payment forms are actuarially equivalent to Option 1, we recommend retaining current assumption





- Current assumption is 50% of active members have dependent children and the youngest child is assumed to be one-year-old at active death
  - Liability for this benefit represents 0.03% of the active liability
  - Given the immateriality of the assumption, as well as its general reasonableness, we recommend no changes at this time



- The Board may want to consider updating actuarial equivalence factors used for Fund administration
- Current actuarial equivalence is defined as:
  - 1994 Group Annuity Mortality Table (weighted 97% males)
  - Interest rate of 8.0%
  - COLA assumption of 1.0%



# Economic Assumptions

Inflation

Future COLA

Investment Return

Administrative Expenses

# Economic Assumptions



Assumption	Current	Proposed for 2023
Price Inflation	2.50%	2.50%
Wage Inflation	3.00%	2.50%
Future COLAs	0.00%	0.00%



- Expected Return on Assets
  - Current assumption: 7.30% net of administration and investment fees
  - Proposed assumption: 7.30% net of investment fees only
    - Reasonable range of 6.75% to 7.50%
    - Implicit decrease in expected return with adding explicit administration expense (approx. 9 basis pts)
- Propose administration expense of 1.25% of payroll added to normal cost



- Follow-up from today's discussion
- Review actuarial cost methods at April meeting and cost implications of any assumption changes
- Final Assumptions and Methods Adopted by Board for use in 12/31/2023 Valuation

# Required Disclosures



The purpose of this presentation is to show the results of the 2023 experience study for the Austin Firefighters Retirement Fund (AFRF) and propose assumptions for the December 31, 2023 actuarial valuation. This presentation is for the use of AFRF and its Board in selecting assumptions for ongoing actuarial valuations.

In preparing our presentation, we relied on information, some oral and some written, supplied by the AFRF. This information includes, but is not limited to, the plan provisions, employee data from December 31, 2016 to December 31, 2022 and financial information. We performed an informal examination of the obvious characteristics of the data for reasonableness and consistency in accordance with Actuarial Standard of Practice No. 23.

Cheiron utilizes and relies upon ProVal, an actuarial valuation software leased from Winklevoss Technologies for the intended purpose of calculating liabilities and projected benefit payments. Projected expected results of future valuations in this presentation were developed using P-Scan, our proprietary tool for the intended purpose of developing projections. As part of the review process for this presentation, we have performed a number of tests to verify that the results are reasonable and appropriate. We are not aware of any material inconsistencies, unreasonable output resulting from the aggregation of assumptions, material limitations or known weaknesses that would affect this presentation.

This presentation and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices and our understanding of the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board as well as applicable laws and regulations. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this presentation. This presentation does not address any contractual or legal issues. We are not attorneys, and our firm does not provide any legal services or advice.

This presentation was prepared exclusively for the AFRF for the purpose described herein. This presentation is not intended to benefit any third party, and Cheiron assumes no duty or liability to any such party.

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Consulting Actuary

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Principal Consulting Actuary



# Appendix



# Overview



2013

Section 802.1014 requiring Texas public retirement systems with \$100+ million in assets to conduct experience study at least every 5 years

2015

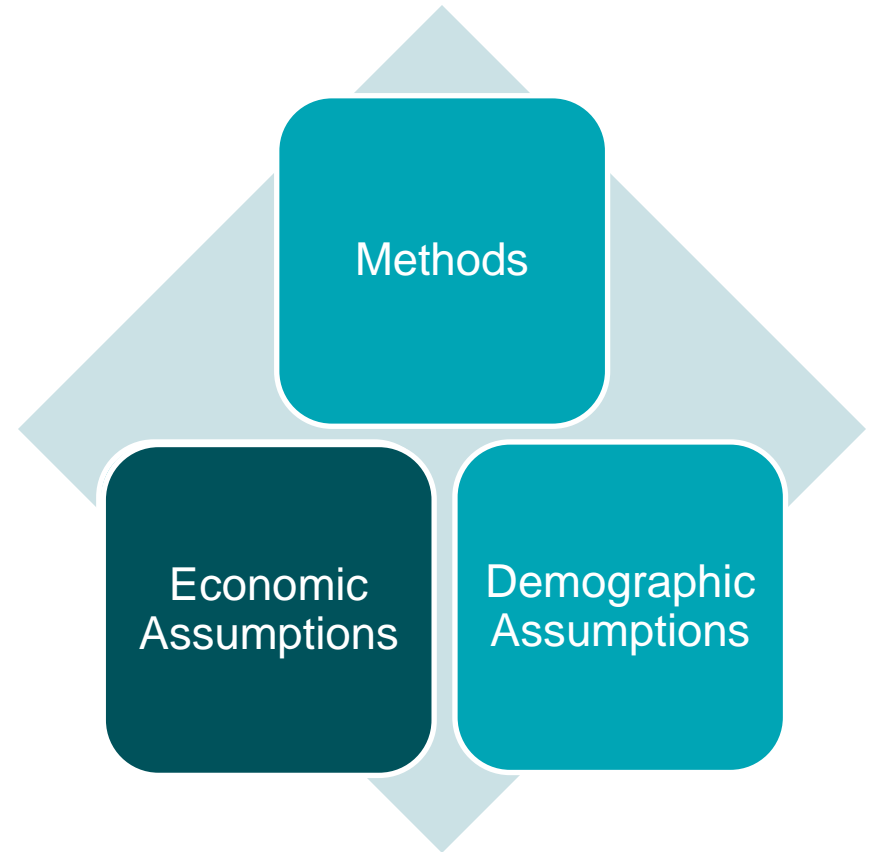
Experience Study covering 11/1/2004 through 12/31/2014

2020

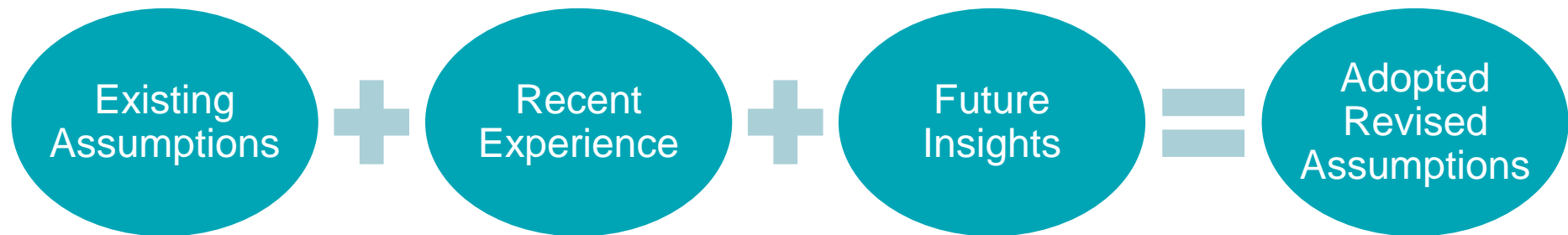
Experience Study covering 11/1/2010 through 12/31/2019

2024

**Board decided to accelerate next Experience Study**



# Overview





## Basis Model:

- Long-term
- Forward looking
- Reasonable
  - Individually
  - In aggregate
- Reflect client specific information where appropriate





# Economic Assumptions

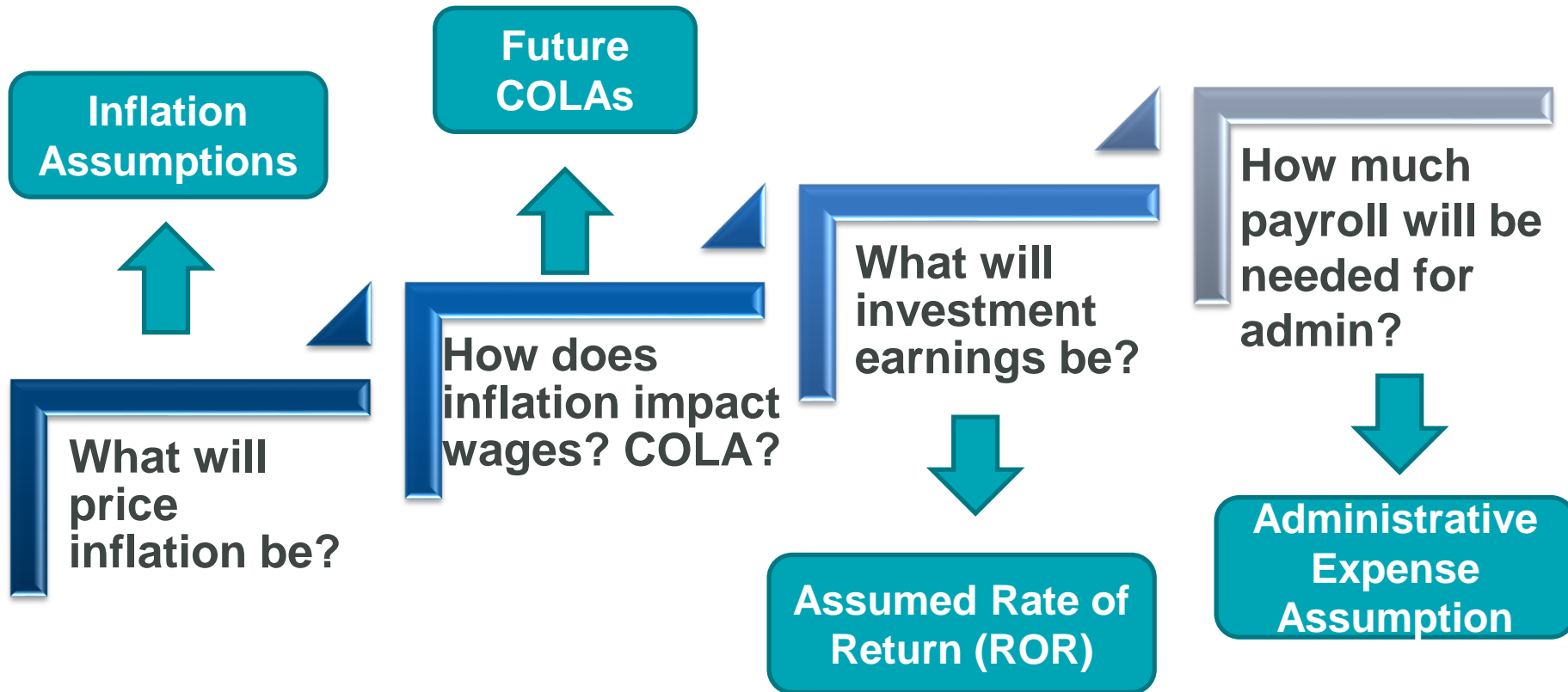
Inflation

Future COLA

Investment Return

Administrative Expenses

# Actuarial Assumptions – Economic





Inflation is a core building block of AFRF assumptions:

- Base Wage Growth (Wage Inflation):  
**Inflation** + Real Wage Growth (productivity)
- Expected Return (Nominal):  
**Inflation** + Real Return
- Real ROR :  
Nominal Return - **Inflation**
- Future COLA:  
**Inflation** reflecting Statute/Rules

## Current Assumptions

Assumption	Current
Price Inflation	2.5%
Wage Inflation	3.0%
ROR (nominal)	7.3%
Real ROR	4.8%
Future COLAs	0.0%



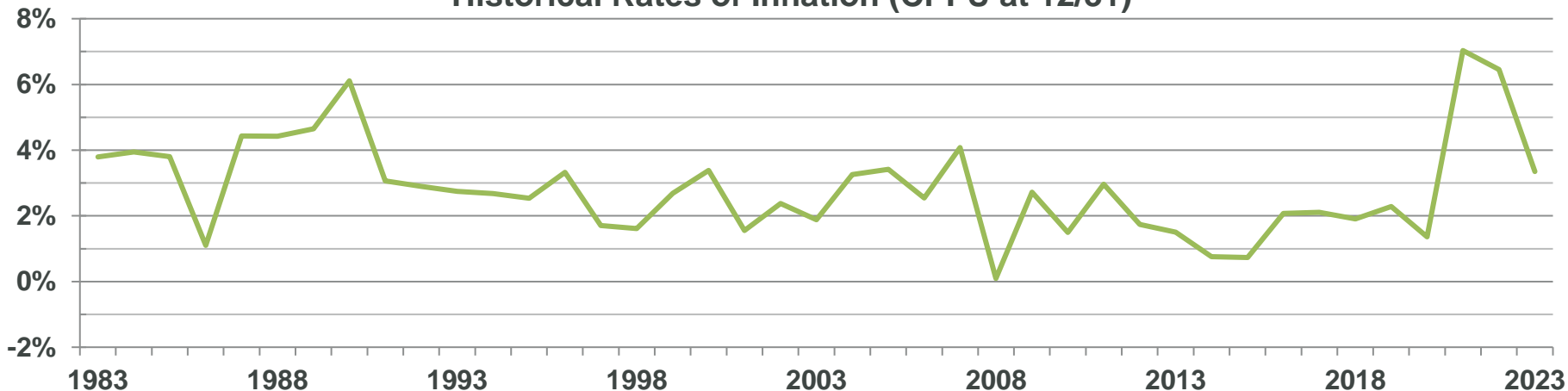
- Context
  - Historical data
  - Industry trends
- Primary basis for recommendations
  - Current market expectations – breakeven inflation rates
  - Forecasts
  - Investment consultant assumptions



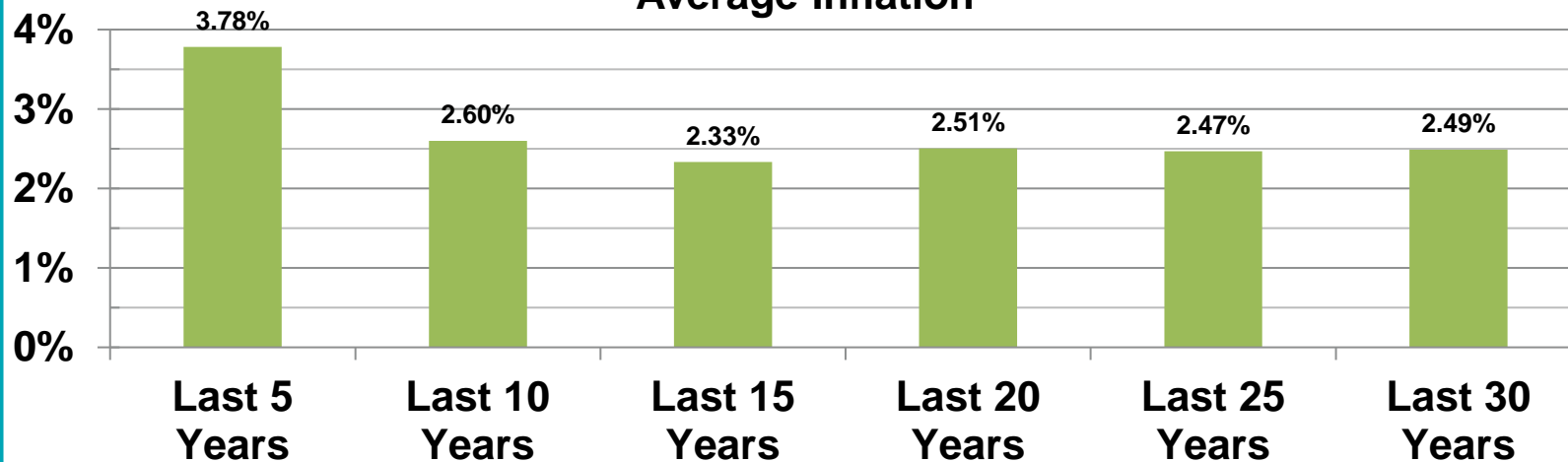
# Inflation – Historical CPI



### Historical Rates of Inflation (CPI-U at 12/31)



### Average Inflation

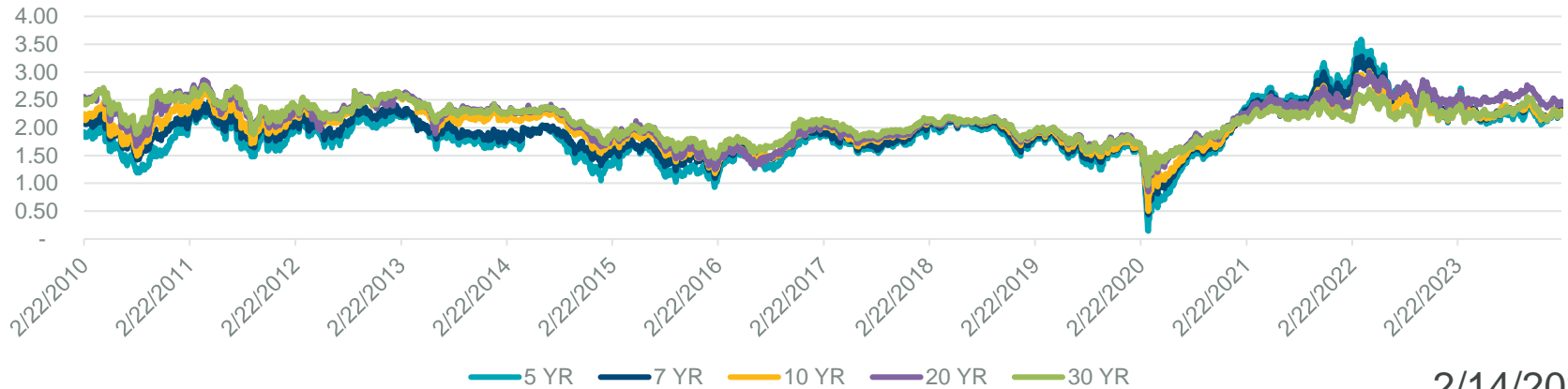




# Inflation – Market Conditions

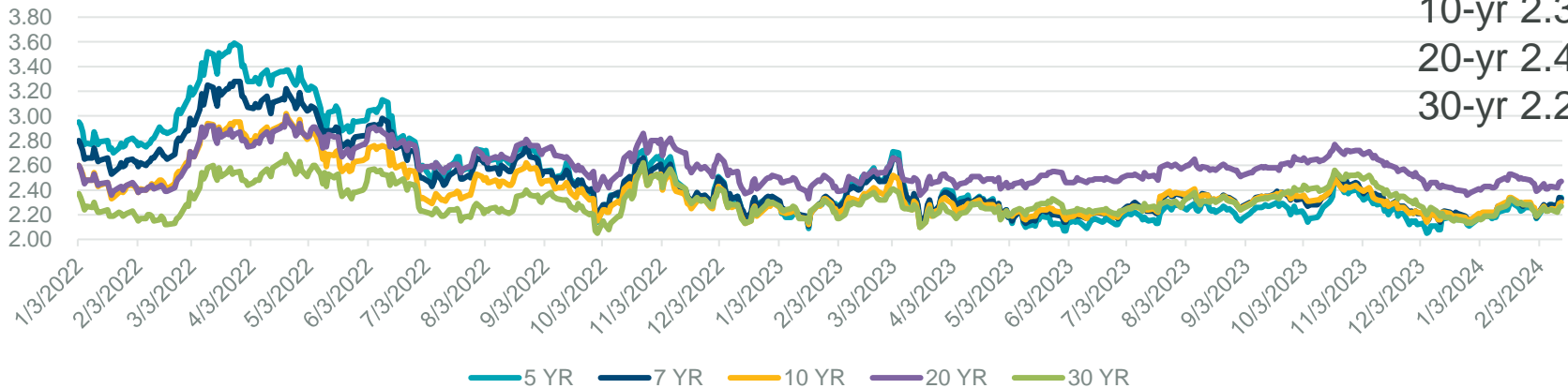


Breakeven Inflation Implied by US Treasuries



**2/14/2024:**  
 5-yr 2.34%  
 7-yr 2.33%  
 10-yr 2.30%  
 20-yr 2.47%  
 30-yr 2.27%

Breakeven Inflation Implied by US Treasuries

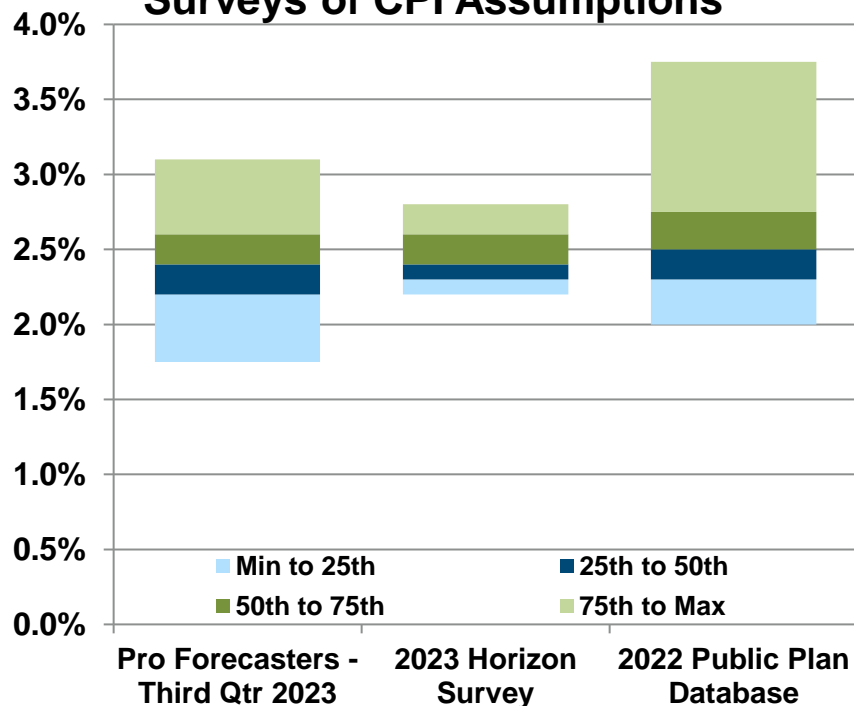


Graphs and data including updates available at [https://bit.ly/BEI\\_Now](https://bit.ly/BEI_Now)

# Inflation Rate – Expectations

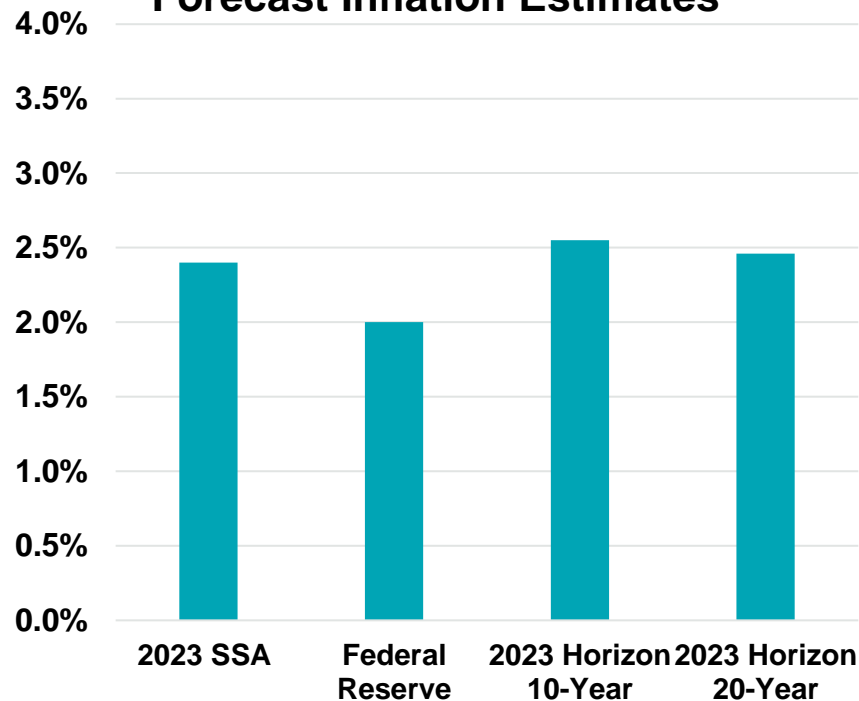


## Surveys of CPI Assumptions



- **Pro Forecasters:** Third Quarter 2023 survey of professional economic forecasters published by the Philadelphia Federal Reserve
- **2023 Horizon:** survey of investment consultant capital market assumptions (20-year)
- **2022 Public Plans:** inflation assumptions used by plans in the Public Plans Data database

## Forecast Inflation Estimates



- **2023 SSA:** March 2023 Social Security Administration OASDI report intermediate cost assumption (2.4%)
- **Federal Reserve:** long-term inflation target (2%)
- **2023 Horizon 10-Year:** average 10-year inflation assumption of financial firms included in 2023 (2.55%)
- **2023 Horizon 20-Year:** average 20-year inflation assumption of financial firms included in 2023 (2.46%)



## Pay for members expected to grow by

- Base wage growth (economic assumption)
- Plus individual merit based on longevity and promotion (demographic assumption)

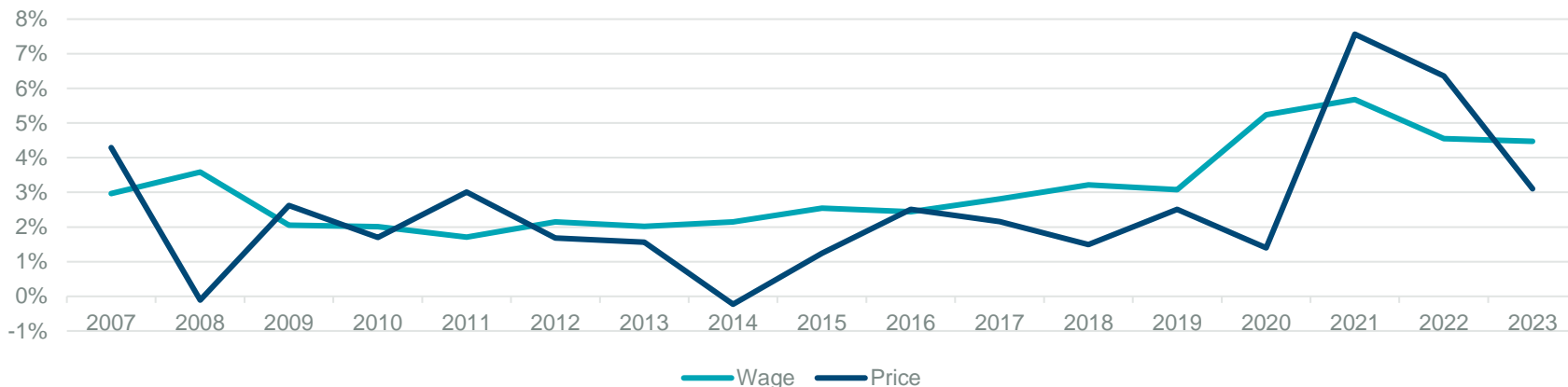
## Wage growth (in aggregate)

- Inflation, plus real-wage factor (productivity)
- Current assumption: 3.00% with assumed 0.50% real-wage growth above price inflation

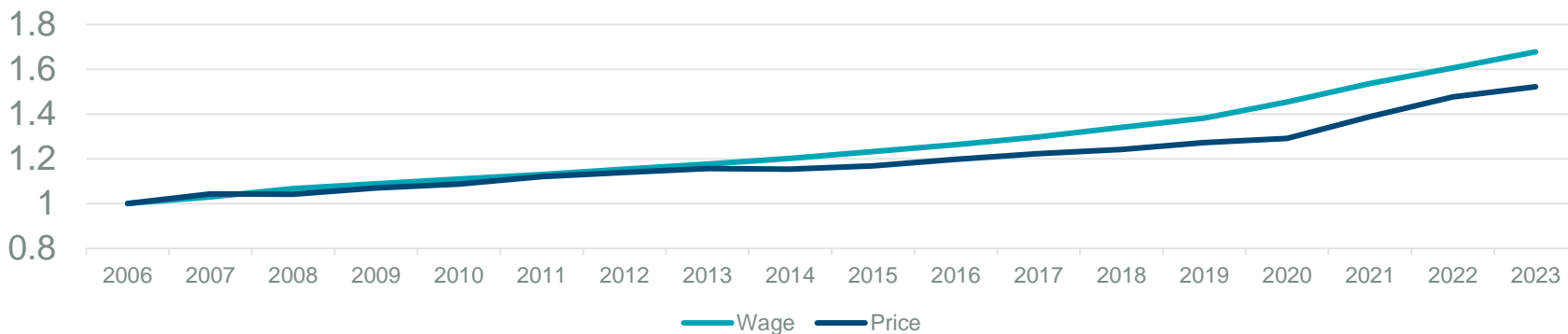
# Wage vs. Price Historical Data



### Annual Year-End Growth in Wages (AHE) and Price (CPI-U)



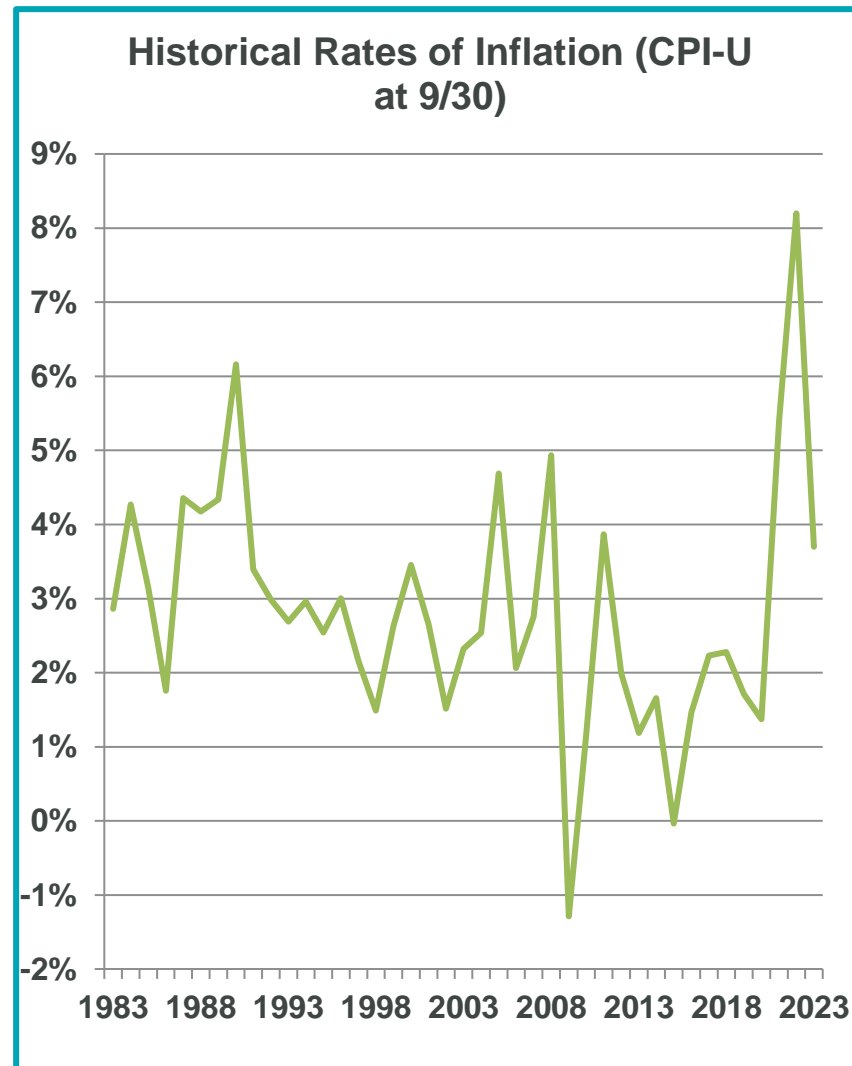
### Comparison of Year-End Comparison of Wage (AHE) and Price (CPI-U) from 2006



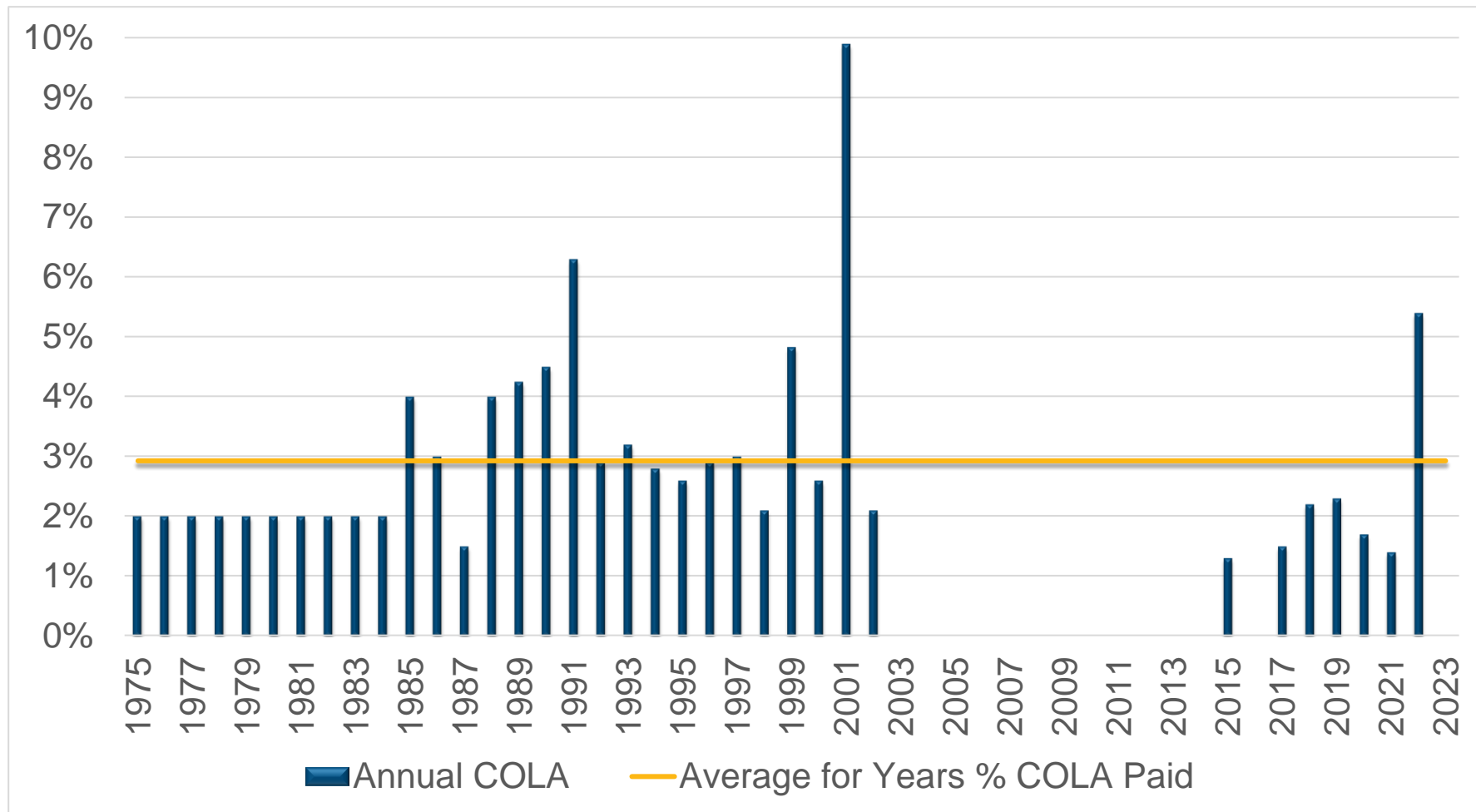
# COLA Assumption Overview



- Cost-of-living adjustments (COLAs) for this Fund designed to relate to inflation and purchasing power protection, so inflation is a key consideration
- However, COLAs subject to financial stability limitations that must be considered in setting the assumption for future COLAs
- COLAs previously granted for those who elect a DROP and are eligible are included in the valuation model



# COLA Assumption – Historical Data



\* Additionally, dollar per month increases: 2005 \$32, 2006 \$100, 2013 \$93, 2014 \$64

\*\* Includes additional 3.33% in 1999 and 6.45% in 2001 with multiplier increases



- COLAs governed by [Article 6243e.1](#) and the [Fund Rules](#)
- Based on these provisions and the Fund's current and projected status, we are currently not anticipating any future COLAs being granted
- As such, the current COLA assumption is 0%
- Were the Fund in such a condition that COLAs could be paid, this assumption would also relate to the inflation assumption



## Most powerful single assumption

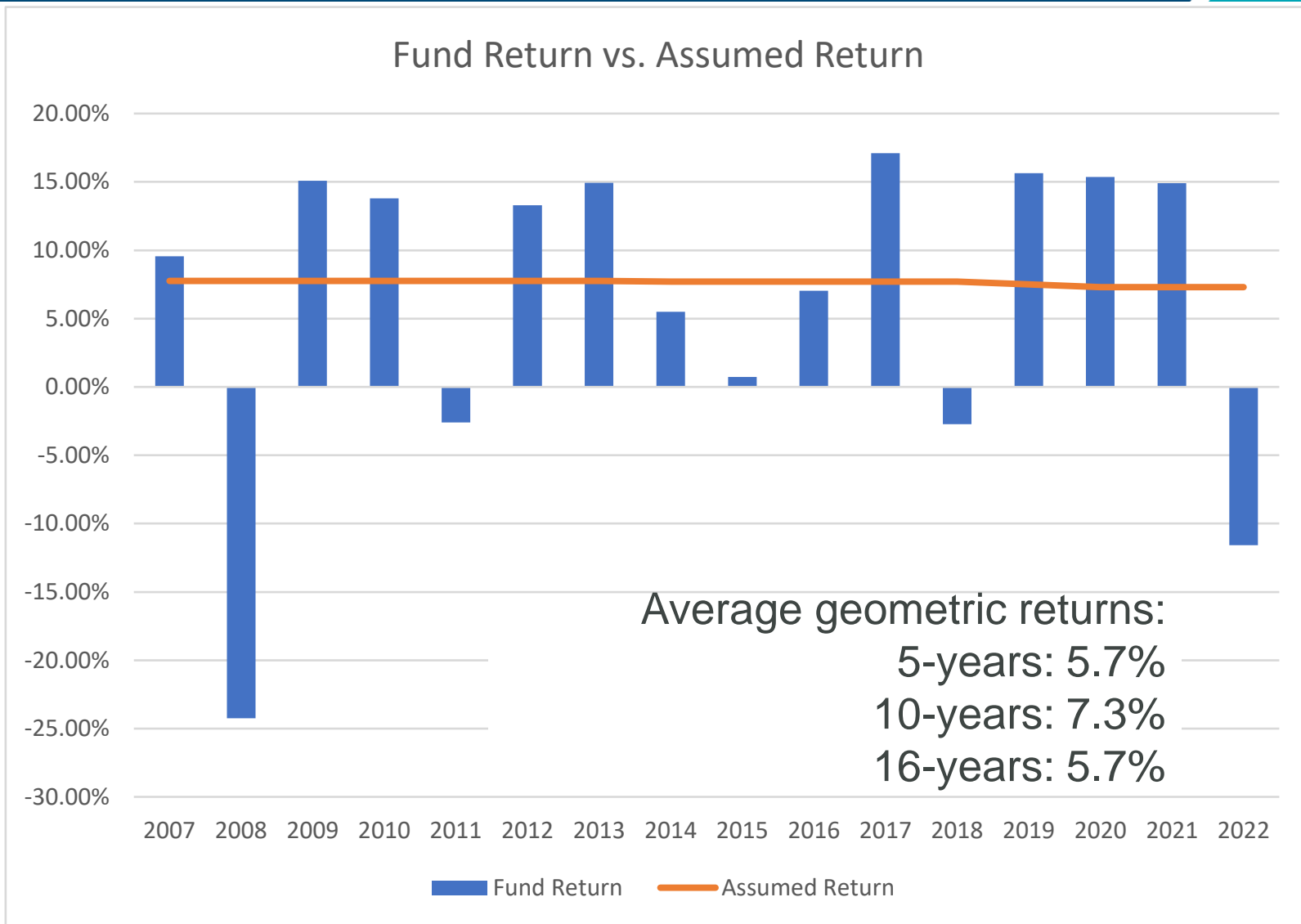
- Current rate is 7.30%, net of investment and administration expenses
- Lower rate → higher expected contributions
- Over time, actual contributions necessary based on **actual** experience and benefits paid (not those expected)

## Factors considered in selecting the rate of return:

- Context
  - Historical experience
  - Asset allocation (current and future)
  - Industry trends
- Expectations for the future
- Board's tolerance for risk



# Investment Return – History

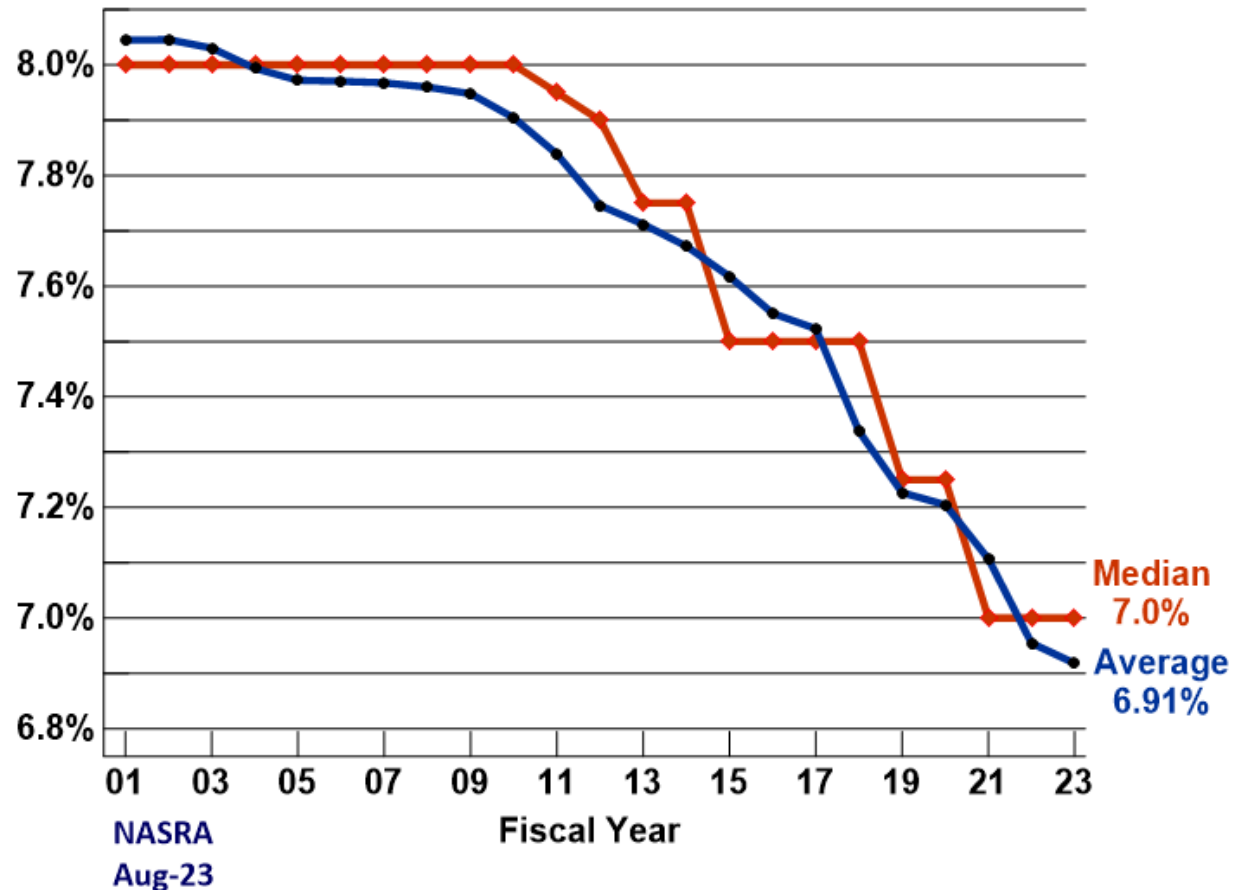


# Investment Return – Industry Trends



- Since 2009, many plans have reduced their investment return assumption
- The median assumption is now 7.00%
- The number of plans assuming 7.00% or lower has increased significantly

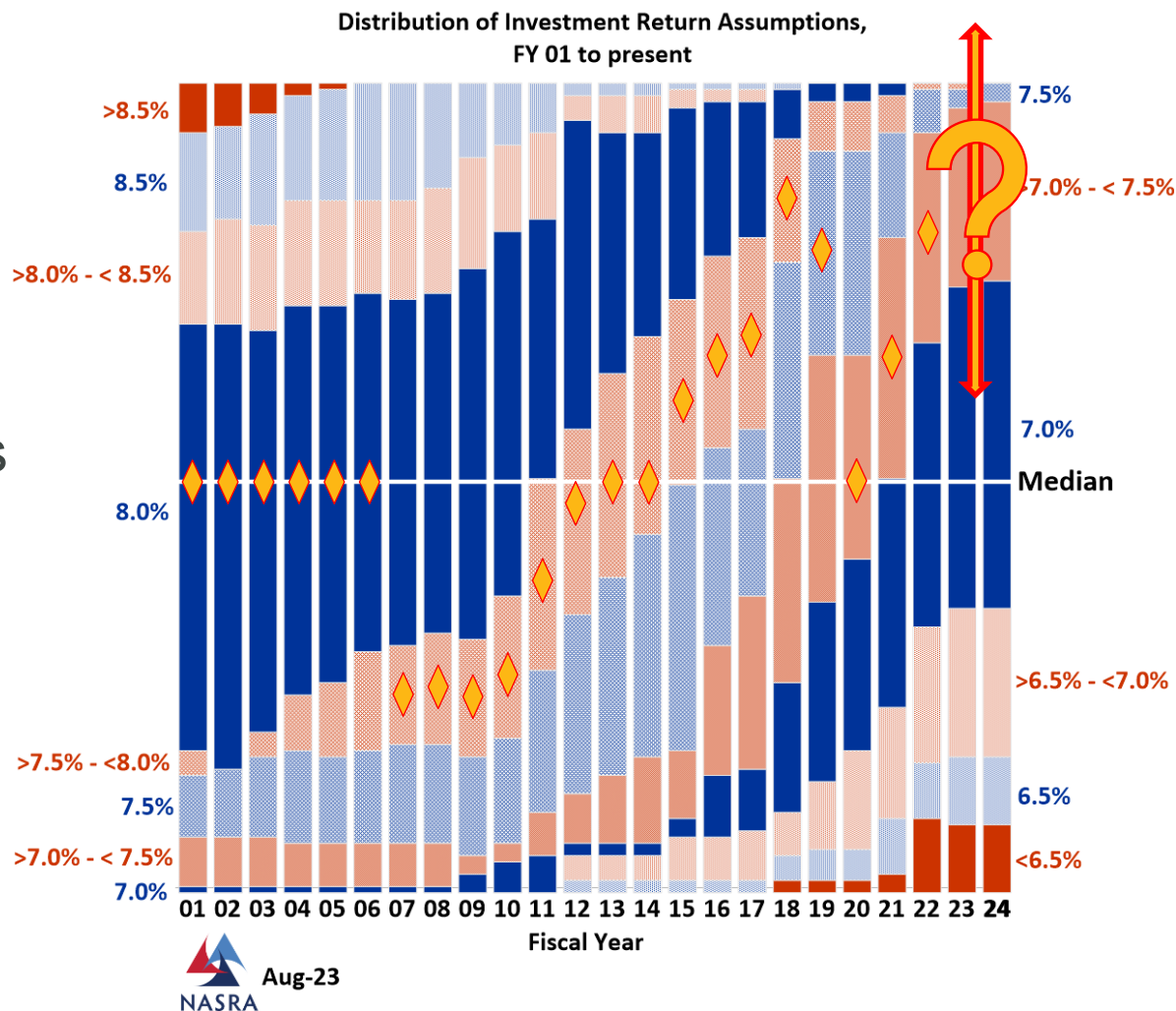
Change to Average and Median Investment Return Assumption, FY 01 to present



# Investment Return – Industry Trends



- Distributions provide additional insights to the medians
- AFRF's current 7.3% is now in the top quartile of plans in the PPD database
- And the majority of the plans shown are not net of administrative expenses



*AFRF History Shown: 2001-2006 @ 8.00%, 2007-2014 @ 7.75%, 2015-2018 @ 7.70%, 2019 @ 7.50%, and 2020-2022 @ 7.30%*

March 25, 2024

# Texas Historical Data



PRB FY 2022 10-year Net Investment Returns vs. Assumed Discount Rate  
Funds with \$100 Million + in Assets (excluding transit, health, vol fire, and judicial)



AFRF's 10-Year Net Return of 7.57% compared to a 7.30% Return Assumption  
 Average for the Group shown is 7.13% 10-Year Net Return and 7.17% Return Assumption  
 Median for Group shown is 7.45% 10-Year Net Return and 7.25% Return Assumption



- Gathered data from the Fund's investment consultant, Meketa, and from the 2022 and 2023 Horizon Surveys
- Expected returns based on target asset allocation
- Horizon Survey is conducted each year and gathers capital market assumptions from 30+ firms
  - 42 are included in the 2023 survey
  - Survey provides averages of capital market assumptions from participating firms



- Forecasts of returns reflect asset allocation in addition to capital market assumptions
- If the actual allocation deviates from that which is targeted, this will thus result in different forecasts
- Information on the current allocations provided by Meketa provided below for reference

Target Asset Allocations - Meketa			
Asset Class	Allocation		
	as of 6/30/2023	Policy	Policy Range
US Equities	22%	20%	13-27%
International Equity	20%	22%	15-29%
Fixed Income	28%	30%	20-40%
Private Equity	18%	15%	5-25%
Real Estate	8%	10%	0-20%
Natural Resources	3%	3%	0-5%
Cash	1%	0%	0-5%

# Asset Allocation



- Horizon data based on specific asset classes
- Using 6/30/2023 allocation information from Meketa, we developed target allocations with these asset classes
- Forecasts will vary with different allocations

## Target Asset Allocations used with Horizon Data

Asset Class	Target Allocation
US Equity - Large Cap	10.8%
US Equity - Small/Mid Cap	9.2%
Non-US Equity - Developed	15.4%
Non-US Equity - Emerging	6.6%
US Corp Bonds - Core	15.2%
US Corp Bonds - High Yield	4.4%
Non-US Debt - Emerging	5.2%
TIPS	5.2%
Real Estate	10.0%
Commodities	3.0%
Private Equity	15.0%

# Investment Return – Future Outlook



Time Horizon	2023 Meketa	2023 Horizon Survey	2022 Horizon Survey
10-year	8.16%	7.50%	6.34%
20-year	8.63%	7.84%	7.04%

- Capital market expectations increased significantly for most asset classes from 2022 to 2023
- Although capital market expectations are long-term assumptions they are updated annually and can fluctuate significantly based on current market conditions
- Forecasts reflect assumed asset allocations



# Investment Return – Future Outlook



Based on the capital market assumptions and asset allocations, the likelihood of achieving certain return thresholds over specified projection periods can be calculated

Source	Probability of Return Thresholds		
	At least 6.5%	At least 7.0%	At least 7.5%
Meketa: 10-year	68.6%	59.9%	55.2%
Meketa: 20-year	75.3%	69.8%	63.9%
2023 Horizon Survey: 20-year	68.8%	62.0%	54.9%

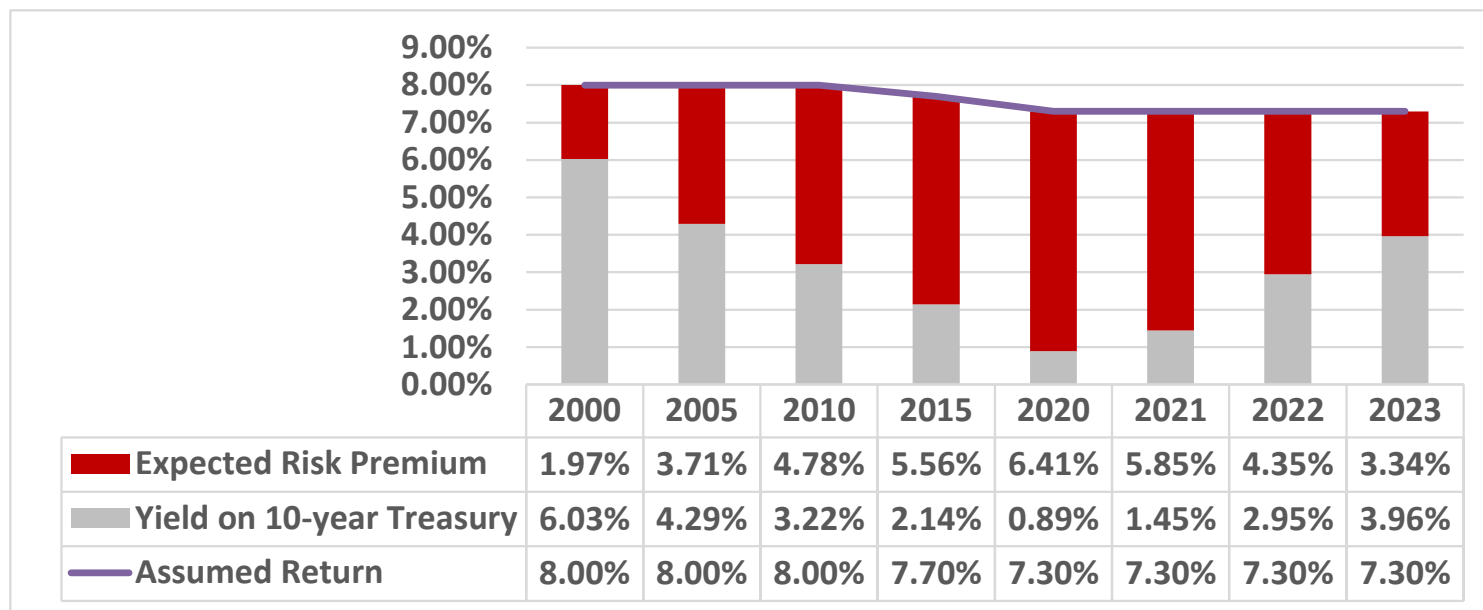
2023 and 2022 Horizon Surveys indicate the probability of achieving returns at least equal to or greater than the current assumption of 7.30% would be 57.8% and 46.2%, respectively, over a 20-year time period.

These reflect current asset allocations.

# Investment Return – Risk Tolerance



- Until the recent increase in market interest rates, with market conditions, increased investment risk was generally required to achieve a given expected return
- Pension plans have met this challenge both by adjusting their investment strategies and by reducing their assumed returns
- Both the expected returns and the risks should be considered in setting asset allocations and selecting a discount rate





- Administrative expenses are currently included in the investment return assumption
  - 7.30% return assumption is net of administration expenses as well as investment expenses
  - Five-year average of administration expenses indicates approximately 9 basis points of return
- Majority of systems pay administration expenses as a percentage of payroll, which is typically added to normal cost in determining contributions
- For GASB purposes, rate of return is only net of investment expenses

# Administrative Expenses



- 5-year average of administration expenses approximately 1% of payroll historically for administration expenses
- Forward-looking expectation?

Year	Admin. Expense	Expected Payroll	Admin. Expense as a % of Exp. Payroll
2022	\$ 1,283,215	\$ 102,887,082	1.25%
2021	\$ 970,731	\$ 98,222,771	0.99%
2020	\$ 1,092,299	\$ 95,642,391	1.14%
2019	\$ 852,192	\$ 92,083,218	0.93%
2018	\$ 704,903	\$ 88,209,122	0.80%
Average	\$ 980,668	\$ 95,408,917	1.02%

# Texas Municipal Safety Admin. Info



<i>AFRF</i>	System	APRS	DPFP	El Paso - Fire	El Paso - Police	Houston Fire	Houston Police	San Antonio F&P
<i>2022</i>	<b>FY basis</b>	2022	2021	2021	2021	2022	2022	2022
<i>1.3</i>	<b>Admin Expense (\$millions)</b>	3.0	6.4	1.0	1.0	5.2	4.2	3.3
<i>N/A</i>	<b>Admin Expense Assumption (as % payroll)</b>	0.90%	1.00% (7mil min.)	1.35%	1.00%	1.25%	0.84%	0.92%
<i>1.1</i>	<b>Assets (billions)</b>	0.9	2.2	0.7	1.0	6.1	7.2	3.6
<i>0.12%</i>	<b>Admin Exp as % Assets</b>	0.32%	0.30%	0.15%	0.10%	0.10%	0.06%	0.09%

- Ft. Worth does not publish this information divided by member type, so not included
- Note that El Paso Police and Fire share many administrative features
- Sources: valuation reports on system website and data.prb.texas.gov



# Demographic Assumptions

Salary Increases

Mortality Rates

Retirement Rates

Termination Rates

Disability Rates

Other Demographic Assumptions



- **Actual-to-Expected Ratio (A/E Ratio)** – The ratio of the actual number of decrements to the expected number based on the assumption
  - Changes should move the A/E ratio closer to 1.00
- **R-Squared ( $R^2$ )** – A measure of how well the assumption explains the observed data
  - Changes should move the  $R^2$  statistic closer to 1.00
- **90% Confidence Interval** – The range around the observed rate in which the true rate for the experience study period falls with 90% confidence
  - The width of the range varies with the substantiality of the available data

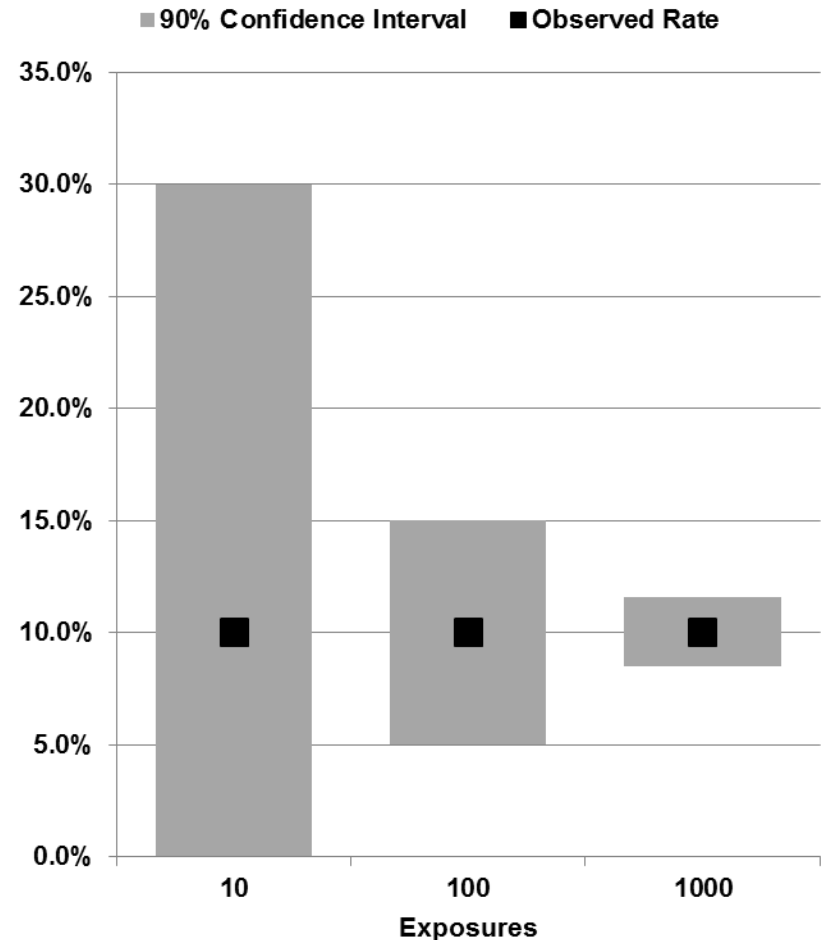
# Demographic Assumptions – Process



The number of actual decrements and exposures is critical in determining how much credibility to assign to the experience:

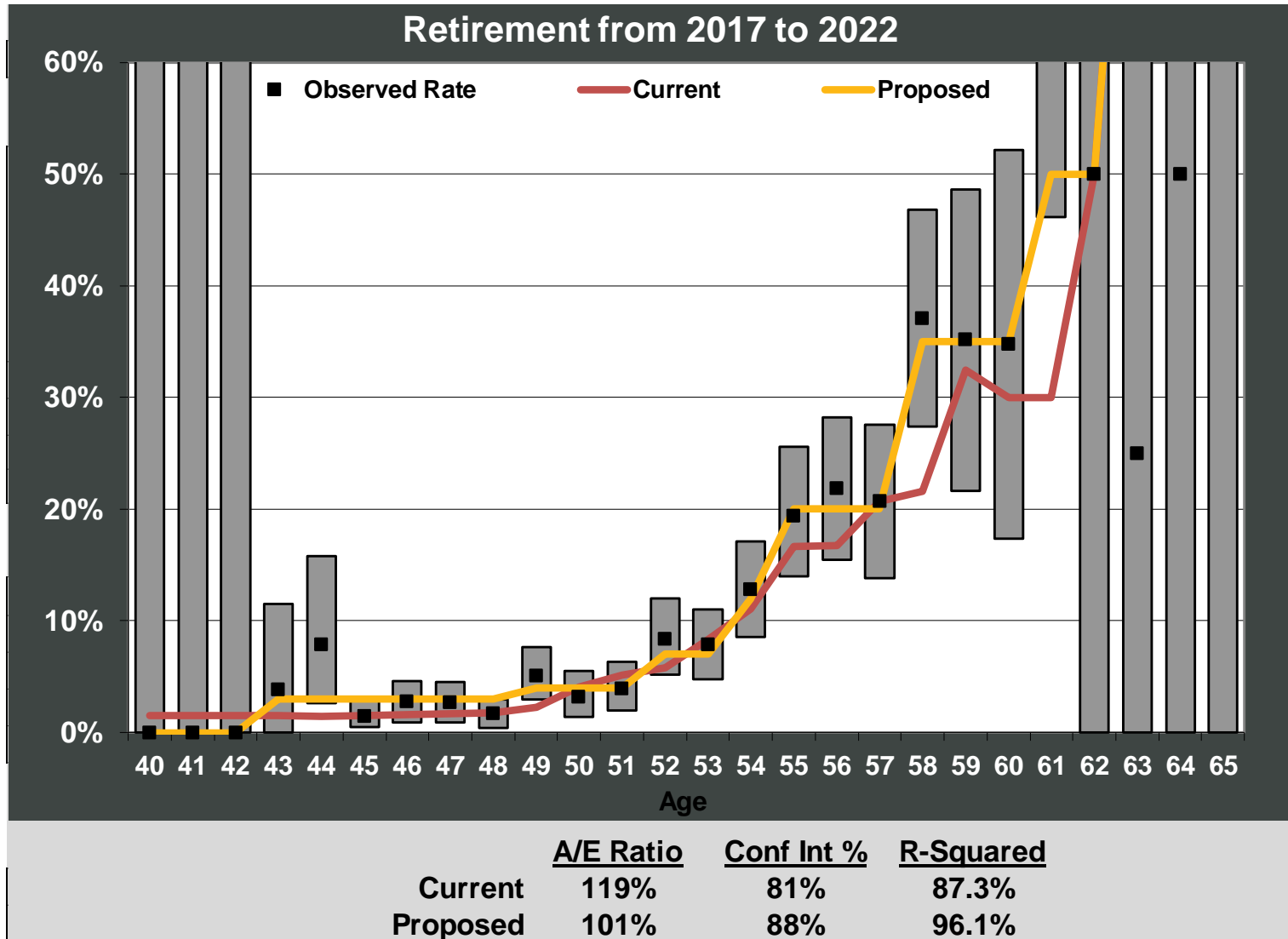
- One actual decrement out of 10 exposures implies that the rate is somewhere between 0% and 30%
- 10 actual decrements out of 100 exposures implies that the rate is somewhere between 5% and 15%
- 100 actual decrements out of 1,000 exposures implies that the rate is somewhere between 8.5% and 11.5%

Confidence Interval Illustration





# Retirement Rates



# Termination Rates

