Preliminary Results of 2014 Actuarial Experience Study
FLORIDA RETIREMENT SYSTEM

August 11, 2014

Presented by:
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Matt Larrabee, FSA
Agenda

- Introduction
- Demographic Assumptions
  - Timing of Retirement/DROP Entry
- Economic Assumptions
  - Investment Return
  - Individual Member Pay Increase
- Actuarial Methods
  - Amortization Period
  - Actuarial Cost Allocation Method
- Wrap-Up
Introduction
Overview of an Actuarial Experience Study

- The FRS Experience Study, conducted every five years:
  - Gives policy makers information to periodically review and update valuation assumptions
  - Reviews current methods, identifying possible alternatives for consideration by policy makers

Data → Assumptions → Methods → Projected Benefit Payments → Actuarially Calculated Contribution Rates → funded Status
Today: Guidance from FRS Assumption Conference Principals

September 8: Completion of detailed experience study report including any changes adopted by Conference

Next Assumptions Conference: Discussion of key valuation results and quantification of any policy alternatives with Conference

December 1: Completion of valuation report, including actuarially calculated contribution rates
Categories of Valuation Assumptions

- There are different categories of assumptions, with assumptions affecting both the FRS and HIS valuations.

Assumptions

Demographic

Member-specific

Economic

System-wide
Who are the Assumption Experts?

- System actuaries need assumptions for all areas that impact the projection of retirement benefits
- Areas where our expertise is foremost are:
  - Demographic assumptions
  - Member-specific economic assumptions

In both of these areas proposed assumptions are developed by analyzing historical member census data using actuarial and statistical techniques, while also being contemplative of ways in which future experience may vary from recently observed experience for reasons such as:

- Legislative changes
- Short-term economic conditions
Who are the Assumption Experts?

- In which assumption areas do actuaries have expertise, but are not alone in that regard?
  - System-wide economic

- Key system-wide economic assumptions are average annual:
  - Inflation
  - Payroll growth
  - Investment return

The guidance of SBA and HEK, the outside investment consultant for System assets, is used in selecting the investment return assumption.
Guidance in Setting Assumptions

- Assumptions don’t determine ultimate long-term System cost
- Ultimately: Contributions + Investments = Benefits + Expenses
- Assumptions only impact the (budget) timing of cost incurrence
Why Do Assumptions (& Methods) Matter?

- Assumptions & methods don’t determine ultimate long-term System cost, but assumptions & methods selected do determine funded status improvement if experience follows assumptions.

Excerpt above from a March 2014 Milliman analysis with projected funded status if (a) actual future investments earnings are 7.75% annually, (b) all other assumptions identified in that analysis are met and (c) current methods are used.
Guidance in Setting Assumptions

- Given that assumptions impact budgeting but do not impact ultimate long-term System cost, what guiding principles should be used in selecting assumptions?
  - Identification of best estimates
  - Striving for internal consistency of assumptions
  - Focus on the long time horizon of the calculations
  - Remaining cognizant that hoping for a result:
    - Does not make it so
    - Does not affect the ultimate long-term System cost

“Math is not an opinion” - Italian saying
Guidance Needed from Today’s Meeting

- To prepare for the Fall 2014 Actuarial Estimating Conference we request:
  - Approval of the demographic assumptions used for financial reporting calculations under GASB
  - For economic assumptions and actuarial methods either:
    - Identification of approved assumptions
    - Identification of assumption or method alternatives to be studied for comparison at the Fall Conference

Time permitting, any Fall Conference comparative work would reflect updated 2014 investment and member census information
Demographic Assumptions
Use of Assumptions

- Demographic and salary increase assumptions for individual members are combined with census data provided by the Division of Retirement to develop projected benefit payments.

- Economic assumptions are used to state those long-term projected benefit payments as a single net present value.

Data Assumptions Methods Provisions

Actuarially Calculated Contribution Rates Funded Status

Projected Benefit Payments
Overview of Demographic Assumptions

- While a variety of demographic assumptions are needed and have been studied, we will focus discussion on the most impactful ones
  - Likelihood of immediate retirement or DROP entry at first eligibility
  - Retiree mortality

These assumptions estimate the answers to two key questions:

When will benefits commence for a member?

For how long will those benefits be paid?
Overview of Demographic Assumptions

- We will illustrate our analysis for the three largest sub-groups of member class and gender (shown in decreasing magnitude of liability)
  - Regular class females
  - Regular class males
  - Special Risk class males

These three sub-groups constitute over 90% of System liability
Demographic Assumptions - Retiree Mortality
Current Retiree Mortality Assumption

- Current assumption was last updated based on 2003 to 2008 FRS Experience Study recommendations adopted by the Assumptions Conference
- Started with a standard set of mortality tables (RP2000)
- Picked the white collar variation of that table
- Continued to use the “generational” version of that table, which reflects that mortality is likely to continue improving over time
  - Someone who reaches age 62 in 2034 will have a longer life expectancy than someone turning 62 this year
Current Retiree Mortality Assumption

- Tables further modified to match observed FRS experience
  - Regular & Special Risk males: multiplied by 90.9%
  - Regular & Special Risk females: multiplied by 95.8%
    - In the prior Experience Study, the difference in observed retiree mortality between Regular class males and Special Risk males was not statistically significant
    - In this study, a statistically significant difference existed
  - Other member classes: multiplied by lower percentages

- These modifications decreased assumed mortality to match FRS-specific experience
  - The multipliers served to increase calculated life expectancy
Selecting the Proposed Assumption

- The assumption is tested by comparing:
  - Actual retiree deaths during 2008 - 2013 period, to
  - Those expected by the modified standard table

- An actual-to-expected (A/E) ratio near 100% indicates a good assumption
  - If A/E is near 100%, the actual experience during the observation period matches the proposed assumption

- The review is done for three retiree groupings
  - Females (all membership classes)
  - Males (other than Special Risk)
  - Special Risk Males
Selecting the Proposed Assumption

- Since the prior experience study, a Society of Actuaries review indicated mortality has been improving in a different manner than that forecast by the projection scale (Scale AA) used in the current assumption
  - In response, a new projection scale (Scale BB) was developed
  - Projection Scale BB allowed us to match observed experience to standard tables
## Current and Proposed Assumption

<table>
<thead>
<tr>
<th>Retiree Class</th>
<th>Current Assumption</th>
<th>Proposed Assumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female Regular &amp; Special Risk</td>
<td>Projection Scale AA 100% White Collar Multiply table by 95.8%</td>
<td>Projection Scale BB 100% White Collar Full table</td>
</tr>
<tr>
<td>Male Regular</td>
<td>Projection Scale AA 100% White Collar Multiply table by 90.9%</td>
<td>Projection Scale BB 50% White, 50% Blue Full table</td>
</tr>
<tr>
<td>Male Special Risk</td>
<td>Projection Scale AA 100% White Collar Multiply table by 90.9%</td>
<td>Projection Scale BB 10% White, 90% Blue Full table</td>
</tr>
</tbody>
</table>
## Proposed Assumption

<table>
<thead>
<tr>
<th>Retiree Class</th>
<th>Actual Deaths</th>
<th>Expected Deaths</th>
<th>Actual / Expected Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female Regular &amp; Special Risk</td>
<td>20,191</td>
<td>20,159</td>
<td>100.2%</td>
</tr>
<tr>
<td>Male Regular</td>
<td>14,596</td>
<td>14,674</td>
<td>99.5%</td>
</tr>
<tr>
<td>Male Special Risk</td>
<td>1,894</td>
<td>1,892</td>
<td>100.1%</td>
</tr>
</tbody>
</table>
## Life Expectancy – Retiree Turning 62 in 2014

<table>
<thead>
<tr>
<th>Retiree Class</th>
<th>Current Assumption</th>
<th>Proposed Assumption</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female Regular &amp; Special Risk</td>
<td>86.4</td>
<td>87.6</td>
<td>1.3</td>
</tr>
<tr>
<td>Male Regular</td>
<td>85.1</td>
<td>84.6</td>
<td>(0.5)</td>
</tr>
<tr>
<td>Male Special Risk</td>
<td>85.1</td>
<td>84.0</td>
<td>(1.1)</td>
</tr>
</tbody>
</table>
# Life Expectancy – Retiree Turning 62 in 2034

<table>
<thead>
<tr>
<th>Retiree Class</th>
<th>Current Assumption</th>
<th>Proposed Assumption</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female Regular &amp; Special Risk</td>
<td>87.2</td>
<td>89.5</td>
<td>2.3</td>
</tr>
<tr>
<td>Male Regular</td>
<td>86.6</td>
<td>86.9</td>
<td>0.3</td>
</tr>
<tr>
<td>Male Special Risk</td>
<td>86.6</td>
<td>86.3</td>
<td>(0.3)</td>
</tr>
</tbody>
</table>
Demographic Assumptions - Timing of Retirement / DROP Entry
Member Decisions at Initial Eligibility

- When a member first reaches eligibility for unreduced retirement benefits, there are three possible paths:
  - Immediate Retirement
  - DROP Entry
  - Do neither → Deferred Retirement

Our study reviewed observed experience for each path.
Comparison Basis for Observed Experience

- We compare the observed experience to the assumptions we use currently for financial reporting calculations.
- GASB, which sets accounting standards, mandates that entry into DROP is treated as equivalent to immediate retirement in setting assumptions for financial reporting.
  - The GASB assumptions from the prior experience study can be seen as the “best estimate” assumptions.
- The current retirement assumptions used for determining actuarially calculated contribution rates are more complicated due to legislative directives regarding the DROP.
  - Those assumptions are covered later in the presentation.
Observation Period Data Used

- In establishing confidence intervals for DROP entry, experience for plan year 2010-2011 was excluded
  - Experience for the two plan years prior to that year was similar to the experience for the two plan years subsequent to that year

- In establishing confidence intervals for immediate and deferred retirement, experience for all five years was used
  - Plan year 2010-2011 experience was similar to that for the other four plan years studied
DROP Entry (Tier I)
Regular Class Females

Retirement assumptions start at age 48

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Immediate Retirement (Tier I)  
Regular Class Females

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Combined DROP/Immediate Retirement (Tier I) Regular Class Females

This chart combines the assumptions from the prior two slides

Rates exceed 50% at many key ages

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Deferred Retirement (Tier I)  
Regular Class Females

Age 55 member defers retirement nearly four more years under proposed assumption (until age 66-67)
DROP Entry (Tier I)
Regular Class Males

Retirement assumptions start at age 48

![Graph showing Retirement Rates by Age]

- 50% Confidence Interval
- 90% Confidence Interval
- Current GASB Assumption
- Proposed Assumption
Immediate Retirement (Tier I)  
Regular Class Males

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Combined DROP/Immediate Retirement (Tier I)
Regular Class Males

This chart combines the assumptions from the prior two slides

Rates exceed 50% at many key ages

![Graph showing retirement rates for Regular Class Males]
Deferred Retirement (Tier I) Regular Class Males

Age 55 member defers retirement four more years under proposed assumption (until age 67-68)
DROP Entry (Tier I)
Special Risk Class Males

Retirement assumptions start at age 45
Immediate Retirement (Tier I) Special Risk Class Males

Retirement Rates

Age

50% Confidence Interval
Current Assumption
90% Confidence Interval
Proposed Assumption
Combined DROP/Immediate Retirement (Tier I)
Special Risk Class Males

This chart combines the assumptions from the prior two slides

Rates exceed 50% at ages 52 to 54

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Deferred Retirement (Tier I)
Special Risk Class Males

Time until deferred retirement for age 50 member essentially unchanged (until age 61-62)
Summary – Timing of Retirement/DROP Entry

- Differences in proposed assumptions compared to the current GASB assumptions:
  - DROP entry is higher at ages 57+ for Regular class
  - DROP entry is higher at all ages for Special Risk class
  - Immediate retirement is lower below age 62 for Regular class females, and at all ages for Regular class males
  - Deferred retirement is lower below age 70 for Regular class females, and below age 62 for Regular class males

- For DROP entry, the current assumption used for calculating contribution rates differs from the GASB assumptions
  - This is covered at length in the next section
Demographic Assumptions - DROP Funding Calculations and Retirement Timing Assumptions
Background

- DROP started in 1998
  - A study completed prior to the DROP’s implementation showed a material cost increase from its introduction
- Current method of funding DROP was designed so that implementation of the DROP would not affect the normal cost contribution rates of the various membership classes
- The current funding method has two cornerstone pieces
  - Uniform DROP payroll charge for all membership classes
  - Artificially depressed class-specific retirement assumptions to calculate actuarially determined contribution rates as if the DROP did not exist
Artificially Depressed Retirement Rates

- Retirement assumptions used for financial reporting calculations treat either DROP entry or immediate retirement as equivalent, consistent with GASB requirements
  - Those assumptions are based on best estimates of observed experience, and recommended adjustments were presented in the previous section

- Assumptions used to determine actuarially calculated class-specific contribution rates are different and lower
  - They are artificially depressed by multiplying the likelihood of DROP entry by one-half, to estimate what the initial eligibility retirement rates might be if the DROP did not exist
Artificially Depressed Retirement Rates
Regular Class Females

The retirement assumptions used for contribution rate setting understate the likelihood of DROP entry, which is nearly equivalent to retirement from a System financial perspective.

This chart is identical to slide 31, but with addition of the artificially depressed rate.
Artificially Depressed Retirement Rates
Regular Class Males

This chart is identical to slide 35, but with addition of the artificially depressed rate

The retirement assumptions used for contribution rate setting understate the likelihood of DROP entry, which is nearly equivalent to retirement from a System financial perspective.
Artificially Depressed Retirement Rates
Special Risk Class Males

This chart is identical to slide 39, but with addition of the artificially depressed rate

The retirement assumptions used for contribution rate setting understate the likelihood of DROP entry, which is nearly equivalent to retirement from a System financial perspective.
How does the use of artificially depressed retirement rates affect the projected System funded status in future years?

Excerpt above from a March 2014 Milliman analysis with projected funded status if (a) actual future investments earnings are 7.75% annually, (b) all other assumptions identified in that analysis are met and (c) current methods are used.
DROP Entry vs. Subsequent Retirement

- The most common DROP entry opportunity is for Regular class females turning age 62
  - Our current assumptions estimate that members in that group who choose not enter the DROP or immediately retire work an additional seven years on average
    • That estimate is unchanged in our proposed assumptions
- From a System financial perspective, it is about 20% more expensive for an age 62 Regular class female to enter DROP than to work seven additional years without entering DROP
  - Foregone benefits are more valuable than starting benefit increases from additional service, pay and higher accrual rates
DROP Entry vs. Subsequent Retirement

- So what happens for the group in question (Regular class females turning age 62 and reaching DROP eligibility) when:
  - 26%* of that group have been assumed to enter the DROP (or retire immediately) per the artificially depressed rate-setting assumptions, but
  - 43%* actually do enter the DROP or retire immediately, mirroring current GASB assumptions?

**Answer:** An “actuarial loss” occurs as more people take the expensive option than the rate-setting assumptions anticipated

*See slide 45 for illustration of assumed retirement rates*
DROP Entry vs. Subsequent Retirement

- An actuarial loss is an increase in liability for experience that differs from assumption
  - The liability for the group in question increases by 3%-4% when the higher than estimated (by the assumptions used to set contribution rates) number of entries into the DROP occur

- This dynamic dampens System funded status improvement
  - Each year a new group of members reach DROP eligibility, more enter DROP than estimated by the artificially depressed assumptions used for setting contribution rates, and new actuarial losses arise

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DROP Contribution Rate Calculations

- We recommend a change so that:
  - Both contribution rate-setting and GASB calculations would use best-estimate assumptions for DROP entry, instead of the current approach of using artificially depressed rates for contribution rate-setting calculations

- In other words, the recommended change would replace the current bifurcated rate approach for the retirement assumption with a single rate approach
  - Using slides 45-47 as examples, the single solid line would replace the two dashed lines
DROP Contribution Rate Calculations

- This change would lead to better prefunding of DROP during each member’s working career, consistent with the prefunding of other System benefit features
- A uniform rate to be charged to DROP payroll could still be calculated to be consistent with legislative directives
Demographic Assumptions - Other Assumptions & Wrap-up
Other Demographic Assumptions

- We compared observed experience versus expected experience under current assumptions for other demographic events.
- For each of the following assumptions, observed experience was reasonably close to current assumptions, with any proposed assumption changes minor in nature and not materially affecting liability or System-average contribution rate calculations:
  - Termination of employment prior to unreduced retirement
  - Non-duty-related disability incidence
  - Disability mortality
  - Active member mortality
Duty-Related Disability Assumptions

- Observed incidence of duty-related disability were compared to the expected incidence based on current assumption
- Actual disability incidence was well below expected for Special Risk class and, collectively, for all other membership classes
  - As such, a modification to assumption is proposed
- Proposed rates are set to mirror observed FRS experience
- Rates vary by gender and age, and Special Risk has different rates than other membership classes
  - Male disability incidence approximately twice female incidence
  - Special Risk incidence approximately nine times that for other membership classes
Demographic Assumptions Wrap-Up

- We propose approval of the demographic assumptions summarized in this section for use in 2014 actuarial valuation calculations for both of the following purposes:
  - Actuarially calculated contribution rates
  - GASB financial reporting
Demographic Assumptions Wrap-Up

- Estimated System average impact of the proposed changes in this section on the 2013 actuarial valuation would have been:

<table>
<thead>
<tr>
<th>Metric</th>
<th>Approximate Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unfunded Actuarial Liability (UAL)</td>
<td>-$1.7 billion</td>
</tr>
<tr>
<td>Normal Cost Rate</td>
<td>0.0% of affected payroll</td>
</tr>
<tr>
<td>UAL Rate</td>
<td>-0.3% of affected payroll</td>
</tr>
</tbody>
</table>

- The UAL decrease is due to the effect of the mortality assumptions for classes other than Regular class

- The proposed elimination of the artificially depressed retirement rates and the increase in average time worked prior to deferred retirement offset each other
Economic Assumptions
Categories of Economic Assumptions

- There are differing categories of economic assumptions

- Member-specific
- Investment-related
- System-wide
- Non-investment related
Economic Assumptions – Inflation & System Payroll Growth
Economic Assumptions

Inflation

- Inflation assumption affects all other economic assumptions, including investment return, payroll growth, and individual member pay increases.

- Over the past 30 years average inflation has been 2.82%, while over the past 15 years the average was 2.38% (calculated as a geometric annual average).
Economic Assumptions

Inflation

- TIPS yields give a market estimate of future inflation

<table>
<thead>
<tr>
<th>As of 7/31/2014</th>
<th>10-Year</th>
<th>30-Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treasury Yield</td>
<td>2.58%</td>
<td>3.32%</td>
</tr>
<tr>
<td>TIPS Yield</td>
<td>0.29%</td>
<td>0.96%</td>
</tr>
<tr>
<td>Break-even Inflation</td>
<td>2.29%</td>
<td>2.36%</td>
</tr>
</tbody>
</table>

- Social Security’s intermediate long-term assumption is 2.70%
  - Combined with its lower near-term assumption, it produces a 30-year average of 2.60%

- The 30-year inflation assumption for HEK/SBA is 2.30%

- We recommend an assumption decrease from 3.00% to 2.50%
Economic Assumptions
System Payroll Growth

- The System payroll growth assumption is an important component of the calculations to amortize the UAL in determining actuarially calculated contribution rates
- Theoretically, payroll growth equals inflation plus real wage growth if active member headcount remains constant
- We recommend an assumption decrease from 4.00% to 3.25%

<table>
<thead>
<tr>
<th></th>
<th>Current</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflation</td>
<td>3.00%</td>
<td>2.50%</td>
</tr>
<tr>
<td>Real Wage Growth</td>
<td>1.00%</td>
<td>0.75%</td>
</tr>
<tr>
<td>Payroll Growth</td>
<td>4.00%</td>
<td>3.25%</td>
</tr>
</tbody>
</table>
Economic Assumptions – Investment Return
Uses of the Long-Term Return Assumption

- As a “discount rate” for establishing the:
  - Actuarial accrued liability, which is a net present value
  - The associated unfunded actuarial liability (UAL)

- Component of the amortization factor used to calculate the contribution plan to eliminate existing UAL over time if future experience (investment-related and otherwise) follows assumptions and calculated contributions are made

Reflecting expectations for future average annual investment earnings, the assumption helps identify a prudent glide path for employer contribution rates
Effect of the Assumption on Amortizations

- At the current 7.75% investment return assumption, not enough money is on hand today to fully satisfy obligations
  - The most recent UAL estimate is $20 billion (on a market value of assets basis) from the 2013 actuarial valuation

- To address the UAL, an installment payment schedule with an articulated amortization period is developed with three key components setting the annual payment level
  - Investment return assumption
  - Payroll growth assumption
  - Amortization period

- The installment plan is the “UAL Rate” part of employer rates
Setting the Investment Return Assumption

Given that we do not know what the actual investment earnings will be, how should one proceed?

- Prudently select a best estimate
- Solicit forecasts from investment professionals
- Recognize that hoping for a result does not make it happen; the assumption does not affect actual investment returns
- Don’t be myopic --- the objective is to make a sound long-term estimate, not to get a single individual year right
- Neither ignore historical results nor be 100% beholden to them
- Since actual results will vary from assumption, review the forecasts’ probability ranges and consider a margin for variance
Investment Return Projections

- We have developed 30-year investment return projections based on:
  - New target asset allocation for FRS
  - Market outlook assumptions developed by Milliman’s credentialed investment professionals

- Given the inherent uncertainty of future investment returns, model results are stated as probability ranges

- Today’s speakers are not credentialed investment advisors

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Milliman Investment Return Model

- Based on FRS newly identified target asset allocation
- Model results in table are geometric annual average net returns, stated as nominal returns, rounded to the nearest 0.1%

<table>
<thead>
<tr>
<th>Percentile</th>
<th>30 Year Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>65th</td>
<td>7.7%</td>
</tr>
<tr>
<td>60th</td>
<td>7.4%</td>
</tr>
<tr>
<td>55th</td>
<td>7.2%</td>
</tr>
<tr>
<td>50th</td>
<td>6.9%</td>
</tr>
<tr>
<td>45th</td>
<td>6.6%</td>
</tr>
<tr>
<td>40th</td>
<td>6.3%</td>
</tr>
<tr>
<td>35th</td>
<td>6.0%</td>
</tr>
</tbody>
</table>

- Milliman model is based on a series of average annual real returns by asset class, plus asset class correlations
- Based on 2.50% inflation assumption and 0.25% deduction for plan expenses
- Model single-year arithmetic mean nominal return is 7.56%
- Model 50th percentile real return (net of inflation) is approximately 4.3%
HEK/SBA Investment Return Model

- The HEK model is developed on a real return (i.e., return in excess of inflation) basis
  - Investment Policy Statement currently has a long-term goal of 5% real return (net of expense)
- Asset allocation policy is shaped to achieve this goal, using annual updates of assumptions and asset-liability analysis over 15 future years
- Current HEK/SBA assumptions show a 5% real return has more than a 50% probability (51% over 15 years, 54% over 30 years)
- On that basis nominal net returns in the HEK/SBA model are 7.66% over 30 years (based on a 2.3% inflation assumption)
Effects of Lowering the Return Assumption

- A lower investment return assumption produces higher calculated liabilities and higher near-term actuarially calculated contribution rates
  - An assumption change tilts the expected balance of the fundamental cost equation away from investment earnings and toward contributions

- A lower assumption also lessens the potential for a pattern of increasing contribution rates in future years
  - Actual investment results determine ultimate long-term System cost, so all else being equal contribution rates
    - Go up if investments underperform assumption
    - Go down if investments outperform assumption
# System-Wide Economic Assumptions

<table>
<thead>
<tr>
<th></th>
<th>Current Assumption</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflation</td>
<td>3.00%</td>
<td>2.50%</td>
</tr>
<tr>
<td>Payroll Growth</td>
<td>4.00%</td>
<td>3.25%</td>
</tr>
<tr>
<td>Investment Return</td>
<td>7.75%</td>
<td>Lower assumption</td>
</tr>
</tbody>
</table>
Investment Return Assumption Wrap-Up

- Estimated System average impact of a change solely in the 2013 valuation’s return assumption to **7.25%** would have been:

<table>
<thead>
<tr>
<th>Metric</th>
<th>Approximate Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unfunded Actuarial Liability (UAL)</td>
<td>+$11 billion</td>
</tr>
<tr>
<td>Normal Cost Rate</td>
<td>+1% of affected payroll</td>
</tr>
<tr>
<td>UAL Rate</td>
<td>+2% of affected payroll</td>
</tr>
</tbody>
</table>

- The amounts are shown are a simplified illustration if no other assumption had been modified
  - A single assumption change is typically not made
  - The effect of coordinated assumption changes (such as to inflation or payroll growth) would modify these estimates
Economic Assumptions – Individual Member Pay Increases
Individual Member Pay Increase Assumption

- Pay increases are projected for each individual member’s full career, with future increases based on membership class, service and gender
  - Observed differences by gender were minor in our study

- For each member and each individual year, the assumed pay increase can be thought of as having two components
  - Inflation-related factor
  - Non-inflation-related factors
    - Systemic - productivity improvements / market competition
    - Individual – step increases, promotion, etc.
Assumption-Setting Process

- The current assumption is charted on the next slides for each member group
  - It is based on actual 2003 - 2008 observed experience and the current 3.0% long-term future inflation assumption

- Actual 2008 – 2013 observed experience is also charted
  - That experience is based on 2.0% actual average inflation, measured on a one-year lag, during the observation period

- Proposed assumption is developed by adjusting the recently observed experience to levels that would have occurred if actual inflation had been at the proposed 2.5% long-term assumption
  - Sets inflation-linked component at 2.5% assumption
  - Non-inflation-linked component set at observed experience
Individual Member Pay Increase
Regular Class Females

Proposed assumption increases 0.3% between 28 and 29 years of service
Individual Member Pay Increase
Regular Class Males

Proposed assumption increases 0.5% between 28 and 29 years of service
Individual Member Pay Increase
Special Risk Class Males

Proposed assumption increases 0.4% between 23 and 24 years of service

This work product was prepared solely for the Department of Management Services for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.
Summary – Individual Member Pay Increase

- Proposed assumption is markedly lower than current assumption at most service levels
  - Differences are most pronounced in the first half of members’ careers

- The decrease has several component pieces
  - Lowering of the inflation-linked piece by 0.50%
  - Lowering of the real wage growth piece by 0.25%
  - Persistent observed experience indicates a decrease in the member-specific, service-linked piece is warranted
  - This piece can also be referred to as the *merit increase* or the *longevity increase*
Individual Member Pay Increase Wrap-Up

- Estimated System average impact of the proposed changes in this section on the 2013 actuarial valuation would have been:

<table>
<thead>
<tr>
<th>Metric</th>
<th>Approximate Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unfunded Actuarial Liability (UAL)</td>
<td>-$1.7 billion</td>
</tr>
<tr>
<td>Normal Cost Rate</td>
<td>-1.4% of affected payroll</td>
</tr>
<tr>
<td>UAL Rate</td>
<td>-0.3% of affected payroll</td>
</tr>
</tbody>
</table>

- The amounts are shown are a simplified illustration if no other assumptions had been modified
  - A single assumption change is typically not made
  - The effect of coordinated assumption changes (such as to inflation or investment return) would modify these estimates
Review of Unused Annual Leave Assumption
Review of Unused Annual Leave Assumption

- Members are allowed to count an amount of unused annual leave in their final average salary calculations not to exceed the lesser of 500 hours or any employer-specific policy limits.
- Current assumption is uniform across all membership classes.
- Recent experience indicates an updated assumption is appropriate.

<table>
<thead>
<tr>
<th>Membership Classes</th>
<th>Current Assumption</th>
<th>Proposed Assumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special Risk, Senior Management</td>
<td>139</td>
<td>290</td>
</tr>
<tr>
<td>Regular, Other Classes Not Noted</td>
<td>139</td>
<td>230</td>
</tr>
</tbody>
</table>
Actuarial Methods
Use of Actuarial Methods

- Actuarial methods allocate the net present value of the projected benefit payments between past and projected future service, which establishes funded status
  - Calculations are done on a budgeting basis
- Methods selected, when combined with assumptions, also develop the pattern of projected contribution rates

Data

Assumptions

Methods

Provisions

Actuarially Calculated Contribution Rates

Funded Status

Projected Benefit Payments
Actuarial Methods
Shortfall Amortization
Amortization Period

- Each year, the system experiences an “actuarial gain” or “actuarial loss” by comparing actual experience to assumed
  - Gains decrease UAL, while losses increase UAL
  - Gains and losses are created by both
    • Investment experience
    and
    • Demographic experience
Amortization Period

- Current policy has been to amortize each year’s gain or loss over a closed 30-year period as a level percentage of projected payroll
  - Statute limits amortization to a maximum of 30 years
- The Pension Funding Task Force and other study groups view 30 year amortizations as less than optimal
  - That opinion is driven partially by the initial “negative amortization” that occurs in a 30-year level percentage of pay amortization
This slide illustrates the amortization pattern of a $20 billion UAL over several alternative amortization periods.

**UAL Balance by Amortization Period**

Level % of Pay, 7.75% interest, 4.0% payroll growth

For the amortization illustrated here, the 20-year UAL Rate would be approximately 1.2%-1.3% of payroll higher than the 30-year UAL Rate for a UAL payroll of $27 Billion.
Shortfall Amortization Periods

- Recent funding policy guidance from organizations such as GFOA recommends periods of twenty years or less for amortizations of most UAL sources as a best practice
  - Guidance indicates that for certain specified UAL sources, amortizations of up to twenty-five years can be considered acceptable
  - Changes in cost allocation method or investment return assumption are two of the UAL sources so identified
Amortization Wrap-Up

- We propose at the next meeting to illustrate the effect of:
  - Current amortization policy versus
  - Amortizing all outstanding unfunded actuarial liability (UAL) as of July 1, 2014 over a twenty-year period

- As a potential variation to the twenty-year amortization alternative, amortizing over twenty-five years the portion of the UAL arising from modifications to:
  - Economic or demographic assumptions
  - Actuarial cost allocation method
Actuarial Methods

Actuarial Cost Allocation Method
Cost Allocation Methods - Introduction

- The division of the present value of a member’s projected benefit payments between past, current & future service is done through use of an actuarial cost allocation method.

- The present day value of projected future benefits allocated to a particular working year is the **Normal Cost**.

- The present day value of projected future benefits allocated to prior years is the **Actuarial Liability**.

- The difference between the Actuarial Value of Assets and the Actuarial Liability is the **Unfunded Actuarial Liability (UAL)**.
Entry Age Normal Cost Allocation Method

- By far the most commonly used cost allocation method for state systems is Entry Age Normal (EAN)
  - Conceptually, EAN sets normal cost rate level as a percent of payroll over a member’s full projected working career
- There are different categories of EAN, including:
  - Individual EAN (most commonly used)
  - Ultimate EAN (used by FRS)
    - Each of these categories contains different interpretations of how to calculate the key metrics

New GASB standards mandate use of Individual EAN for financial reporting calculations for the System and its employers
Ultimate EAN Cost Allocation Method

- FRS currently uses the Ultimate EAN cost allocation method for calculating employer contribution rates to fund the System
  - Individual EAN is used for financial reporting, per GASB
- Ultimate EAN sets Normal Cost as if each member was in Tier II
  - As such, Normal Cost is lower with Ultimate EAN than it is under Individual Entry Age
- Cost methods do allocate benefits between past and projected future service, but don’t affect the level of projected benefits
  - Since Ultimate EAN allocates less of projected benefits to future service, it allocates more to past service and has a higher actuarial liability than Individual Entry Age
Contribution Rates

- Actuarially calculated contribution rates = 
  \[- (\text{Normal Cost}) + (\text{Amortization of Unfunded Actuarial Liability})\]

- The best way to understand the contribution rate differences between Individual EAN and Ultimate EAN is development of the normal cost rate for a Tier I member
Individual EAN Cost Allocation Method

- A Tier I member’s Individual EAN normal cost rate is the level % of payroll contribution needed during a member’s career to fund a Tier I level of benefits if experience follows assumptions
  - The bifurcated nature of Tier I COLA benefits means that Tier I members with the same age at hire but differing years of service will have different Individual EAN normal cost rates
  - This differs from Ultimate EAN, where the normal cost rate is set for Tier I members as if they do not receive COLA benefits, consistent with the lack of COLA in Tier II benefits
Ultimate EAN Cost Allocation Method

- The cost allocation method used by FRS to calculate employer contribution rates to fund the System is Ultimate EAN.
- Ultimate EAN calculates the normal cost rate for all members as if they all participate in the newest, or ultimate, tier.
- Our sample Tier I’s Ultimate EAN normal cost rate is the career level % of payroll contribution needed to fund a Tier II level of benefits if experience follows assumptions.
  - Members with the same age, membership class and gender at hire will all have the same normal cost rates under Ultimate EAN regardless of year of hire or tier.
Ultimate EAN Cost Allocation Method

- The total projected benefit levels calculated for individual members do reflect tier and year of hire
  - Cost method only affects allocation between past, current & future
Individual EAN v. Ultimate EAN Comparison

- Individual EAN’s normal cost rate is higher than Ultimate EAN’s
  - The System average Individual EAN normal cost rate would gradually drift to the Ultimate EAN normal cost rate over time

- Similarly, Individual EAN has a higher present value of all future normal costs than Ultimate EAN

- Because Ultimate EAN allocates less of total projected benefits to future years of service, Individual EAN has a lower Actuarial Liability than Ultimate EAN
  - Actuarial Liability = (Net present value of projected future benefits) - (Costs allocated to projected future service)
Individual EAN v. Ultimate EAN Comparison

- Even though Ultimate EAN has a higher Actuarial Liability and Unfunded Actuarial Liability (UAL), the amortization of that higher UAL is only a partial offset to the higher normal cost rate of Individual EAN
Individual EAN v. Ultimate EAN Comparison

<table>
<thead>
<tr>
<th></th>
<th>Individual EAN</th>
<th>Ultimate EAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculation of Tier I Normal Cost Rate</td>
<td>Reflects career average cost of Tier I benefit</td>
<td>Reflects career average cost of Tier II benefit</td>
</tr>
<tr>
<td>Present Value of Future Normal Costs (PVFNC)</td>
<td>Higher under this method</td>
<td>Lower under this method</td>
</tr>
<tr>
<td>Total Present Value of Projected Benefits (PVPB)</td>
<td>Equivalent regardless of allocation method</td>
<td>Equivalent regardless of allocation method</td>
</tr>
<tr>
<td>Actuarial Liability (= PVPB minus PVFNC)</td>
<td>Lower under this method</td>
<td>Higher under this method</td>
</tr>
<tr>
<td>System Average Normal Cost Rate</td>
<td>Drifts down over time as Tier IIs replace Tier Is</td>
<td>Remains level over time</td>
</tr>
</tbody>
</table>

A change to Individual EAN allocation would increase Normal Cost and decrease Actuarial Liability, while not affecting projected benefit payment levels.
Individual EAN v. Ultimate EAN Comparison

- The differences between Individual EAN and Ultimate EAN can be assessed through the prism of these guiding principles:
  - Protection of funded status
  - Contribution rate stability
  - Contribution rate predictability
  - Intergenerational equity
  - Transparency and understandability
  - Actuarial soundness

- Contribution rate policies differ significantly in their funding patterns and effects on funded status projections if future experience follows assumptions.
Cost Allocation Method Wrap-Up

- We propose at the next meeting to illustrate effects of:
  - Retaining current interpretation of Ultimate Entry Age versus
  - Retaining Ultimate Entry Age, but modifying the interpretation approach to allocate future normal costs only to projected service periods based on Tier I retirement timing assumptions for Tier I members versus
  - Changing to Individual Entry Age, which is consistent with GASB standards and the most commonly used method

*We recommend using either the 2nd or 3rd approach listed above*
Wrap-Up
A Look Forward to Next Meeting

- Plan year 2013-2014 investment returns were above assumption
- The part of the accumulated investment gains to be recognized by asset smoothing methodology in 2013-2014 is shown

<table>
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<tr>
<th>Metric</th>
<th>Approximate Effect</th>
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</thead>
<tbody>
<tr>
<td>Unfunded Actuarial Liability (UAL)</td>
<td>-$3 billion</td>
</tr>
<tr>
<td>Normal Cost Rate</td>
<td>0.0% of affected payroll</td>
</tr>
<tr>
<td>UAL Rate</td>
<td>-0.6% of affected payroll</td>
</tr>
</tbody>
</table>

- In addition, we preliminarily estimate that approximately $10 billion of accumulated investment gains will not yet be recognized in the July 1, 2014 Actuarial Value of Assets (AVA)
  - Systematic recognition occurs in subsequent plan years
Agenda for Next Meeting

- Compare actuarial calculations under current policies and any proposed alternative policies identified today
  - Calculations will be based on demographic census and System financial information as of July 1, 2014

- Formal approval of all methods and assumptions for use in the 2014 actuarial valuations for FRS and HIS, which will determine actuarially calculated contribution rates for July 2015 - June 2016

Thanks for your time and attention this afternoon
Appendix
Milliman Capital Market Outlook Assumptions

For assessing the expected portfolio return under Milliman’s capital market assumptions, we considered the FRS to be allocated among the model’s asset classes as shown below. This allocation is based on our understanding of the most recently revised target allocation policy, titled “Fixed Income to GE, RE, PE, SI (6%)” as provided to us by email on July 22, 2014.

<table>
<thead>
<tr>
<th>Policy Allocation</th>
<th>Annual Arithmetic Mean</th>
<th>Annualized Geometric Mean</th>
<th>Annual Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash</td>
<td>1.0%</td>
<td>3.01%</td>
<td>3.00%</td>
</tr>
<tr>
<td>Intermediate-Term Bonds</td>
<td>18.0%</td>
<td>4.07%</td>
<td>3.95%</td>
</tr>
<tr>
<td>High Yield Bonds</td>
<td>3.0%</td>
<td>6.69%</td>
<td>6.15%</td>
</tr>
<tr>
<td>Broad US Equities</td>
<td>26.5%</td>
<td>8.41%</td>
<td>6.85%</td>
</tr>
<tr>
<td>Developed Foreign Equities</td>
<td>21.2%</td>
<td>8.56%</td>
<td>6.75%</td>
</tr>
<tr>
<td>Emerging Market Equities</td>
<td>5.3%</td>
<td>11.48%</td>
<td>7.50%</td>
</tr>
<tr>
<td>Private Equity</td>
<td>6.0%</td>
<td>11.70%</td>
<td>8.00%</td>
</tr>
<tr>
<td>Hedge Funds / Absolute Return</td>
<td>7.0%</td>
<td>5.71%</td>
<td>5.25%</td>
</tr>
<tr>
<td>Real Estate (Property)</td>
<td>12.0%</td>
<td>7.01%</td>
<td>6.25%</td>
</tr>
<tr>
<td>US Inflation (CPI-U)</td>
<td></td>
<td></td>
<td>2.50%</td>
</tr>
<tr>
<td><strong>Fund Total (reflecting asset class correlations)</strong></td>
<td><strong>100.0%</strong></td>
<td><strong>7.56%</strong></td>
<td><strong>6.89%</strong></td>
</tr>
</tbody>
</table>

* Returns reflects 0.25% reduction for System expenses.
Actuarial Basis

Data
We have based our projection of System liabilities on the data supplied by the Florida Retirement System (FRS) for the five plan year observation period of July 1, 2008 to June 30, 2013. The data was not independently audited by Milliman.

Assets as of June 30, 2014, measured on a fair market value basis are preliminarily estimated to be $148 billion, as communicated verbally to us by FRS personnel during the week of July 28, 2014.

Methods / Policies

Actuarial Cost Method: For determination of actuarially calculated employer contribution rates: Ultimate Entry Age Normal, as described in the 2013 Valuation Report. For plan financial reporting: Individual Entry Age Normal, applied in a manner consistent with recently published GASB standards.

UAL Amortization: The UAL for FRS is currently amortized as a level percentage of projected applicable payroll over a closed period. Any additional UAL that arises each year from variations from the assumptions used for determination of actuarially calculated employer calculation rates is amortized over a 30 year period.

Actuarial Value of Assets: Asset smoothing method described in the 2013 Valuation Report. The method used is consistent with applicable statutes.

Assumptions
In general, all current assumptions are as described in the 2013 Valuation Report.

Provisions
Provisions valued are as described in the 2013 Valuation Report.
Analysis Methodology – Confidence Intervals

- The common statistical technique of confidence intervals was used in reviewing patterns in retirement and other categories.

- Example: flipping a coin to see if it is fair or biased
  - Say it was flipped ten times and there were four tails
    - We shouldn’t conclude it is biased, as there is a 38% chance of four tails or fewer from 10 flips of a fair coin
  - If instead it was flipped 1,000 times and there were 400 tails
    - There is only a 0.00000001% chance the coin is fair

Additional statistical information allows us to draw stronger conclusions about what constitutes an appropriate assumption based on recently observed experience.
Caveats and Disclaimers

This presentation discusses actuarial methods and assumptions proposed for use in the valuation of the Florida Retirement System ("FRS" or "the System"). For the most recent complete actuarial valuation results, including cautions regarding the limitations of use of valuation calculations, please refer to our formal Actuarial Valuation Report as of July 1, 2013 ("the 2013 Valuation Report") published on December 3, 2013. The 2013 Valuation Report, including all supporting information regarding data, assumptions, methods, and provisions, is incorporated by reference into this presentation. The statements of reliance and limitations on the use of this material is reflected in the Valuation Report and still apply to this presentation.

In preparing this presentation, we relied, without audit, on information (some oral and some in writing) supplied by the System’s staff, as well as capital market expectations provided by SBA and HEK. This information includes, but is not limited to, statutory provisions, employee data, and financial information. We found this information to be reasonably consistent and comparable with information used for other purposes. The results depend on the integrity of this information. If any of this information is inaccurate or incomplete our results may be different and our calculations may need to be revised.

Milliman’s work product was prepared exclusively for the Department of Management Services for a specific and limited purpose. It is a complex, technical analysis that assumes a high level of knowledge concerning FRS’s operations, and uses FRS data, which Milliman has not audited. It is not for the use or benefit of any third party for any purpose. To the extent that Milliman’s work is not subject to disclosure under applicable public records laws, Milliman’s work may not be provided to third parties without Milliman’s prior written consent. Milliman does not intend to benefit or create a legal duty to any third party recipient of its work product. Any third party recipient of Milliman’s work product who desires professional guidance should not rely upon Milliman’s work product, but should engage qualified professionals for advice appropriate to its own specific needs.

The consultants who worked on this assignment are pension actuaries. Milliman’s advice is not intended to be a substitute for qualified legal or accounting counsel.

On the basis of the foregoing, we hereby certify that, to the best of our knowledge and belief, this presentation is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices. We are members of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein.
# Assumptions Summary – Regular Class Females

<table>
<thead>
<tr>
<th>Category</th>
<th>Current Assumption</th>
<th>Proposed Assumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Disabled Mortality</td>
<td>White collar generational, Scale AA, multiplied by 95.8%</td>
<td>White collar generational, Scale BB, generally slightly higher life expectancy than current</td>
</tr>
<tr>
<td>Member Salary Increase</td>
<td>Age &amp; service based; average annual increase for 35 year old hire who works 30 years of 5.4%</td>
<td>Service based; lower increases, especially at lower service levels; average increase of 4.4%</td>
</tr>
<tr>
<td>Unused Leave</td>
<td>139 hours at time of retirement/DROP entry</td>
<td>230 hours at time of retirement/DROP entry</td>
</tr>
<tr>
<td>DROP Entry*</td>
<td>GASP: near 30% at ages 48-56, near 40% at ages 57+ Funding: half of the above rates (artificially depressed)</td>
<td>Both GASP &amp; Funding: Similar to current GASP assumption at ages 48-56; rates near 50% at ages 57+</td>
</tr>
<tr>
<td>Immediate Retirement*</td>
<td>8%-10% up to age 58; near 12% ages 59-61; 9% at age 62</td>
<td>4%-5% up to age 55; 7% ages 56-60; 9% at ages 61-62</td>
</tr>
<tr>
<td>Deferred Retirement*</td>
<td>5%-10% ages 48-57; 10%-15% at ages 58-64; 12%-18% thereafter</td>
<td>2%-3% to age 57, grading to 5% at ages 59-61; 12% age 62; 8% ages 63-64; 15% thereafter</td>
</tr>
<tr>
<td>Termination of Employment</td>
<td>Age &amp; service based; rates for 10+ years of service range from 5.4% (age 30) to 3.0% (age 65)</td>
<td>Retain current assumption</td>
</tr>
<tr>
<td>Duty Disability Incidence</td>
<td>Social Security Study 74 table; scaled to match pre-2008 FRS experience</td>
<td>Custom table from FRS-specific experience; markedly lower rates than current assumption</td>
</tr>
<tr>
<td>Non-Duty Disability Incidence</td>
<td>Social Security Study 74 table; scaled to match pre-2008 FRS experience</td>
<td>Custom table from FRS-specific experience; slightly lower rates than current assumption</td>
</tr>
</tbody>
</table>

*Rates are shown for Tier I. Tier II rates are equivalent, except where modified to reflect differing age/service requirements for retirement.
## Assumptions Summary – Regular Class Males

<table>
<thead>
<tr>
<th>Category</th>
<th>Current Assumption</th>
<th>Proposed Assumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Disabled Mortality</td>
<td>White collar generational, Scale AA, multiplied by 90.9%</td>
<td>50% White collar/50% Blue collar generational, Scale BB; slightly higher future mortality improvement</td>
</tr>
<tr>
<td>Member Salary Increase</td>
<td>Age &amp; service based; average annual increase for 35 year old hire who works 30 years of 5.7%</td>
<td>Service based; lower increases, especially at lower service levels; average increase of 4.5%</td>
</tr>
<tr>
<td>Unused Leave</td>
<td>139 hours at time of retirement/DROP entry</td>
<td>230 hours at time of retirement/DROP entry</td>
</tr>
<tr>
<td>DROP Entry*</td>
<td>GASB: near 30% at ages 48-55, near 40% at ages 56+ Funding: half of the above rates (artificially depressed)</td>
<td>Both GASB &amp; Funding: Similar to current GASB assumption at ages 48-56; rate of 55% at ages 57+</td>
</tr>
<tr>
<td>Immediate Retirement*</td>
<td>10% grading to 16% at ages 48-60; 13% at age 61; 18% at age 62</td>
<td>4% at ages 48-54; 5% at ages 55-60; 8% age 61; 11% at age 62</td>
</tr>
<tr>
<td>Deferred Retirement*</td>
<td>9%-11% ages 48-65; grading to 13% at age 68 and thereafter</td>
<td>2%-5% to ages 61; 11% at age 62; 8% at ages 63-64; 13% thereafter</td>
</tr>
<tr>
<td>Termination of Employment</td>
<td>Age &amp; service based; rates for 10+ years of service range from 4.7% (age 30) to 3.7% (age 65)</td>
<td>Retain current assumption</td>
</tr>
<tr>
<td>Duty Disability Incidence</td>
<td>Social Security Study 74 table; scaled to match pre-2008 FRS experience</td>
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*Rates are shown for Tier I. Tier II rates are equivalent, except where modified to reflect differing age/service requirements for retirement.*
### Assumptions Summary – Special Risk Class Females

<table>
<thead>
<tr>
<th>Category</th>
<th>Current Assumption</th>
<th>Proposed Assumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Disabled Mortality</td>
<td>White collar generational, Scale AA, multiplied by 95.8%</td>
<td>White collar generational, Scale BB, generally slightly higher life expectancy than current</td>
</tr>
<tr>
<td>Member Salary Increase</td>
<td>Age &amp; service based; average annual increase for 30 year old hire who works 25 years of 6.2%</td>
<td>Service based; lower increases, especially at lower service levels; average increase of 5.3%</td>
</tr>
<tr>
<td>Unused Leave</td>
<td>139 hours at time of retirement/DROP entry</td>
<td>290 hours at time of retirement/DROP entry</td>
</tr>
<tr>
<td>DROP Entry*</td>
<td>GASB: 4% grading to 33% ages 45-54, 16% at age 55</td>
<td>Both GASB &amp; Funding: 20% to age 51 and at ages 53-54; 30%-31% at ages 52 and 55</td>
</tr>
<tr>
<td>Immediate Retirement*</td>
<td>Between 2%-10% at all ages from 45-55</td>
<td>4% at ages 45-49; 5% at ages 50-55</td>
</tr>
<tr>
<td>Deferred Retirement*</td>
<td>4%-7% to age 60; 9%-20% at ages 61-70; 65% thereafter</td>
<td>3%-5% to age 59, 7%-9% at ages 60-61; 20-25% ages 62-69; 100% thereafter</td>
</tr>
<tr>
<td>Termination of Employment</td>
<td>Age &amp; service based; rates for 10+ years of service range from 1.7% (age 30) to 4.0% (age 55)</td>
<td>Retain current assumption</td>
</tr>
<tr>
<td>Duty Disability Incidence</td>
<td>Social Security Study 74 table; scaled to match pre-2008 FRS experience</td>
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*Rates are shown for Tier I. Tier II rates are equivalent, except where modified to reflect differing age/service requirements for retirement.*
## Assumptions Summary – Special Risk Class Males

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<td>Non-Disabled Mortality</td>
<td>White collar generational, Scale AA, multiplied by 90.9%</td>
<td>10% White collar/90% Blue collar generational, Scale BB; slightly lower life expectancy than current</td>
</tr>
<tr>
<td>Member Salary Increase</td>
<td>Age &amp; service based; average annual increase for 30 year old hire who works 25 years of 6.4%</td>
<td>Service based; lower increases, especially at lower service levels; average increase of 5.5%</td>
</tr>
<tr>
<td>Unused Leave</td>
<td>139 hours at time of retirement/DROP entry</td>
<td>290 hours at time of retirement/DROP entry</td>
</tr>
<tr>
<td>DROP Entry*</td>
<td>GASB: 11% grading to 39% ages 45-52, near 35% ages 52-54, 18% at age 55</td>
<td>Both GASB &amp; Funding: 23%-30% to age 50; 40-50% ages 51-54; 29% at ages 55</td>
</tr>
<tr>
<td></td>
<td>Funding: half of the above rates (artificially depressed)</td>
<td></td>
</tr>
<tr>
<td>Immediate Retirement*</td>
<td>Between 2%-10% at all ages from 45-55</td>
<td>4% at ages 45-46; 7% at ages 47-54; 6% at age 55</td>
</tr>
<tr>
<td>Deferred Retirement*</td>
<td>3%-5% to age 60; near 15% ages 61-74; 25% thereafter</td>
<td>3%-5% to age 59, 7%-9% at ages 60-61; 20-25% ages 62-69; 100% thereafter</td>
</tr>
<tr>
<td>Termination of Employment</td>
<td>Age &amp; service based; rates for 10+ years of service range from 2.1% (age 30) to 1.8% (age 55)</td>
<td>Retain current assumption</td>
</tr>
<tr>
<td>Duty Disability Incidence</td>
<td>Social Security Study 74 table; scaled to match pre-2008 FRS experience</td>
<td>Custom table from FRS-specific experience; markedly lower rates than current assumption</td>
</tr>
<tr>
<td>Non-Duty Disability Incidence</td>
<td>Social Security Study 74 table; scaled to match pre-2008 FRS experience</td>
<td>Custom table from FRS-specific experience; slightly lower rates than current assumption</td>
</tr>
</tbody>
</table>

*Rates are shown for Tier I. Tier II rates are equivalent, except where modified to reflect differing age/service requirements for retirement.
## Assumptions Summary – Elected Officers’ Class Females

<table>
<thead>
<tr>
<th>Category</th>
<th>Current Assumption</th>
<th>Proposed Assumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Disabled Mortality</td>
<td>White collar generational, Scale AA, multiplied by 56.7%</td>
<td>White collar generational, Scale BB, generally slightly higher life expectancy than current</td>
</tr>
<tr>
<td>Member Salary Increase</td>
<td>Age &amp; service based; average annual increase for 35 year old hire who works 30 years of 4.2%</td>
<td>Service based; lower increases, especially at lower service; average increase of 4.0% (J, ECO); 5.1% (ECO)</td>
</tr>
<tr>
<td>Unused Leave</td>
<td>139 hours at time of retirement/DROP entry</td>
<td>230 hours at time of retirement/DROP entry</td>
</tr>
<tr>
<td>DROP Entry*</td>
<td>GASB: 10% at ages 45-49, near 25% at ages 50-60, near 17% at ages 61-62</td>
<td>Both GASB &amp; Funding: 30% at age 48, increasing by 2.5% per year through age 61; 50% at age 62; 15% thereafter</td>
</tr>
<tr>
<td></td>
<td>Funding: half of the above rates (artificially depressed)</td>
<td></td>
</tr>
<tr>
<td>Immediate Retirement*</td>
<td>3%-4% to age 59; 3%-10% at ages 60-69; near 12% at ages 70-76; 3.5% thereafter</td>
<td>10% at all ages, starting at age 48</td>
</tr>
<tr>
<td>Deferred Retirement*</td>
<td>1%-6% to age 59; 7%-11% at ages 60-65; 5%-8% at ages 66-69; near 13% thereafter</td>
<td>5% at ages 48-61; 15% at age 62; 11% at ages 63-64; 15% thereafter</td>
</tr>
<tr>
<td>Termination of Employment</td>
<td>Age &amp; service based; rates for 10+ years of service range from 4.2%/10.8%/2.9% (age 30 ECO/ESO/J) to 2.4%/7.3%/1.4% (age 65 ECO/ESO/J)</td>
<td>Retain current assumption</td>
</tr>
<tr>
<td>Duty Disability Incidence</td>
<td>Social Security Study 74 table; scaled to match pre-2008 FRS experience</td>
<td>Custom table from FRS-specific experience consistent with table used for Regular class members</td>
</tr>
<tr>
<td>Non-Duty Disability Incidence</td>
<td>Social Security Study 74 table; scaled to match pre-2008 FRS experience</td>
<td>Custom table from FRS-specific experience consistent with table used for Regular class members</td>
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# Assumptions Summary – Elected Officers’ Class Males

<table>
<thead>
<tr>
<th>Category</th>
<th>Current Assumption</th>
<th>Proposed Assumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Disabled Mortality</td>
<td>White collar generational, Scale AA, multiplied by 82.4%</td>
<td>50% White collar/50% Blue collar generational, Scale BB; slightly higher future mortality improvement</td>
</tr>
<tr>
<td>Member Salary Increase</td>
<td>Age &amp; service based; average annual increase for 35 year old hire who works 30 years of 4.2%</td>
<td>Service based; lower increases, especially at lower service; average increase of 4.0% (J, ECO); 4.6% (ECO)</td>
</tr>
<tr>
<td>Unused Leave</td>
<td>139 hours at time of retirement/DROP entry</td>
<td>230 hours at time of retirement/DROP entry</td>
</tr>
<tr>
<td>DROP Entry*</td>
<td>GASB: near 16% at ages 45-54; near 25% at ages 55-64; near 13% thereafter Funding: half of the above rates (artificially depressed)</td>
<td>Both GASB &amp; Funding: 30% at age 48, increasing by 2.5% per year through age 61; 50% at age 62; 15% thereafter</td>
</tr>
<tr>
<td>Immediate Retirement*</td>
<td>2%-8% to age 63; 16% at ages 64-69; 20% thereafter</td>
<td>10% at all ages, starting at age 48</td>
</tr>
<tr>
<td>Deferred Retirement*</td>
<td>1%-2% to age 59; 5%-10% at ages 60-69; near 15% thereafter</td>
<td>5% at ages 48-61; 15% at age 62; 11% at ages 63-64; 15% thereafter</td>
</tr>
<tr>
<td>Termination of Employment</td>
<td>Age &amp; service based; rates for 10+ years of service range from 5.7%/6.7%/2.0% (age 30 ECO/ESO/J) to 3.5%/4.2%/0.7% (age 65 ECO/ESO/J)</td>
<td>Retain current assumption</td>
</tr>
<tr>
<td>Duty Disability Incidence</td>
<td>Social Security Study 74 table; scaled to match pre-2008 FRS experience</td>
<td>Custom table from FRS-specific experience consistent with table used for Regular class members</td>
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## Assumptions Summary – Senior Mgmt Svc Class Females

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<tbody>
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<tr>
<td>Member Salary Increase</td>
<td>Age &amp; service based; average annual increase for 35 year old hire who works 30 years of 5.4%</td>
<td>Service based; lower increases, especially at lower service levels; average increase of 4.6%</td>
</tr>
<tr>
<td>Unused Leave</td>
<td>139 hours at time of retirement/DROP entry</td>
<td>290 hours at time of retirement/DROP entry</td>
</tr>
<tr>
<td>DROP Entry*</td>
<td>GASB: near 25% at ages 45-53; near 35% at ages 54-61; 30% at age 62</td>
<td>Both GASB &amp; Funding: 30% at age 48, increasing by 2.5% per year through age 61; 50% at age 62; 15% thereafter</td>
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<td></td>
<td>Funding: half of the above rates (artificially depressed)</td>
<td></td>
</tr>
<tr>
<td>Immediate Retirement*</td>
<td>9%-14% to age 59; 21% at ages 60-62; 10-19% at ages 63-67; 12% thereafter</td>
<td>5% to age 57, 10% at ages 58-62; 5% thereafter</td>
</tr>
<tr>
<td>Deferred Retirement*</td>
<td>6%-11% to age 59; 11%-21% at ages 60-69; near 17% thereafter</td>
<td>5% to age 61; 15% at age 62; 11% at ages 63-64; 15% thereafter</td>
</tr>
<tr>
<td>Termination of Employment</td>
<td>Age &amp; service based; rates for 10+ years of service range from 3.9% (age 30) to 1.9% (age 65)</td>
<td>Similar to current assumption, except decrease rates for short service employees based on recently observed experience;</td>
</tr>
<tr>
<td>Duty Disability Incidence</td>
<td>Social Security Study 74 table; scaled to match pre-2008 FRS experience</td>
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<td>290 hours at time of retirement/DROP entry</td>
</tr>
<tr>
<td>DROP Entry*</td>
<td>GASB: near 25% at ages 45-53; near 38% at ages 54-61; 25% at age 62 Funding: half of the above rates (artificially depressed)</td>
<td>Both GASB &amp; Funding: 30% at age 48, increasing by 2.5% per year through age 61; 50% at age 62; 15% thereafter</td>
</tr>
<tr>
<td>Immediate Retirement*</td>
<td>12%-17% to age 60; 25-33% at ages 61-62; 10-23% at ages 63-67; 12% thereafter</td>
<td>5% to age 57, 10% at ages 58-62; 5% thereafter</td>
</tr>
<tr>
<td>Deferred Retirement*</td>
<td>10%-12% to age 59; 13%-22% at ages 60-69; near 18% thereafter</td>
<td>5% to age 61; 15% at age 62; 11% at ages 63-64; 15% thereafter</td>
</tr>
<tr>
<td>Termination of Employment</td>
<td>Age &amp; service based; rates for 10+ years of service range from 4.1% (age 30) to 2.6% (age 65)</td>
<td>Similar to current assumption, except decrease rates for short service employees based on recently observed experience;</td>
</tr>
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<td>Duty Disability Incidence</td>
<td>Social Security Study 74 table; scaled to match pre-2008 FRS experience</td>
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