



OREGON PUBLIC EMPLOYEES RETIREMENT SYSTEM

2014 Experience Study

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September 23, 2015

Board of Trustees
Oregon Public Employees Retirement System

Re: 2014 Experience Study – Oregon Public Employees Retirement System

Dear Members of the Board:

The results of an actuarial valuation are based on the actuarial methods and assumptions used in the valuation. These methods and assumptions are used in developing employer contribution rates, disclosing employer liabilities pursuant to GASB requirements and for analyzing the fiscal impact of proposed legislative amendments.

This experience study report has been prepared exclusively for the Oregon Public Employees Retirement System (PERS) and its governing PERS Board (Board). **The study recommends to the Board the actuarial methods and assumptions to be used in the December 31, 2014 and 2015 actuarial valuations of PERS.**

Except where otherwise noted, the analysis in this study was based on data for the experience period from January 1, 2011 to December 31, 2014 as provided by PERS. PERS is solely responsible for the validity, accuracy and comprehensiveness of this information; the results of our analysis can be expected to differ and may need to be revised if the underlying data supplied is incomplete or inaccurate.

Milliman's work is prepared solely for the use and benefit of the Oregon Public Employees Retirement System.

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The consultants who worked on this assignment are pension actuaries and, for the analysis of the RHIPA program, healthcare actuaries. Milliman's advice is not intended to be a substitute for qualified legal or accounting counsel.

The signing actuaries are independent of the plan sponsor. We are not aware of any relationship that would impair the objectivity of our work.



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On the basis of the foregoing, we hereby certify that, to the best of our knowledge and belief, this report 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 related to the healthcare cost inflation rates for the RHIPA retiree healthcare program discussed in this report were determined by Milliman actuaries qualified in such matters.

Sincerely,



Matt Larrabee, FSA, EA, MAAA
Principal and Consulting Actuary



Scott Preppernau, FSA, EA, MAAA
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1. Executive Summary

This experience study report has been prepared exclusively for the Oregon Public Employees Retirement System (PERS) and the PERS Board (Board) in order to analyze the system's experience from January 1, 2011 through December 31, 2014 and to recommend actuarial methods and assumptions to be used in the December 31, 2014 and 2015 actuarial valuations of PERS.

A brief summary of the recommended method and assumption changes contained in this report as well as items reviewed at the May 2015 and/or July 2015 Board meetings follows:

Actuarial Methods

- No changes recommended for most actuarial methods, including actuarial cost method, amortization method, and rate collar.

Allocation Procedures

- When allocating accrued liability for Tier 1/Tier 2 active members who have earned service with multiple PERS employers, base 75% of the allocation on service with each employer (100% for police & fire members) and base the rest on the member account balance associated with each employer. These assumptions have both increased 5% since the prior experience study. This movement illustrates the continued migration of projected future Tier 1/Tier 2 retirement benefits away from the Money Match calculation, which is based on account balances, toward the ongoing Full Formula approach, which is based on final average salary.

Economic Assumptions

- Lower the inflation assumption from 2.75% per year to 2.50% per year, which in turns lowers the annual system payroll growth assumption from 3.75% per year to 3.50% per year.
- Lower the investment return assumption from the current assumption of 7.75% per year. Based on the current target asset allocation of the Oregon PERS Fund, analyses under three different sets of capital market assumptions indicate the best estimate of future expected returns falls between 7.00% and 7.50%. At its July 2015 meeting, the Board selected an assumed return of 7.50%.
- Add an explicit assumption regarding administrative expenses for Tier 1/Tier 2.
- Update the assumed health cost trend rates.

Demographic Assumptions

- Adjust the healthy mortality assumption to reflect an updated mortality improvement scale for all groups.
- Adjust retirement rates for most groups to more closely align with recent and expected future experience.
- Increase the merit component of the salary increase assumption for all members based on observations of the last eight years of experience.
- Update pre-retirement termination of employment assumptions for two member categories.
- Slightly lower assumed rates of duty disability for general service members.
- Increase the Tier 1 unused vacation cash out assumption for most categories.
- Adjust the Tier 1/Tier 2 unused sick leave assumption for three groups to more closely reflect recently observed experience.
- Decrease the healthy participation assumption for the RHIA retiree healthcare program.
- Increase the RHIPA participation assumption for longer-service members.

2. Actuarial Methods and Allocation Procedures

Overview

Actuarial methods and allocation procedures are used as part of the valuation to determine actuarial accrued liabilities, to determine normal costs, to allocate costs to individual employers and to amortize unfunded liabilities. The following Board objectives were considered in developing the actuarial methods and allocation procedures:

- Transparency of shortfall and funded status calculations
- Predictable and stable employer contribution rates
- Protection of the plan's funded status to enhance benefit security for members
- Equity across generations of taxpayers funding the program
- Actuarial soundness - crafting policy that will fully fund the system if assumptions are met
- Compliance with GASB (Governmental Accounting Standards Board) requirements

The actuarial methods used for the December 31, 2013 actuarial valuation and the changes recommended for the December 31, 2014 and 2015 actuarial valuations are shown in the table below.

Method	December 31, 2013 Valuation	December 31, 2014 and 2015 Valuations
Cost method	Entry Age Normal (EAN)	No change
UAL Amortization method	UAL amortized as a level percent of combined Tier 1/Tier 2 and OPSRP payroll	No change
UAL Amortization period	<ul style="list-style-type: none"> ▪ UAL bases – Closed amortization from the first rate setting valuation in which experience is recognized <ul style="list-style-type: none"> – Tier 1/Tier 2 – re-amortized over 20 years effective December 31, 2013 – OPSRP – 16 Years – RHIA/RHIPA – 10 years ▪ Newly established side accounts – Aligned with the new Tier 1/Tier 2 base from the most recent rate-setting valuation ▪ Newly established transition liabilities or surpluses – 18 years from the date joining the SLGRP (State & Local Government Rate Pool) 	No change
Asset valuation method	Market value	No change
Exclusion of reserves from valuation assets	Contingency Reserve, Capital Preservation Reserve, and Tier 1 Rate Guarantee Reserve (RGR) excluded from valuation assets. RGR is not excluded from valuation assets when RGR is negative (i.e., when the RGR is a deficit reserve).	No change

Method	December 31, 2013 Valuation	December 31, 2014 and 2015 Valuations
Allocation of Benefits in Force (BIF) Reserve	The BIF is allocated to each rate pool in proportion to the retiree liability attributable to the rate pool.	No change
Rate collar	Change in base contribution rate limited (i.e., collared) to greater of 20% of current base rate or 3% of payroll. Size of collar doubles if funded percentage excluding side accounts falls below 60% or increases above 140%. If the funded percentage excluding side accounts is between 60% and 70% or between 130% and 140%, the size of the rate collar is increased on a graded scale. Exclude RHIA and RHIPA (retiree medical) rates from the rate collar calculation.	No change
Liability allocation for actives with several employers	<ul style="list-style-type: none"> ▪ Allocate Actuarial Accrued Liability 30% (5% for police & fire) based on account balance with each employer and 70% (95% for police & fire) based on service with each employer 	Change allocation to 25% (0% for police & fire) based on account balance and 75% (100% for police & fire) based on service with each employer.
	<ul style="list-style-type: none"> ▪ Allocate Normal Cost to current employer 	No change

The methods or procedures are described in greater detail on the following pages.

Actuarial Cost Method

The total cost of the program, over time, will be equal to the benefits paid less investment earnings and is not affected directly by the actuarial cost method. The actuarial cost method is simply a tool to allocate costs to past, current or future years and thus primarily affects the timing of cost recognition.

The December 31, 2013 valuation used the Entry Age Normal (EAN) method, which allocates costs as a level percentage of payroll across the full projected working career. EAN is the required method under the recently implemented GASB 67 and 68 financial reporting standards, though the Board could choose to use a different method for employer contribution rate calculations. Oregon PERS adopted EAN for all purposes with the December 31, 2012 valuation. Employing a consistent method for both financial reporting and contributions is more understandable to interested parties as only one set of liability and normal cost calculations will be made for each employer. The EAN approach is widely used in the actuarial and public plan sponsor community because it provides a realistic estimate of the long-term costs of a retirement program as a level percentage of payroll if all assumptions are met. The benefits of this method are unchanged from when the Board previously adopted it, and thus we recommend continuing to use the EAN cost method.

Amortization Method

Unfunded Actuarial Liability

The unfunded actuarial liability (UAL) is amortized as a level percentage of combined payroll (Tier 1/Tier 2 plus OPSRP) in order to maintain more level contribution rates as payroll for the closed group of Tier 1/Tier 2 members declines and payroll of OPSRP members increases. We recommend this methodology continue.

The UAL is currently amortized over the following closed periods as a level percent of projected payroll from the first rate-setting valuation in which the experience is recognized:

- Tier 1/Tier 2 – 20 years
- OPSRP – 16 years
- RHIA/RHIPA – 10 years

As part of a collection of method changes made with the 2012 Experience Study, the Board made a policy decision to re-amortize all existing Tier 1/Tier 2 shortfall (unfunded actuarial liability or UAL) at the December 31, 2013 rate-setting actuarial valuation. Gains and losses between subsequent rate-setting valuations will be amortized as a level percentage of payroll over a closed 20 year period from the valuation in which they are first recognized.

Side Accounts and Transition Liabilities/Surpluses

Prior to the 2010 Experience Study, side accounts and transition liabilities/surpluses were amortized over the period ending December 31, 2027. To better match the amortization periods for new side accounts and new transition liabilities with the amortization of the Tier 1/Tier 2 UAL and to avoid issues related to a shortening amortization period, as part of the 2010 Experience Study the PERS Board adopted the following amortization procedures which are not tied to a fixed date:

- Newly established side accounts are amortized over the same period as the new Tier 1/Tier 2 UAL base from the most recent rate-setting valuation. For example, a side account created in July 2015 would be amortized to December 31, 2033, aligned with the Tier 1/Tier 2 UAL base created in the December 31, 2013 valuation.

- New transition liabilities/surpluses are amortized over the 18 year period beginning when the employer joins the SLGRP. This amortization period aligns with the last Tier 1/Tier 2 amortization base established as an independent employer.

We recommend no change to the amortization method or periods of side accounts and new transition liabilities/surpluses.

Asset Valuation Method

Effective December 31, 2004, the Board adopted market value as the actuarial value of assets, replacing the four-year smoothing method previously used to determine the actuarial asset value, which is used for shortfall (UAL) calculations. Although asset smoothing is a common method for smoothing contribution rates in public sector plans, the smoothed asset value does not provide a transparent measure of the plan's funded status and UAL. Market value provides more transparency to members and other interested parties regarding the funded status of the plan. Instead of smoothing assets, a rate collar method (described below) is used to smooth contribution rates.

We recommend no change to the asset valuation method.

Excluded Reserves

Statute provides that the Board may establish Contingency and Capital Preservation reserve accounts to mitigate gains and losses of invested capital and other contingencies, including certain legal expenses or judgments. In addition, statute requires the establishment and maintenance of a Rate Guarantee or Deficit reserve to fund earnings crediting to Tier 1 member regular accounts when actual earnings are below the investment return assumption selected by the Board.

The Contingency and Capital Preservation reserves are excluded from the valuation assets used for employer rate-setting calculations. We recommend no change to the treatment of the Contingency and Capital Preservation reserves.

The Rate Guarantee Reserve (RGR) was positive as of December 31, 2013, but can become negative (in deficit status) if, over time, the required crediting on Tier 1 member accounts exceeds the investment earnings on those accounts. The RGR was negative from the December 31, 2008 valuation to the December 31, 2012 valuation. All else being equal, excluding a negative reserve increases the level of valuation assets used in employer rate-setting calculations. This occurs because subtracting a negative amount is mathematically equivalent to adding a positive amount of the same magnitude. If the negative reserve was larger in absolute value than the sum of the other reserves, this approach would lead to the actuarial value of assets used in shortfall (UAL) calculations being larger than the market value of assets.

As part of the 2010 Experience Study, the Board decided to only exclude the RGR from assets when it is in positive surplus position, and to not subtract a negative RGR (which would increase the actuarial value of assets) when it is in deficit status. We recommend this treatment of the RGR continue.

Rate Collar Method

Effective December 31, 2004, a rate collar method was adopted that limits biennium to biennium changes in contribution rates to be within a specified "collar". The existing rate collar method restricts the change in an employer's "base" Tier 1/Tier 2 contribution rate (i.e., the rate before contemplation of side account rate offsets or rate adjustments for any pre-pooled obligations) to the greater of 20 percent of the current rate or

3% of payroll. If the funded status excluding side accounts is less than 60% or greater than 140%, the size of the rate collar is doubled. If the funded percentage excluding side accounts is between 60% and 70% or between 130% and 140%, the size of the rate collar is increased on a graded scale.

The rate collar is applied for each employer (or rate pool) prior to any adjustments to the employer contribution rate for side accounts, transition liabilities, or pre-SLGRP pooled liabilities. The rate collar only applies to employer contribution rates for pension benefits. Rates attributable to RHIA and RHIPA (retiree medical) programs are not subject to the collar.

Liability Allocation for Actives with Several Employers

Over the course of a member's working career, a member may work for more than one employer covered under the Tier 1/Tier 2 program. Since employer contribution rates are developed on an individual employer basis, the member's liability should be allocated between such a member's various Tier 1/Tier 2 employers. If all of the member's employers participate in the same rate pool, the allocation has no effect on rates, but if the employers participate in different pools or are independent, the allocation can have an impact on the different employers' rates.

When a member retires, PERS allocates the cost of the retirement benefit between the employers the member worked for based on the formula that produces the member's retirement benefit. If the member's benefit is calculated under the Money Match approach, the cost is allocated in proportion to the member's account balance attributable to each employer. If the member's benefit is calculated under the percent of final average pay Full Formula approach, the cost is allocated in proportion to the service attributable to each employer.

In the period prior to the 2003 system reforms and shortly thereafter, the vast majority of retirement benefits were calculated under Money Match, so the member liability in valuations prior to December 31, 2006 had been allocated in proportion to the member's account balance attributable to each employer. With no new member contributions to Tier 1/Tier 2, however, this procedure meant no liability was allocated to employers for service after December 31, 2003 in the valuation. As Money Match benefits became less dominant and retirements with Full Formula benefits become more prevalent, a change in the procedure to allocate liability among employers was warranted.

Effective with the December 31, 2006 valuation, a change was made to allocate a member's actuarial accrued liability among employers based on a weighted average of the Money Match methodology, which utilizes account balance, and the Full Formula methodology, which utilizes service. The methodologies were weighted according to the percentage of the system-wide actuarial accrued liability for new retirements projected to be attributable to Money Match and Full Formula, respectively, as of the next rate-setting valuation. For the December 31, 2012 and December 31, 2013 valuations, the Money Match method was weighted 70 percent for general service members and 5 percent for police & fire members.

The table below shows a summary of the portion of the total actuarial liability for Tier 1/Tier 2 active members estimated to be attributable to Money Match benefits at the most recent published valuation date and how that proportion is projected to change in subsequent years.

December 31,	General Service	Police & Fire
2013	27%	4%
2014	25%	3%
2015	24%	3%
2016	22%	2%

Since the next rate-setting valuation is the December 31, 2015 valuation, we recommend the Money Match method be weighted 25 percent for general service members. This weighting will continue to be reviewed with each experience study and updated as necessary. For police & fire members we recommend the allocation be based entirely on the Full Formula approach, now that the Money Match portion is less than 5% and declining.

As in prior valuations, the member’s normal cost will continue to be assigned to his or her current employer.

3. Economic Assumptions

Overview

Actuarial Standard of Practice (ASOP) No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*, provides guidance on selecting economic assumptions used in measuring obligations under defined benefit pension plans. ASOP No. 27 suggests that economic assumptions be developed using the actuary's professional judgment, taking into consideration past experience and the actuary's expectations regarding the future. The process for selecting economic assumptions involves:

- Identifying components of each assumption and evaluating relevant data
- Considering factors specific to the measurement along with other general factors
- Selecting a reasonable assumption

Under ASOP No. 27, an assumption is considered reasonable if:

- It is appropriate for the purpose of the measurement,
- It reflects the actuary's professional judgment,
- It takes into account relevant historical and current economic data,
- It reflects the actuary's estimate of future experience, the actuary's observation of estimates inherent in market data, or a combination thereof, and
- It has no significant bias, except when provisions for adverse deviation are included and disclosed.

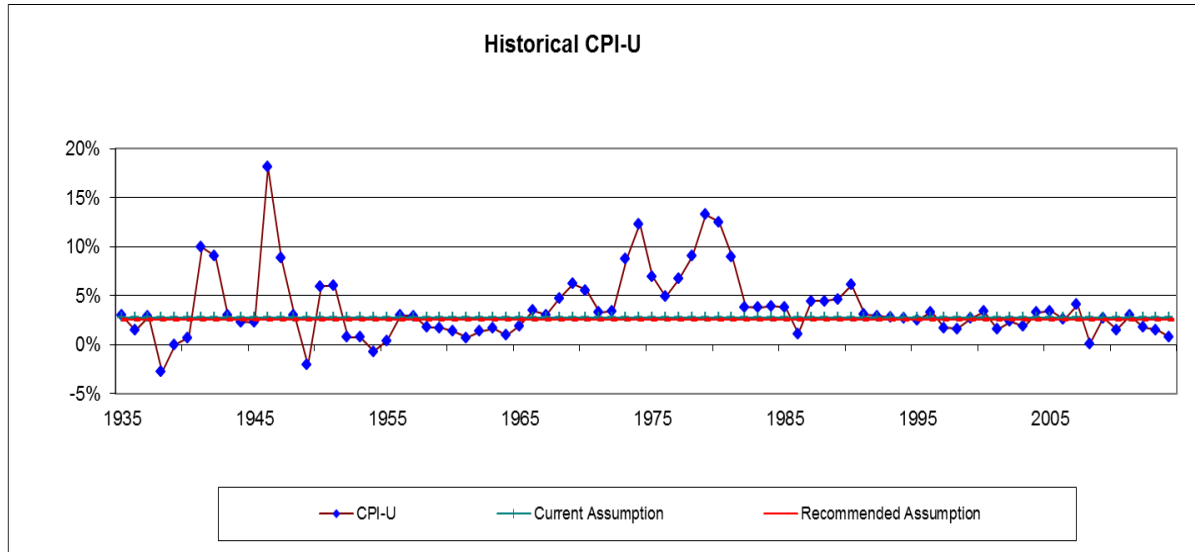
A summary of the economic assumptions used for the December 31, 2013 actuarial valuation and those recommended for the December 31, 2014 and 2015 actuarial valuations is shown below:

Assumption	December 31, 2013 Valuation	December 31, 2014 and 2015 Valuations
Inflation (other than healthcare)	2.75%	2.50%
Real wage growth	1.00%	No Change
Payroll growth	3.75%	3.50%
Regular investment return	7.75%	7.50% (selected by the Board at the July 2015 Board meeting)
Variable account investment return	Same as regular investment return	Same as regular investment return
Tier 1/Tier 2 administrative expenses	N/A	\$33.0 million/year
OPSRP administrative expenses	\$5.5 million/year	\$5.5 million/year
Healthcare cost inflation rates		
▪ 2015 rate	5.90%	7.00%
▪ Ultimate inflation rate	4.70%	4.40%
▪ Year reaching ultimate rate	2083	2094

The recommended assumptions shown above, in our opinion, were selected in a manner consistent with the requirements of ASOP No. 27. Each of the above assumptions is described in detail below and on the following pages.

Inflation

The assumed inflation rate is the basis for all of the other economic assumptions. It affects other assumptions including payroll growth, investment return, and healthcare inflation.



In selecting an appropriate inflation assumption, we consider both historical data and the breakeven inflation rates inherent in current long-term Treasury Inflation Protection Securities (TIPS). The chart above shows the annual inflation rate for the years ending December 31 from 1935 through 2014 as reported by the Bureau of Labor Statistics. The mean and median annual rates over this period are **3.64** percent and **2.96** percent respectively.

Historical inflation rates vary significantly from period to period and may not be an indication of future inflation rates. With the development of a TIPS market, we can calculate an estimated breakeven inflation rate by comparing yields on regular Treasury securities to the yields on TIPS. The table below shows yields as of December 31, 2014, for 10-year and 30-year Treasury bonds and TIPS.

As of 12/31/2014	10-Year	30-Year
Treasury Yield	2.17%	2.75%
TIPS Yield	0.49%	0.83%
Breakeven Inflation	1.68%	1.92%

We also considered two other inflation measures in our analysis: Social Security’s intermediate inflation projection of **2.54** percent over the period 2015-2025 (with an ultimate rate of 2.70 percent), and the Congressional Budget Office’s projection of CPI of an average of **2.25** percent inflation over the period 2015-2025. These measures were taken from the 2014 versions of the OASDI and CBO reports, which were the most current available at the time the analysis was performed.

Based on the information shown above, we recommend lowering inflation assumption from the current level of 2.75 percent to 2.50 percent. Based on a combination of historical and market data and expert forecasts, our judgment is that **2.50** percent is an appropriate unbiased long-term assumption.

Real Wage Growth

The expected salary growth assumption is the sum of three factors:

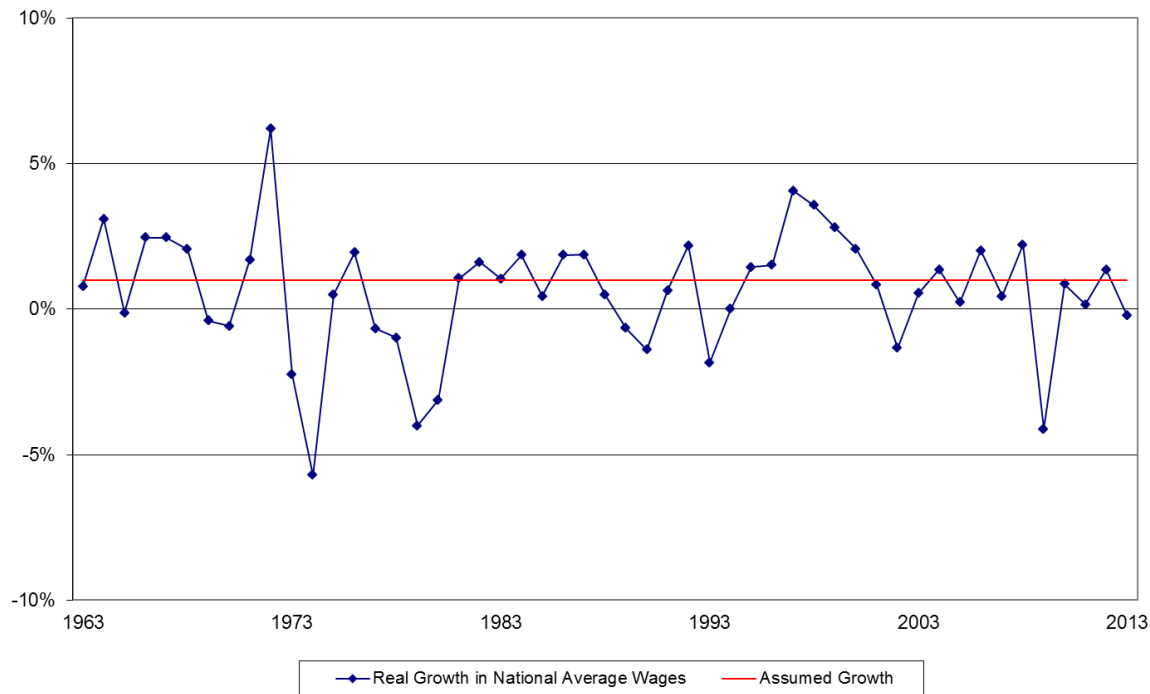
- Inflation,
- Real wage growth, and
- Merit and longevity wage growth.

Real wage growth represents the increase in wages above inflation for the entire group due to improvements in productivity and competitive pressures. Merit and longevity wage growth, in contrast, represent the increases in wages for an individual due to factors such as performance, promotion, or seniority.

Real wage growth combined with inflation represents the expected growth in total payroll for a stable population. Changes in payroll due to an increase or decline in the covered population are not captured by this assumption. The payroll growth assumption is used to develop the annual amount necessary to amortize the unfunded actuarial liability as a level percentage of expected payroll.

The chart below shows the real growth in national average wages over the past fifty years based on data compiled by the Social Security Administration.

Historical Real Growth in National Average Wages



While the change in any one year has been volatile, the change over longer periods of time is more stable as shown in the table below. However, the significant outlier result of a 4.1 percent productivity decrease in 2009 (measuring change in national average wages from 2008 to 2009) has a strong downward impact on the trailing averages shown in the table below. For example, the 10 year trailing average ending on December 31, 2008, is 1.11 percent.

Length of Period Ending December 31, 2013	Average Real Growth in National Average Wages
10 years	0.41%
20 years	0.97%
30 years	0.83%
40 years	0.40%
50 years	0.61%

We also considered the Social Security Administration's current long-term intermediate wage growth assumption of 1.13 percent in our analysis.

Based on the combination of historical data and forecasted future experience, we consider the current assumption of 1.00 percent to continue to be appropriate. We recommend no change to the assumption at this time.

Payroll Growth

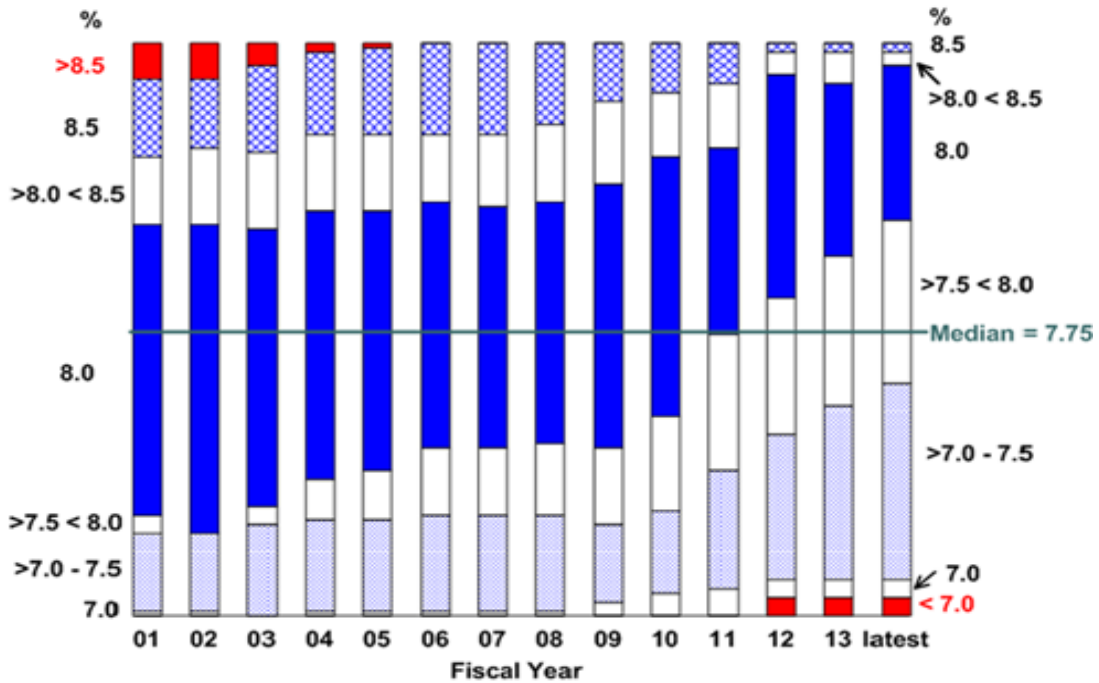
Payroll growth is the sum of inflation and real wage growth. Since we are recommending lowering the inflation assumption 25 basis point and making no change to the real wage growth assumption, the payroll growth assumption will be reduced from 3.75 percent to 3.50 percent.

Investment Return

The assumed rate of investment return is used to discount the future projected benefit payments from the retirement plan to the valuation date, to project interest credits on member accounts to retirement, to convert member accounts to a monthly retirement allowance under the Money Match formula, and to convert the retirement allowance to optional joint & survivor benefits. As such, it is one of the most important assumptions used in valuing the plan's liabilities and developing contribution rates. The assumption is intended to reflect the long-term expected future return on the portfolio of assets that fund the benefits.

To provide some perspective on this assumption, the chart below shows the assumptions used by the 126 largest US public sector systems in a regularly updated survey published by the National Association of State Retirement Administrators (NASRA). As can be seen from the chart (updated in NASRA's May 2015 Issue Brief), the Oregon PERS assumption of 7.75% used in the prior valuation is currently the median assumption for large US public sector systems. The majority of systems have investment return assumptions below 8%. The average (mean) return assumption is 7.68%. Given the consensus view among investment professionals regarding lower long-term expected returns for fixed income investments, we believe that this downward trend in the survey will continue in the future as systems periodically revisit their investment return assumptions.

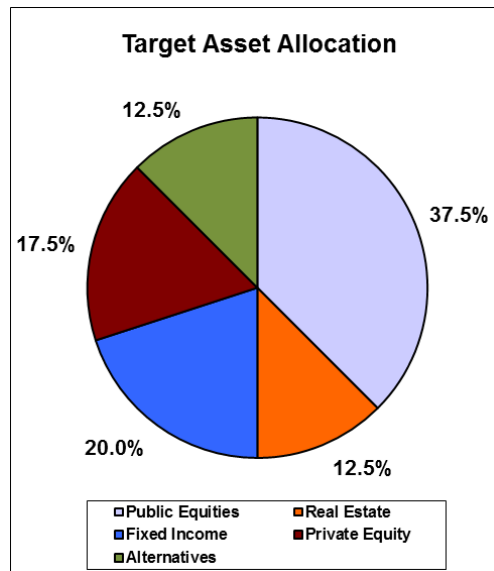
**NASRA Public Fund Survey
Assumed Investment Return**



Source: Compiled by NASRA based on Public Fund Survey

Regular Accounts

Based on the Oregon Investment Council’s (OIC) Statement of Investment Objectives and Policy Framework for the Oregon Public Employees Retirement Fund revised as of December 3, 2014 and the revised allocation adopted at the June 3, 2015 OIC meeting, we understand the target asset allocation adopted by the OIC is as follows:



To develop an analytical basis for the Board's selection of the investment return assumption, we use long-term assumptions developed by Milliman's capital market assumptions team for each of the asset classes in which the plan is invested based on the OIC's long-term target asset allocation. Since the OIC uses broader asset classes than those for which Milliman's investment actuaries develop long-term return assumptions, we used OIC's description of each asset class to map it to the classes shown below. For example, the OIC's allocation to "alternatives" was distributed among hedge funds, real estate, and commodities based on the detail available. Each asset class assumption is based on a consistent set of underlying assumptions, including the inflation assumption. These assumptions are not based on historical returns, but instead are based on a forward-looking capital market economic model. Based on the target allocation and investment return assumptions for each of the asset classes, our 50th percentile best estimate assumption is developed as follows:

Asset Class	Target Allocation	Annual Arithmetic Mean	20-Year Annualized Geometric Mean	Annual Standard Deviation
Core Fixed Income	8.00%	4.10%	4.00%	4.68%
Short-Term Bonds	8.00%	3.65%	3.61%	2.74%
Bank/Leveraged Loans	3.00%	5.69%	5.42%	7.82%
High Yield Bonds	1.00%	6.67%	6.20%	10.28%
Large/Mid Cap US Equities	15.75%	7.96%	6.70%	17.07%
Small Cap US Equities	1.31%	8.93%	6.99%	21.35%
Micro Cap US Equities	1.31%	9.37%	7.01%	23.72%
Developed Foreign Equities	13.13%	8.34%	6.73%	19.40%
Emerging Market Equities	4.13%	10.56%	7.25%	28.45%
Non-US Small Cap Equities	1.88%	9.01%	7.22%	20.55%
Private Equity	17.50%	11.60%	7.97%	30.00%
Real Estate (Property)	10.00%	6.48%	5.84%	12.00%
Real Estate (REITS)	2.50%	8.74%	6.69%	22.02%
Hedge Fund of Funds - Diversified	2.50%	4.94%	4.64%	8.09%
Hedge Fund – Event-driven	0.63%	7.07%	6.72%	8.90%
Timber	1.88%	6.60%	5.85%	13.00%
Farmland	1.88%	7.11%	6.37%	13.00%
Infrastructure	3.75%	8.31%	7.13%	16.50%
Commodities	1.88%	6.07%	4.58%	18.40%
Portfolio – Net of Investment Expenses	100.00%	7.80 %	7.03%*	13.27%

*The model's 20-year annualized geometric median is 6.99%.

Based on capital market expectations developed by Milliman.

We compared the expected return to the range of returns developed using a mean-variance model and the capital market assumptions of Milliman and Callan, the OIC’s investment consultant. In addition, we modeled the returns projected for the OIC’s asset allocation using the 10-year capital market assumptions from the 2014 Survey of Capital Market Assumptions published by Horizon Actuarial Services, LLC. Returns shown below are net of passive investment expenses. We assume that expenses incurred for active management are offset by additional returns gained from active management.

The table below compares the median of expected annualized returns calculated on a geometric basis for the Regular Account based on Milliman’s and Callan’s capital market assumptions, along with the average assumptions from the Horizon survey.

	Milliman	Callan	Horizon
Median annualized geometric return	6.99%	7.51%	7.25%
Assumed inflation	2.50%	2.25%	2.41%
Timeframe modeled	20 years	10 – 20 years	10 years

Based on the capital market outlooks modeled above, we believe the investment return assumption should be reduced from the current 7.75% assumption. An assumption between 7.00% and 7.50% would be reasonable, based on the forward-looking return expectations of the investment professionals considered, and before any potential active management adjustments. Based on discussion at the July 31, 2015 PERS Board meeting, the Board adopted an assumption of 7.50%.

Variable Account

The variable account is invested entirely in Public Equities. As a result, the annual expected arithmetic return is significantly higher than for the regular account, but so is the standard deviation. The result is a long-term compounded geometric annual return similar to the regular account, based on Milliman’s capital market assumptions. Prior to the December 31, 2012 valuation, the compound geometric variable account return was assumed to be higher than the regular account return. Beginning with that valuation, the variable account return assumption was set equal to the regular account return assumption, as the relationship between the various asset classes no longer warranted such a distinction. We recommend continuing to set the variable account return assumption equal to the regular account return assumption.

Administrative Expenses

In the mature Tier 1/Tier 2 program, administrative expenses are modest compared to program asset levels. As such, in prior valuations, administrative expenses for Tier 1/Tier 2 were estimated by a 5 basis point adjustment to the expected plan investment return. In contrast, administrative expenses for the relatively new OPSRP program are significant in comparison to OPSRP assets. As such, the recent valuations included an explicit administrative expense assumption for the OPSRP program, but not for the Tier 1/Tier 2 program.

Recently implemented GASB Statements No. 67 and No. 68 specifically require the long-term investment return assumption to be developed gross of administrative expenses. As a result, we will no longer reflect an adjustment for Tier 1/Tier 2 administrative expenses in the expected investment return, and will develop explicit administrative expense assumptions for both Tier 1/Tier 2 and OPSRP.

The OPSRP assumed administrative expenses in the December 31, 2013 valuation were \$5.5 million per year. A summary of recent actual administrative expenses for both Tier 1/Tier 2 and OPSRP is shown below.

Year	Tier 1/Tier 2		OPSRP	
	Dollar Amount (\$ millions)	Percentage of Beginning of Year Assets	Dollar Amount (\$ millions)	Percentage of Beginning of Year Assets
2010	\$22.8	0.05%	\$6.1	1.37%
2011	\$22.2	0.05%	\$6.9	1.05%
2012	\$26.4	0.06%	\$5.3	0.63%
2013	\$29.6	0.06%	\$4.5	0.38%
2014	\$30.1	0.06%	\$5.0	0.30%

Based on PERS financial reporting information reviewed as part of this study, we recommend setting the assumed actual administrative expenses for 2015 and 2016 at \$33.0 million for Tier 1/Tier 2 and maintaining the current assumption of \$5.5 million for OPSRP.

Healthcare Cost Trend Rates

Healthcare cost trend rates are used to estimate increases in the employer cost of the RHIPA subsidy. Based on analysis performed by Milliman’s healthcare actuaries, we recommend the following change to the healthcare cost trend assumption. These rates include consideration of the excise tax that will be introduced in 2018 by the Patient Protection and Affordable Care Act.

Note that the following chart shows sample rates. A full chart can be found in the appendices.

Year ¹	December 31, 2012 and 2013 Valuations	December 31, 2014 and 2015 Valuations
2013	8.0%	N/A
2014	6.1%	N/A
2015	5.9%	7.0%
2016	5.5%	6.3%
2017	6.2%	6.0%
2018	5.9%	5.4%
2019	5.8%	5.3%
2020	5.9%	5.4%
2021	6.0%	5.4%
2022	6.0%	5.4%
2023	6.5%	5.4%
2024	6.9%	5.4%

¹ For valuation purposes, the health cost trend rates are assumed to be applied at the beginning of the plan year.

Year ¹	December 31, 2012 and 2013 Valuations	December 31, 2014 and 2015 Valuations
2025	6.9%	5.5%
2030	6.6%	6.4%
2035	6.4%	6.3%
2040	5.9%	5.9%
2045	5.7%	5.7%
2050	5.6%	5.5%
2060	5.5%	5.4%
2070	5.3%	4.6%
2080	4.9%	4.5%
2090	4.7%	4.5%
2094+	4.7%	4.4%

4. Demographic Assumptions

Overview

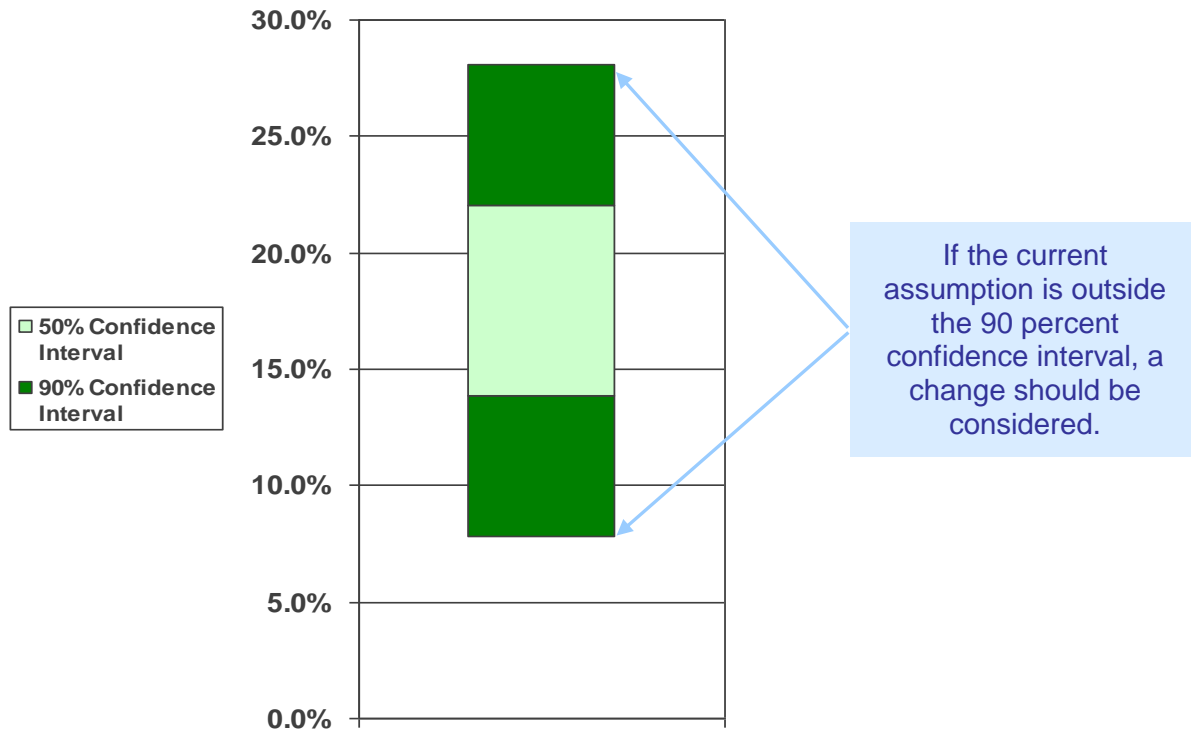
Actuarial Standard of Practice (ASOP) No. 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*, provides guidance on selecting demographic assumptions used in measuring obligations under defined benefit pension plans. The general process for recommending demographic assumptions as defined in ASOP No. 35 is as follows:

- Identify the types of assumptions;
- Consider the relevant assumption universe;
- Consider the assumption format;
- Select the specific assumptions; and
- Evaluate the reasonableness of the selected assumption.

The purpose of the demographic experience study is to compare actual experience against expected experience based on the assumptions used in the most recent actuarial valuation. The observation period used in this study is January 1, 2011 through December 31, 2014, and the current assumptions are those adopted by the Board for the December 31, 2013 actuarial valuation. If the actual experience differs significantly from the overall expected experience, or if the pattern of actual decrements by age, sex, or duration does not follow the expected pattern, new assumptions are considered.

Confidence intervals have been used to measure observed experience against current assumptions to determine the reasonableness of the assumption. The floating bars represent the 50 percent and 90 percent confidence intervals around the observed experience. The 90 percent confidence interval represents the range around the observed rate that could be expected to contain the true rate during the period of study with 90 percent probability. The size of the confidence interval depends on the number of observations and the likelihood of occurrence. If an assumption is outside the 90 percent confidence interval and there is no other information to explain the observed experience, a change in assumption should be considered. A sample graph with confidence intervals is shown below:

Overview (continued)



The demographic assumptions used for the December 31, 2013 actuarial valuation and the recommended assumptions for the December 31, 2014 and December 31, 2015 actuarial valuations are shown in detail in the following sections.

A summary of the changes recommended to the Board are as follows:

- Adjust the healthy mortality assumption to reflect an updated mortality improvement scale for all groups.
- Adjust retirement rates for most groups modestly to more closely align with recent and expected future experience.
- Increase the merit component of the salary increase assumption for all members based on observations of the last eight years of experience.
- Update pre-retirement termination of employment assumptions for two member categories.
- Slightly lower assumed rates of duty disability for general service members.
- Update the Tier 1 unused vacation cash out assumption for most categories. The recommendations increase the Tier 1 unused vacation cash out assumption based on recent experience.
- Adjust the Tier 1/Tier 2 unused sick leave assumption for three groups to more closely reflect recently observed experience.
- Decrease the healthy participation assumption for the RHIA retiree healthcare programs.
- Increase the participation assumption for the RHIPA retiree healthcare program for longer-service members.

The recommended assumptions, in our opinion, were selected in a manner consistent with the requirements of ASOP No. 35.

Mortality

Mortality rates are used to project the length of time benefits will be paid to current and future retirees and beneficiaries. The selection of a mortality assumption affects plan liabilities because the estimated value of retiree benefits depends on how long the benefit payments are expected to continue. There are clear differences in the mortality rates among healthy retired members, disabled retired members, and non-retired members. As a result, each of these groups is reviewed independently.

A summary of the current assumed mortality rates and recommended changes is shown below:

Assumption	December 31, 2013 Valuation	Recommended December 31, 2014 and 2015 Valuations
Healthy Annuitant Mortality	RP2000 <u>Generational with Scale AA</u>, Combined Active/Healthy Annuitant, Sex Distinct	RP2000 <u>Generational with Scale BB</u>, Combined Active/Healthy Annuitant, Sex Distinct
▪ School District male	No collar, set back 24 months	No change to collar adjustment or set back
▪ Other General Service male (and male beneficiary)	Blended 25% blue collar/75% white collar, set back 12 months	No change to collar adjustment or set back
▪ Police & Fire male	Blended 25% blue collar/75% white collar, set back 12 months	No change to collar adjustment or set back
▪ School District female	White collar, set back 24 months	No collar, set back 24 months
▪ Other female (and female beneficiary)	White collar, no setback	Blended 25% blue collar/75% white collar, no setback
Disabled Retiree Mortality	RP 2000 <u>Static</u>, Disabled, No Collar, Sex distinct	RP 2000 <u>Generational with Scale BB</u>, Disabled, No Collar, Sex distinct
▪ Male	65% of Disabled table, but not less than corresponding healthy annuitant rates	70% of Disabled table, but not less than corresponding healthy annuitant rates
▪ Female	90% of Disabled table, but not less than corresponding healthy annuitant rates	95% of Disabled table, but not less than corresponding healthy annuitant rates
Non-Annuitant Mortality	Fixed Percentage of Healthy Annuitant Mortality	No change
▪ School District male	70%	60%
▪ Other General Service male	85%	75%
▪ Police & Fire male	95%	75%
▪ School District female	60%	55%
▪ Other female	55%	60%

Mortality (continued)

Healthy Annuitant Mortality

Mortality assumptions for healthy retired members are separated into five groups based on employment category and gender (school district males, school district females, police & fire males, other general service males, all other females). Experience for female police & fire members was not sufficient for them to be rated on their own, so they were combined with non-school district general service females.

Mortality rates are expected to continue to decrease in the future, and the resulting increased longevity should be anticipated in the actuarial valuation. For Oregon PERS, this is done through the use of a generational mortality table. A generational mortality table anticipates future improvements in mortality by using a different static mortality table for each year of birth, with the tables for later years of birth assuming lower mortality than the tables for earlier years of birth.

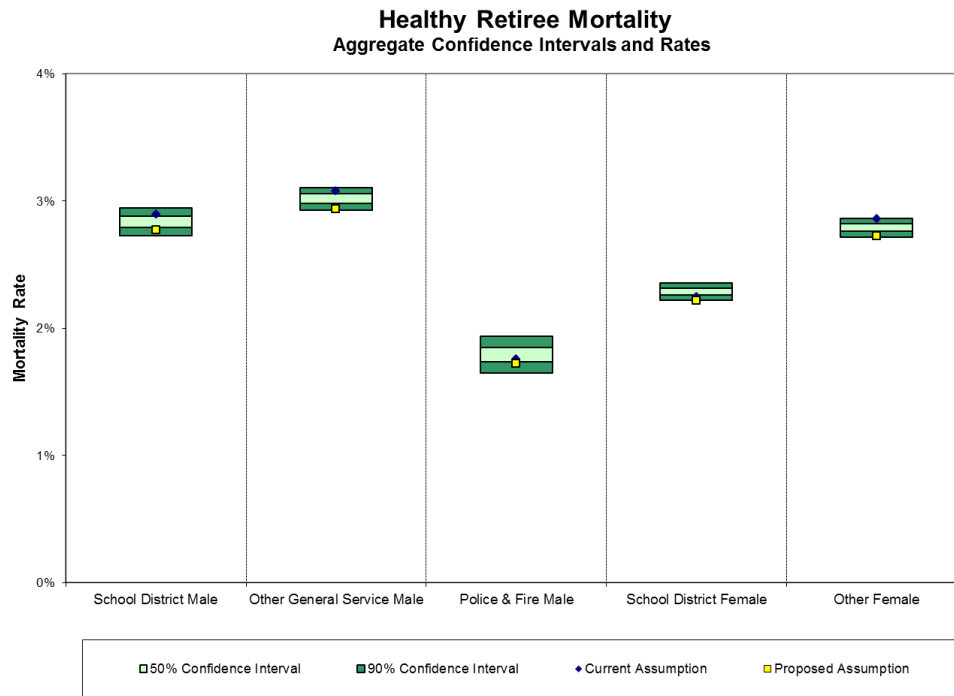
To assist in review of the current mortality assumption’s reasonability, we calculated the ratio of actual deaths to expected deaths (A/E ratio) during the experience study period for each of the five groups described above. With a generational mortality table, we generally targeted A/E ratios of near 100 percent in previous studies.

	Exposures	Actual Deaths	Current Assumption		Recommended Assumption	
			Expected Deaths	A/E Ratio	Expected Deaths	A/E Ratio
School District male	62,018	1,758	1,796	98%	1,717	102%
Other General Service male	99,915	3,015	3,077	98%	2,931	103%
Police & Fire male	23,670	424	416	102%	408	104%
School District Female	131,204	2,999	2,946	102%	2,906	103%
Other female	133,632	3,728	3,817	98%	3,640	102%

The A/E ratios for all of the groups were near 100 percent, which indicates the current assumptions have tracked recent experience well in aggregate. However, based on recently-concluded studies prepared by the Society of Actuaries (SOA), we recommend updating the mortality improvement scale used to project future mortality from the current Scale AA to Scale BB. The SOA’s research, based upon analysis of large amounts of Social Security data, indicates that Scale AA no longer would constitute the “best actuarial information on mortality at the time” as mandated by ORS 238.607.

In this study, we recommend targeting an A/E ratio with a margin slightly above 100 percent (from 102 to 104 percent). This margin is intended as an allowance for the fact that our analysis uses a headcount-weighted approach, rather than a benefits-weighted approach which might produce moderately lower weighted mortality rates.

Mortality (continued)



The RP 2000 generational mortality table has a number of adjustments that can be applied to match the mortality rates of Oregon PERS. At times we use a “set back” to adjust the mortality rates. A “set back” of 12 months, for example, treats all members as if they were 12 months younger than they really are when applying the mortality table, which results in lower assumed mortality rates for members. In addition to a “set back,” we have also applied a collar adjustment as defined in the RP 2000 table. Essentially, a “white collar” adjustment further reduces the rates of mortality while a “blue collar” adjustment increases the rates of mortality. The basic table reflects a blend of approximately 55 percent “white collar” and 45 percent “blue collar.” Please note that “white collar” and “blue collar” are used in this context only to describe the adjustments made to the RP 2000 generational mortality table and are not intended to classify any members as either “blue collar” or “white collar.”

Mortality (*continued*)

A summary of the current and recommended healthy retiree mortality assumptions is shown below:

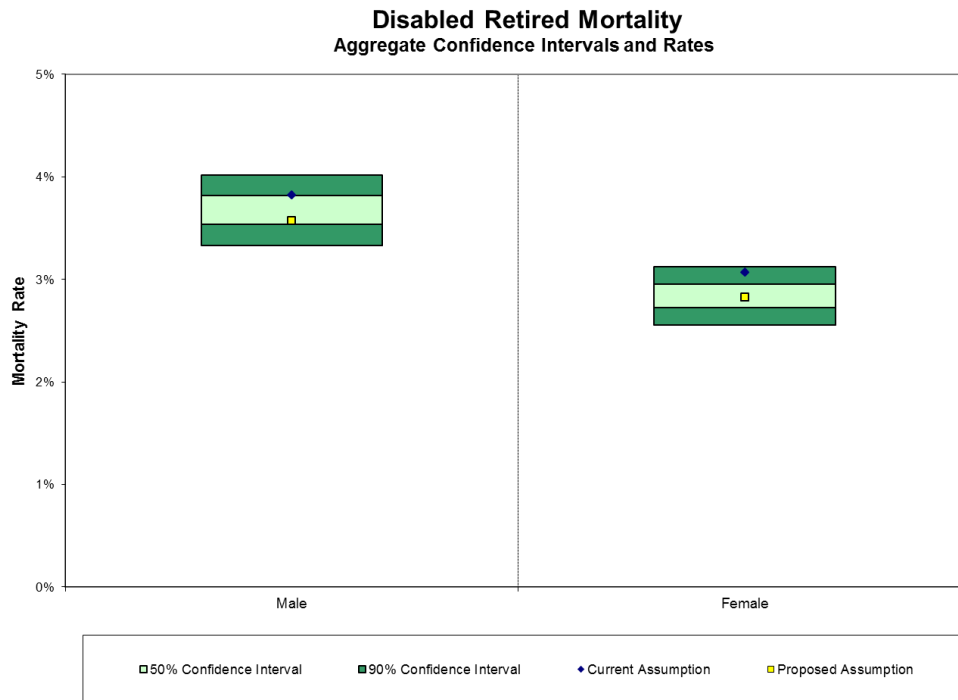
	December 31, 2013 Valuation	Recommended December 31, 2014 and 2015 Valuations
Basic Table	RP2000 <u>Generational with Scale AA</u>, Combined Active/Healthy Annuitant, Sex Distinct	RP2000 <u>Generational with Scale BB</u>, Combined Active/Healthy Annuitant, Sex Distinct
School District male	No collar, set back 24 months	No change to collar adjustment or set back
Other General Service male (and male beneficiary)	Blended 25% blue collar/75% white collar, set back 12 months	No change to collar adjustment or set back
Police & Fire male	Blended 25% blue collar/75% white collar, set back 12 months	No change to collar adjustment or set back
School District female	White collar, set back 24 months	No collar, set back 24 months
Other female (and female beneficiary)	White collar, no setback	Blended 25% blue collar/75% white collar, no setback

Disabled Retiree Mortality

Disabled members are expected to experience higher mortality rates at a given age than healthy retired members. In the past, disabled mortality was not expected to improve over time as significantly as healthy mortality. As a result, the current assumption does not use generational mortality for disabled retirees. However, based on recent studies performed by the Social Security Administration and the Society of Actuaries, it is now reasonable to assume continued improvement in disabled mortality as is standard for healthy mortality. We now recommend updating the disabled mortality assumption to reflect generational mortality improvement.

	Exposures	Actual Deaths	December 31, 2013 Valuation		Recommended December 31, 2014 and 2015 Valuations	
			Expected Deaths	A/E Ratio	Expected Deaths	A/E Ratio
Male	8,164	300	312	96%	291	103%
Female	9,328	265	286	93%	253	101%

Mortality (continued)



A summary of current and recommended disabled retiree mortality assumptions is shown below:

	December 31, 2013 Valuation	Recommended December 31, 2014 and 2015 Valuations
Basic Table	RP 2000 <u>Static</u>, Disabled, No Collar, Sex distinct	RP 2000 <u>Generational with Scale BB</u>, Disabled, No Collar, Sex distinct
Male	65% of Disabled table, but not less than corresponding healthy annuitant rates	70% of Disabled table, but not less than corresponding healthy annuitant rates
Female	90% of Disabled table, but not less than corresponding healthy annuitant rates	95% of Disabled table, but not less than corresponding healthy annuitant rates

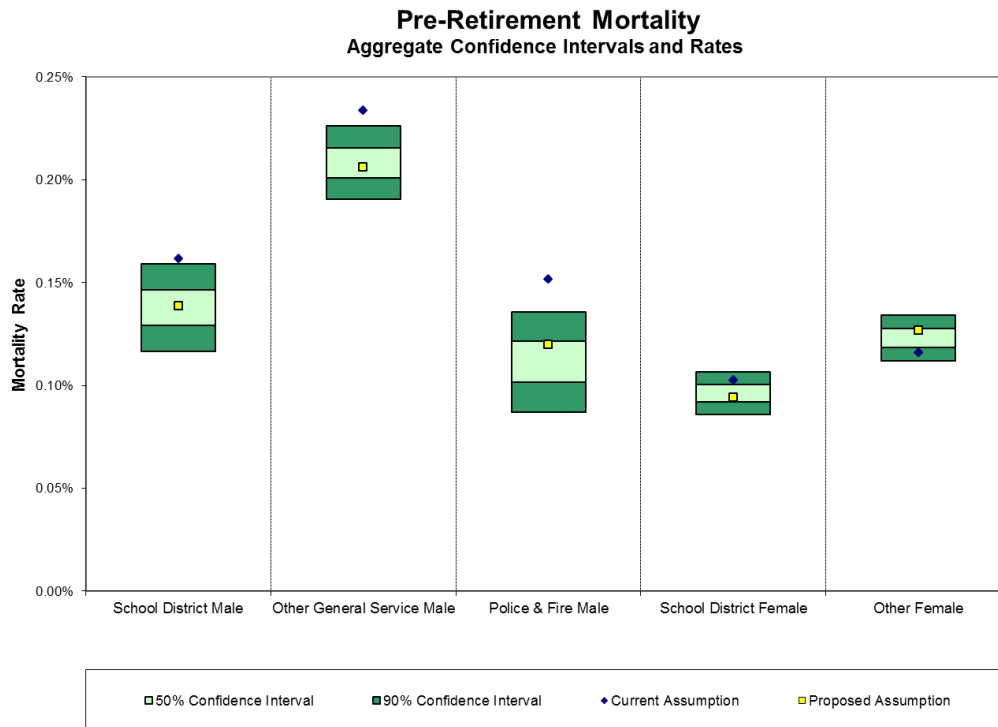
Non-Annuitant Mortality

The non-annuitant mortality assumption applies to active members and dormant members (those members who have terminated employment but are vested and entitled to a future benefit), and is a fixed percentage of the healthy annuitant mortality rates. Because the healthy annuitant mortality assumptions have changed for all groups, the associated non-annuitant mortality assumptions have also changed. The analysis below compares the current fixed percentages as applied to the recommended healthy annuitant mortality assumptions to determine if a change also needs to be made in the fixed percentages for each of the groups. A/E ratios for non-annuitants have been targeted around 100 percent.

Mortality (continued)

	Exposures	Actual Deaths	December 31, 2013 Valuation		Recommended December 31, 2014 and 2015 Valuations	
			Expected Deaths	A/E Ratio	Expected Deaths	A/E Ratio
School District male	81,602	113	132	85%	113	99%
Other General Service male	177,419	370	415	89%	366	101%
Police & Fire male	50,284	56	76	74%	60	93%
School District female	237,658	229	244	94%	224	102%
Other female	265,198	327	308	106%	336	97%

With the very limited number of non-retired deaths in the experience period, the A/E ratio tends to fluctuate, particularly for police & fire males. Since the underlying annuitant mortality table was changed for all groups with the introduction of mortality projection Scale BB, the percentage factors used for active mortality were all updated at the same time.



Mortality (*continued*)

A summary of the current and recommended non-retired mortality assumptions is shown below:

	December 31, 2013 Valuation	Recommended December 31, 2014 and 2015 Valuations
Basic Assumption	Fixed Percentage of Healthy Annuitant Mortality	No change
School District male	70%	60%
Other General Service male	85%	75%
Police & Fire male	95%	75%
School District female	60%	55%
Other female	55%	60%

Retirement Assumptions

The retirement assumptions used in the actuarial valuation include the following assumptions:

- Retirement from active status
- Probability a member will elect a lump sum option at retirement
- Percentage of members who elect to purchase credited service at retirement.

Retirement from Active Status

Members are eligible to retire as early as age 55 (50 for police & fire members) or earlier if the member has 30 years of service. In our analysis, we have found significant differences in the retirement patterns based on length of service, employment category (general service or police & fire), and eligibility for unreduced benefits.

A summary of the early, normal, and unreduced retirement dates under the plan are as follows:

Employment Category	Tier	Normal Retirement Age	Early Retirement Age	Unreduced Retirement
General Service	1	58	55	30 years of service
General Service	2	60	55	30 years of service
General Service	OPSRP	65	55	Age 58 with 30 years
Police & Fire	1 and 2	55	50	30 years of service, or age 50 with 25 years of service
Police & Fire	OPSRP	60	50	Age 53 with 25 years
State Judiciary	N/A	65	60	60 if Plan B; N/A if Plan A

Structure for Retirement Rates

The structure of the PERS retirement rate assumption separates rates by job classification and by service level. General service rates differ across three service bands: less than 15 years, 15 to 29 years, and 30 or more years of service. The first two service bands have different assumptions for school districts versus all other general service members. With this study, we also recommend different assumptions for school districts versus all other general service members for the third service band. Police & fire rates employ the following three service bands: less than 13 years, 13 to 24 years, and 25 or more years of service.

The service band structure anticipates that member retirement decisions will contemplate the amount of the retirement benefit and the affordability of retirement.

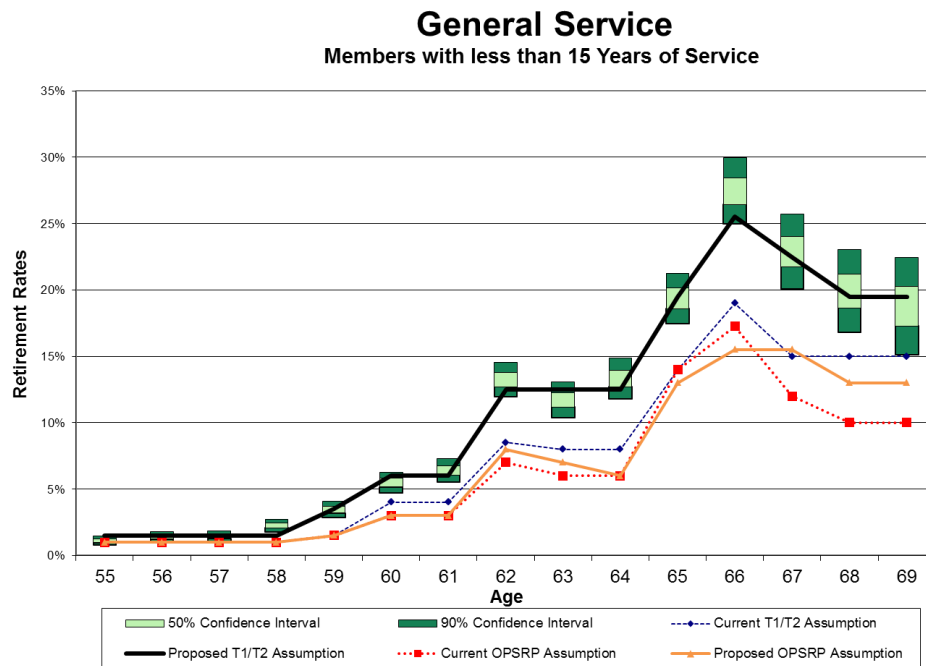
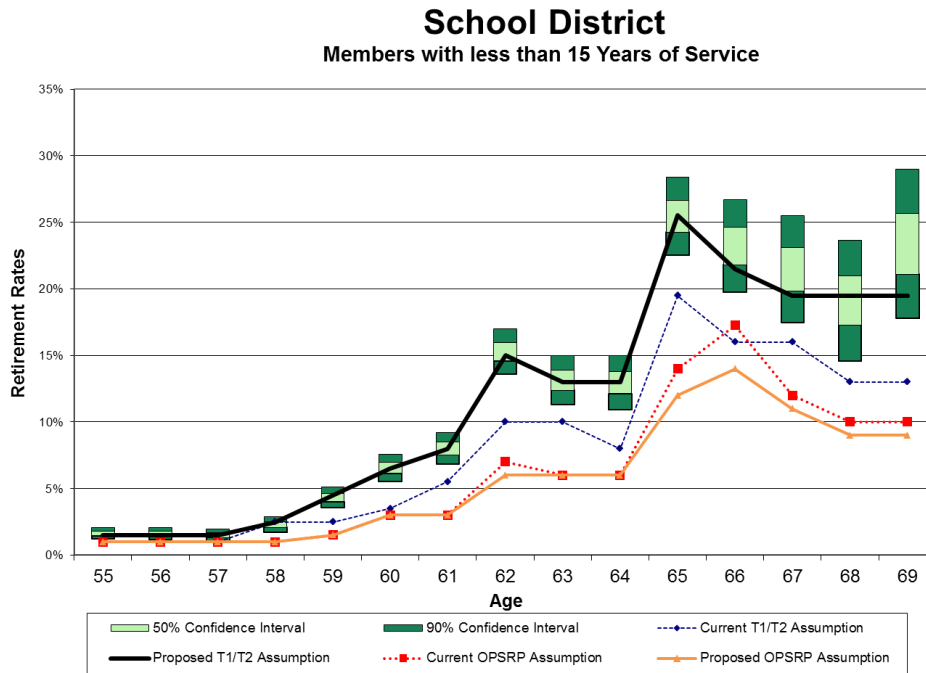
School District and General Service Retirement Rates

Members with Less Than 15 Years of Service

Retirement decisions by members with less than 15 years of service are likely to be heavily influenced by the availability of resources other than PERS benefits, including Social Security, prior employment, spousal benefits, and savings.

The following charts show the current assumed rates of retirement, the confidence interval around observed experience, and the recommended retirement rate assumption for school district and general service members retiring with less than 15 years of service.

Retirement Assumptions (continued)



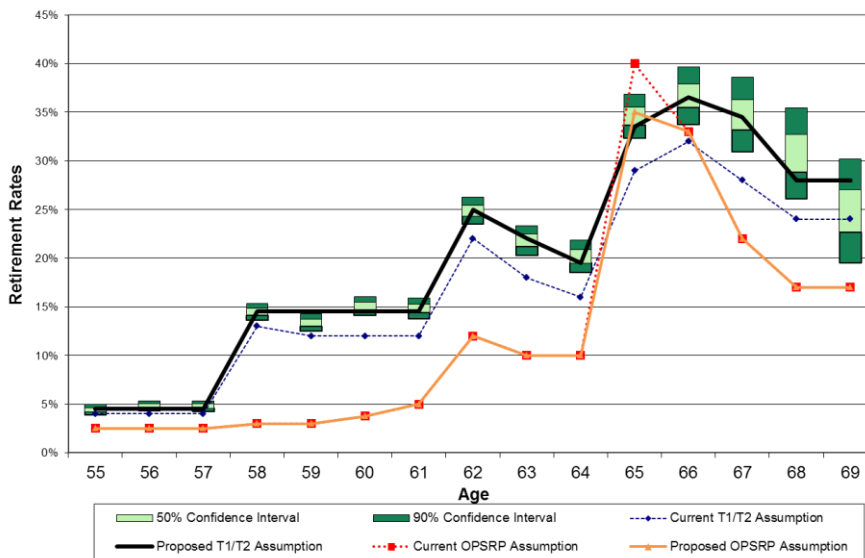
Retirement Assumptions (continued)

Members with 15 to 30 Years of Service

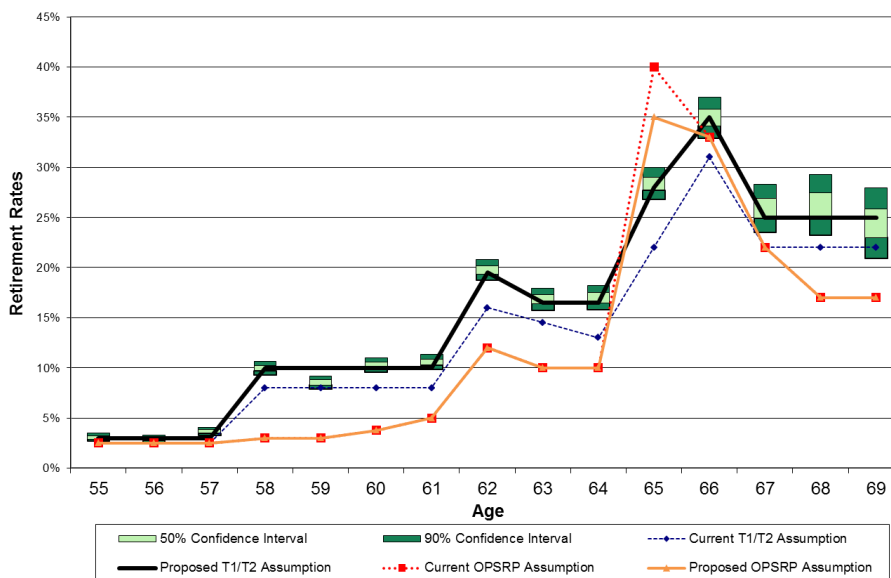
Retirement decisions by members with 15 to 29 years of years of service are likely to be influenced by the structure of PERS benefits as well as the availability of other resources, including Social Security, prior employment, spousal benefits, and savings.

The following charts show the current assumed rates of retirement, the confidence interval around observed experience, and the recommended retirement rate assumption for school district and general service members retiring with more than 15 years of service and less than 30 years of service.

School District
Members with 15 - 29 Years of Service



General Service
Members with 15 - 29 Years of Service



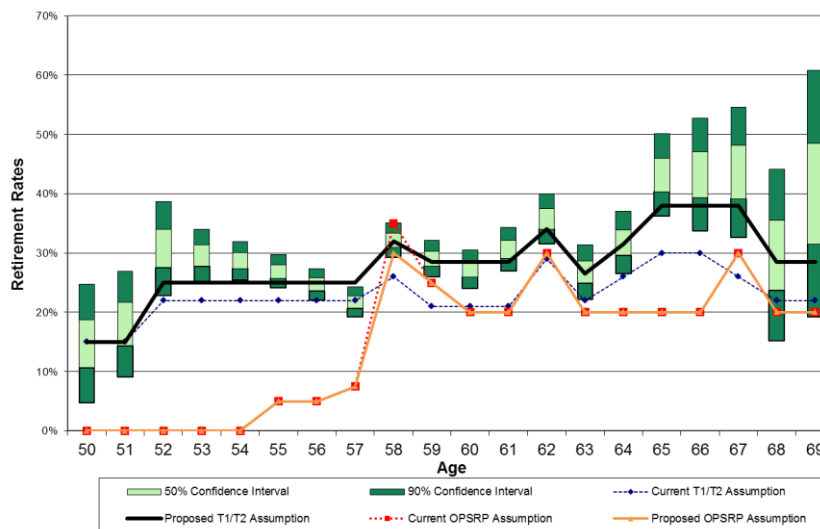
Retirement Assumptions (continued)

Members with 30 or More Years of Service

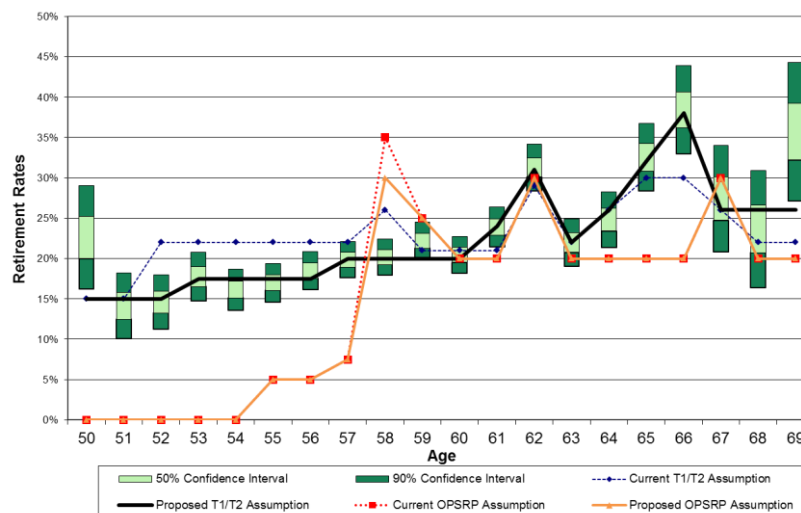
Previously, the retirement rate assumption for members with 30 or more years of service at retirement did not differentiate between school district and all other general service members. With this study, we have analyzed the rates separately and now recommend adopting distinct rates for these groups. Our analysis indicated that school district members with 30 or more years of service had higher rates of retirement than did other general service members with 30 or more years of service. Our recommended assumption reflects this experience.

The following charts show the current assumed rates of retirement, the confidence interval around observed experience and the recommended retirement rate assumption for school district and other general service members retiring with more than 30 years of service.

School District
Members with 30+Years of Service



General Service
Members with 30+Years of Service



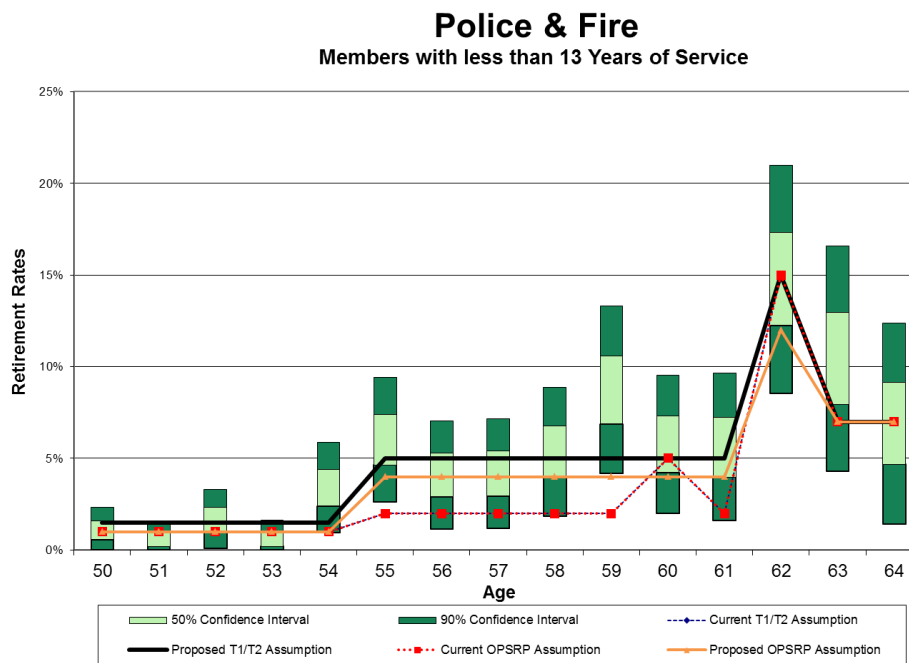
Retirement Assumptions (continued)

Police & Fire

Members with Less Than 13 Years of Service

The retirement assumption for police & fire members differs for members retiring with less than 13 years of service, those retiring with between 13 and 24 years of service, and those retiring with more than 25 years of service. Retirement decisions by members with less than 13 years of service are likely to be heavily influenced by the availability of resources other than PERS benefits, including Social Security, prior employment, spousal benefits, and savings.

The following graph shows the current assumed rates of retirement, the confidence interval around observed experience and the recommended retirement rate assumption for police & fire members retiring with less than 13 years of service.

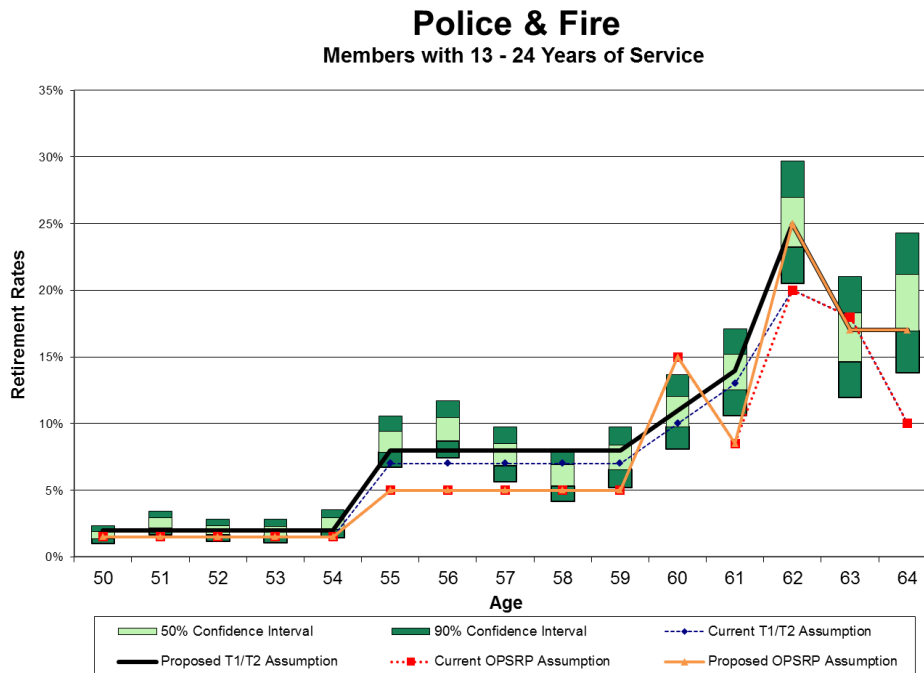


Retirement Assumptions (continued)

Members with 13 to 24 Years of Service

Retirement rates for members with 13 to 24 years of service are likely to be influenced by the structure of PERS benefits as well as the availability of other resources, including Social Security, prior employment, spousal benefits, and savings.

The following chart shows the current assumed rates of retirement, the confidence interval around observed experience, and the recommended retirement rate assumption for police & fire members retiring with between 13 and 24 years of service.

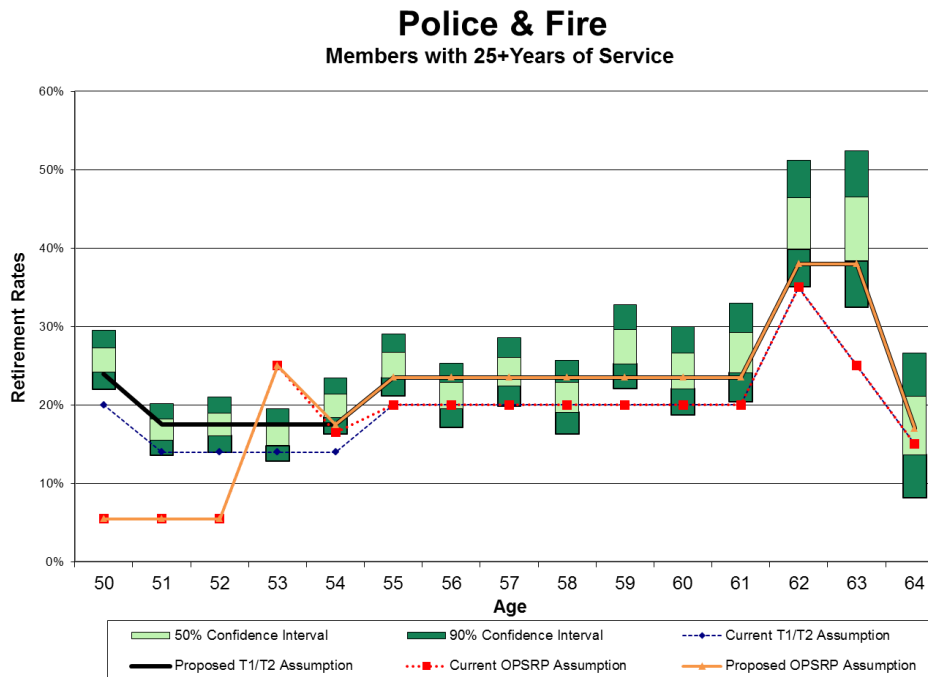


Retirement Assumptions (continued)

Members with 25 or More Years of Service

Police & fire members with 25 or more years of service can retire immediately at age 50 (53 for OPSRP) with unreduced retirement benefits. As a result, retirement rates at all ages are relatively high, with a spike at first eligibility for unreduced benefits, and another increase when Social Security benefits become available.

The following chart shows the current assumed rates of retirement, the confidence interval around observed experience, and the recommended retirement rate assumption for police & fire members retiring with more than 25 years of service.

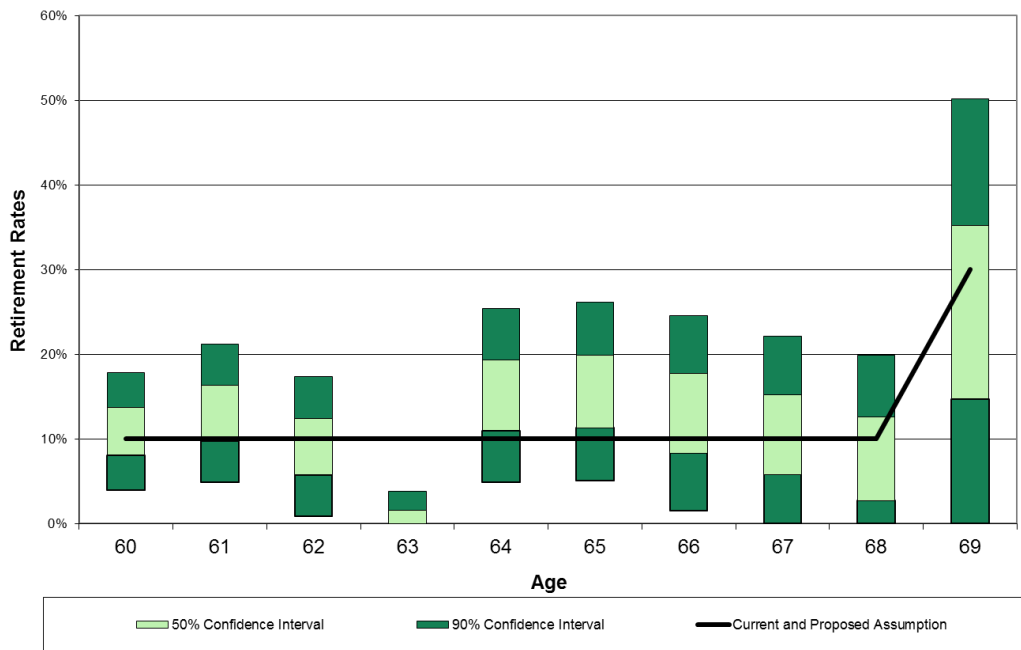


Retirement Assumptions (*continued*)

Judges

The following chart shows the current assumed rates of retirement, the confidence interval around observed experience, and the recommended retirement rate assumption for members of the State Judiciary. The current assumption generally remains in the confidence intervals, so no changes are proposed to the current assumption.

Judge Members



Retirement Assumptions (continued)

Summary of Recommended Retirement Rates

The following table summarizes our recommended Tier 1/Tier 2 retirement rates:

Tier 1/Tier 2 Recommended December 31, 2014 and 2015 Valuations										
	Police & Fire			General Service			School Districts			Judges
Age	< 13 yrs	13-24 yrs	25+ yrs	<15 yrs	15-29 yrs	30+ yrs	<15 yrs	15-29 yrs	30+ yrs	
Less than 50						15.00%			15.00%	
50	1.50%	2.00%	24.00%			15.00%			15.00%	
51	1.50%	2.00%	17.50%			15.00%			15.00%	
52	1.50%	2.00%	17.50%			15.00%			25.00%	
53	1.50%	2.00%	17.50%			17.50%			25.00%	
54	1.50%	2.00%	17.50%			17.50%			25.00%	
55	5.00%	8.00%	23.50%	1.50%	3.00%	17.50%	1.50%	4.50%	25.00%	
56	5.00%	8.00%	23.50%	1.50%	3.00%	17.50%	1.50%	4.50%	25.00%	
57	5.00%	8.00%	23.50%	1.50%	3.00%	20.00%	1.50%	4.50%	25.00%	
58	5.00%	8.00%	23.50%	1.50%	10.00%	20.00%	2.50%	14.50%	32.00%	
59	5.00%	8.00%	23.50%	3.50%	10.00%	20.00%	4.50%	14.50%	28.50%	
60	5.00%	11.00%	23.50%	6.00%	10.00%	20.00%	6.50%	14.50%	28.50%	10.00%
61	5.00%	14.00%	23.50%	6.00%	10.00%	24.00%	8.00%	14.50%	28.50%	10.00%
62	15.00%	25.00%	38.00%	12.50%	19.50%	31.00%	15.00%	25.00%	34.00%	10.00%
63	7.00%	17.00%	38.00%	12.50%	16.50%	22.00%	13.00%	22.00%	26.50%	10.00%
64	7.00%	17.00%	17.00%	12.50%	16.50%	26.00%	13.00%	19.50%	31.50%	10.00%
65	100.00%	100.00%	100.00%	19.50%	28.00%	32.00%	25.50%	33.50%	38.00%	10.00%
66				25.50%	35.00%	38.00%	21.50%	36.50%	38.00%	10.00%
67				22.50%	25.00%	26.00%	19.50%	34.50%	38.00%	10.00%
68				19.50%	25.00%	26.00%	19.50%	28.00%	28.50%	10.00%
69				19.50%	25.00%	26.00%	19.50%	28.00%	28.50%	30.00%
70				100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Retirement Assumptions (*continued*)

The following table summarizes our recommended OPSRP retirement rates:

OPSRP Recommended December 31, 2014 and 2015 Valuations									
	Police & Fire			General Service			School Districts		
Age	< 13 yrs	13-24 yrs	25+ yrs	<15 yrs	15-29 yrs	30+ yrs	<15 yrs	15-29 yrs	30+ yrs
50	1.00%	1.50%	5.50%						
51	1.00%	1.50%	5.50%						
52	1.00%	1.50%	5.50%						
53	1.00%	1.50%	25.00%						
54	1.00%	1.50%	17.50%						
55	4.00%	5.00%	23.50%	1.00%	2.50%	5.00%	1.00%	2.50%	5.00%
56	4.00%	5.00%	23.50%	1.00%	2.50%	5.00%	1.00%	2.50%	5.00%
57	4.00%	5.00%	23.50%	1.00%	2.50%	7.50%	1.00%	2.50%	7.50%
58	4.00%	5.00%	23.50%	1.00%	3.00%	30.00%	1.00%	3.00%	30.00%
59	4.00%	5.00%	23.50%	1.50%	3.00%	25.00%	1.50%	3.00%	25.00%
60	4.00%	15.00%	23.50%	3.00%	3.75%	20.00%	3.00%	3.75%	20.00%
61	4.00%	8.50%	23.50%	3.00%	5.00%	20.00%	3.00%	5.00%	20.00%
62	12.00%	25.00%	38.00%	8.00%	12.00%	30.00%	6.00%	12.00%	30.00%
63	7.00%	17.00%	38.00%	7.00%	10.00%	20.00%	6.00%	10.00%	20.00%
64	7.00%	17.00%	17.00%	6.00%	10.00%	20.00%	6.00%	10.00%	20.00%
65	100.00%	100.00%	100.00%	13.00%	35.00%	20.00%	12.00%	35.00%	20.00%
66				15.50%	33.00%	20.00%	14.00%	33.00%	20.00%
67				15.50%	22.00%	30.00%	11.00%	22.00%	30.00%
68				13.00%	17.00%	20.00%	9.00%	17.00%	20.00%
69				13.00%	17.00%	20.00%	9.00%	17.00%	20.00%
70				100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Retirement Assumptions (*continued*)

Lump Sum Option at Retirement

At retirement, a member has the option of electing a total lump sum distribution equal to two times the member's account balance, a partial lump sum distribution equal to the member's account balance with a reduced monthly allowance, or a monthly allowance with no lump sum distribution. The percentage of active members electing a lump sum distribution at retirement has declined slightly from the prior experience study. The results of our analysis are as follows:

Election at Retirement	Number of Retired Members	Percentage of Retirements	December 31, 2013 Valuation Assumption	Recommended December 31, 2014 and 2015 Valuations
Partial Lump Sum	868	4.5%	5.0%	4.5%
Total Lump Sum				
• 2011	245	4.6%	N/A	N/A
• 2012	133	3.3%	N/A	N/A
• 2013	217	3.7%	4.0%	N/A
• 2014	129	3.1%	3.5%	N/A
• 2015	TBD	TBD	3.0%	No change
• 2016	TBD	TBD	2.5%	No change

When a member elects a total or partial lump sum under Money Match or a partial lump sum under Full Formula, he or she gives up the value of future COLAs (cost of living allowances) on the lump sum amount. A total lump sum election under Full Formula may cause the member to give up significantly more. Because there are no new contributions to member accounts and the system is projected to become dominated by Full Formula over time, we expect the total lump sum rate to decline over time.

Based on the data shown above, we recommend lowering the partial lump sum assumption of 5.0 percent to 4.5 percent. We recommend no change to the total lump sum assumption of 3.0 percent in 2015 decreasing by 0.5 percent per year until reaching 0.0 percent.

Retirement Assumptions (*continued*)

Purchase of Credited Service

A member has the option of purchasing service at retirement to enhance his or her retirement benefits. Service may be purchased under one or more of the following categories:

- Purchase of forfeited service
- Credit for waiting time
- Credit for educational service
- Credit for military service
- Credit for seasonal positions
- Credit for police officers and firefighters
- Purchase of retirement credit for disability time

Most purchases are full cost purchases, meaning the member pays both the member and employer cost to obtain the service. Since the member pays the full cost of the service purchased, the purchase produces no impact or only a small impact on projected Tier 1/Tier 2 employer costs. The most common, and predictable, non-full cost service purchase made by members is purchasing credit for the six-month waiting period. Thus, for valuation purposes, we have included an adjustment to account for those members who are expected to make the waiting period service purchase.

For Money Match retirements, the purchase of credited service is generally cost-neutral to the system, because the member is depositing both the member and employer contributions. Therefore, in reviewing actual experience, we examined non-Money Match retirements. The following table shows the number of members who retired in the experience period and elected to purchase credit for the six-month waiting period:

	Count	Number Electing to Purchase Waiting Time Service	Percentage of Retirements	December 31, 2013 Valuation Assumption	Recommended December 31, 2014 and 2015 Valuations
Non-Money Match Retirements	11,958	7,204	60%	60%	60%

We recommend maintaining the assumption of non-Money Match retirements purchasing credited service for the six month waiting period at 60 percent.

Disability Incidence Assumptions

The Plan provides duty and non-duty disability benefits to members. Members are eligible to receive duty disability benefits if they become disabled as a direct result of a job-related injury or illness, regardless of length of service. Members are eligible for non-duty disability benefits (also referred to as ordinary disability) if they become disabled after ten years of service (six years if a judge), but prior to normal retirement eligibility.

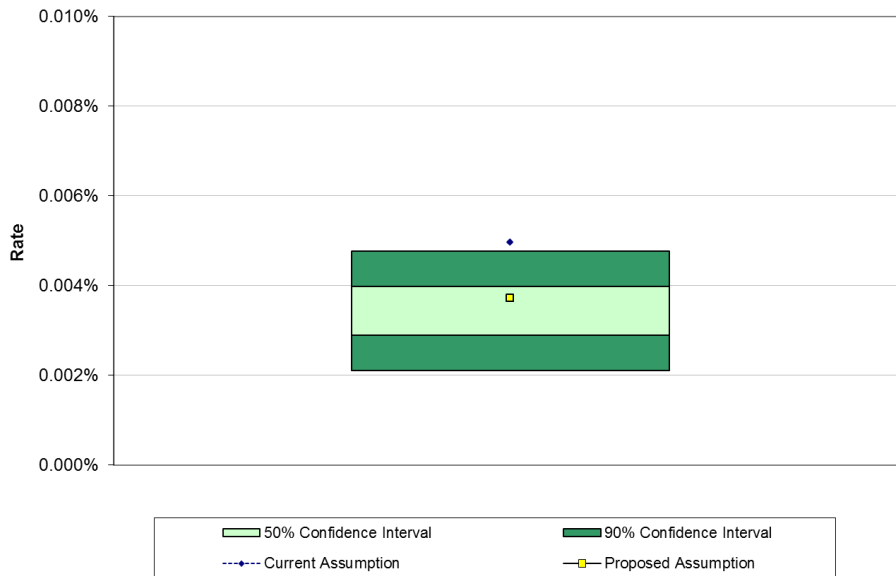
Duty disability incidence rates are developed separately for police & fire and general service members. Ordinary (non-duty) disability rates are developed for the system as a whole.

Duty Disability

Due to the limited amount of experience data available at some ages, this assumption employs a standard table adjusted to fit within the aggregate confidence interval. We recommend updating the duty disability incidence assumption for general service at this time.

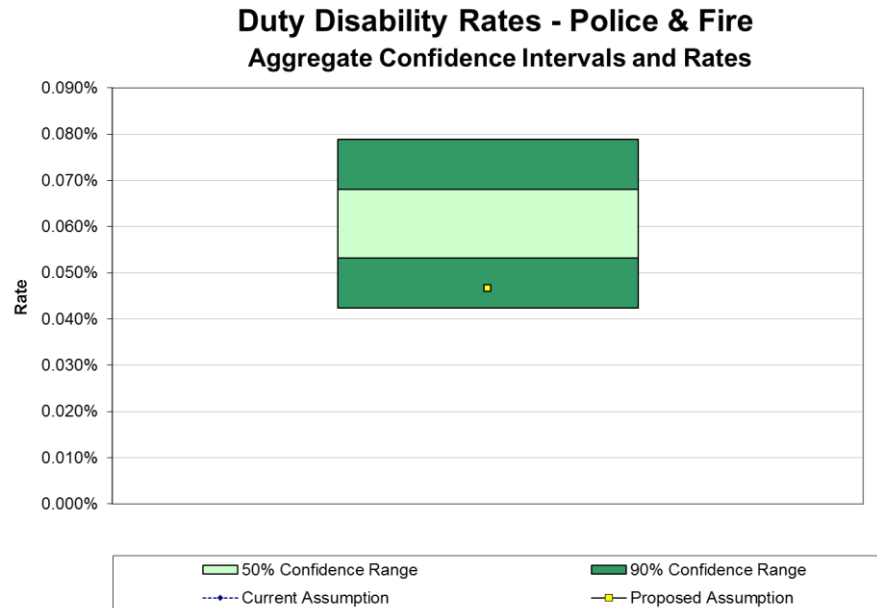
The current assumed aggregate rate for the general service assumption is above the 90 percent confidence interval of the disability rates experienced. We recommend updating the assumption to more closely match observed experience.

Duty Disability Rates - General Service
Aggregate Confidence Intervals and Rates



The current assumed aggregate rate for police & fire members is below actual observed experience, but within the 90 percent confidence interval. As such, we recommend maintaining the current assumption and continuing to monitor experience in the next study.

Disability Incidence Assumptions (continued)

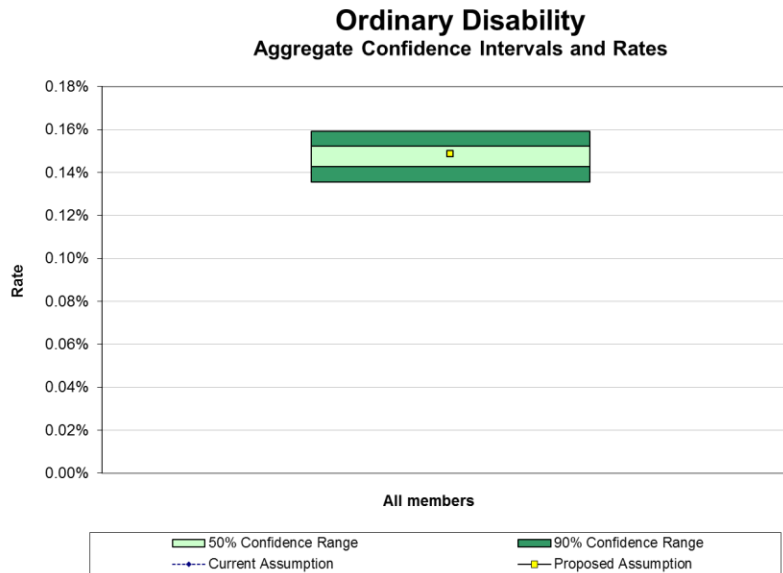


Ordinary (Non-Duty) Disability

As with duty disability, the experience data for ordinary disability was very limited at specific ages. Therefore, this assumption also uses a standard table adjusted to fit within the aggregate confidence interval. Based on the disability rates experienced, we recommend no change to the ordinary disability incidence assumption at this time.

The data underlying the ordinary disability study showed a pattern wherein a member's record would only be recognized as a disability retirement (rather than a service retirement or other separation from service) after a lag period that could span over a year. Because such lagged experience is not yet available for 2014, the final year of our study, we included in our analysis an assumption as to additional disabilities occurring in 2014 that will not be apparent until the subsequent reporting period. Our assumption was based on an average of such records observed in the first three years of the study.

Disability Incidence Assumptions (continued)



The following table summarizes our recommended disability incidence rates:

	Percentage of the 1985 Disability Class 1 Rates	
	December 31, 2013 Valuation	Recommended December 31, 2014 and 2015 Valuations
Duty Disability		
• Police & Fire	20% (0.006% – 0.169%)	No change
• General Service	1.2% (0.0004% – 0.010%)	0.9% (0.0003% – 0.008%)
Ordinary Disability	50% with 0.18% cap (0.015% – 0.180%)	No change

Termination Assumptions

Not all active members are expected to continue working for covered employers until retirement. Termination rates represent the probabilities that a member will leave covered employment for causes other than retirement, disability or death at any given point during their working career.

Beginning with the most recent experience study, termination rates have been developed as service-based assumptions. Prior to that, the assumption was structured as an age-based select and ultimate assumption. The service-based assumptions reflect the experience of Tier 1, Tier 2, and OPSRP members, with each group affecting the period of the table relating to the relevant service amount.

Assumptions are developed for the following groups:

- School District males
- School District females
- Other General Service males
- Other General Service females
- Police & Fire (single table for both males and females)

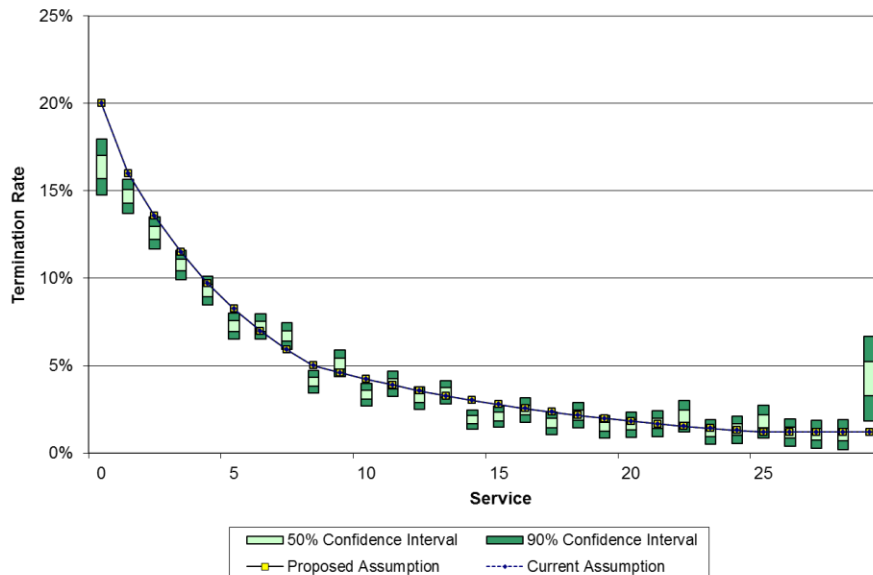
Termination Rates

The following charts show the confidence interval around observed experience and the recommended rates of termination by year of service. These charts are based on the observed experience of members in the relevant group during the study period. We recommend changes to the assumptions for non-school district general service females and police & fire members. For the other three groups, we recommend maintaining the current assumption and evaluating again with the next study.

Full listings of recommended termination assumptions are included in the appendix.

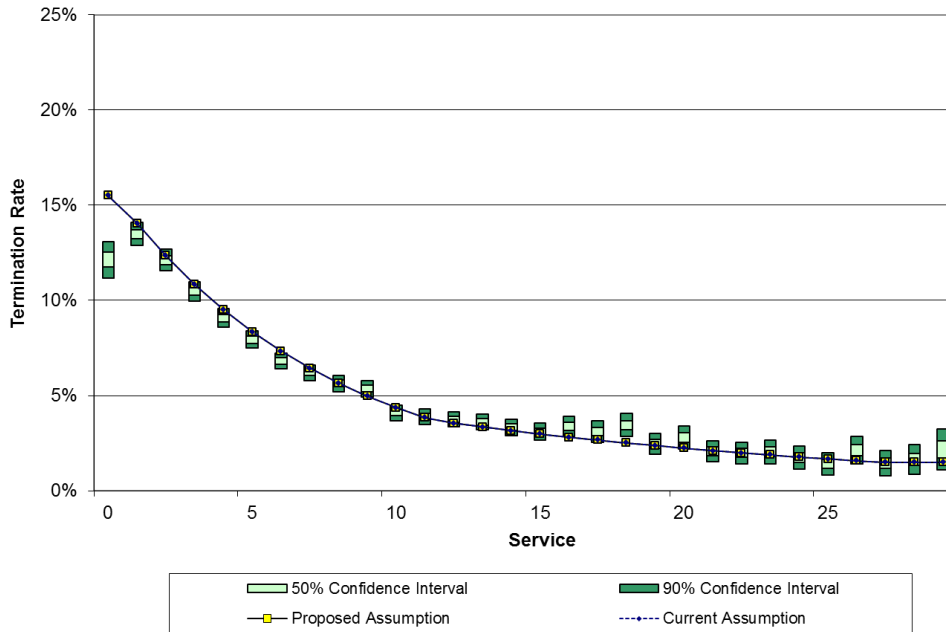
School Districts

School District Male



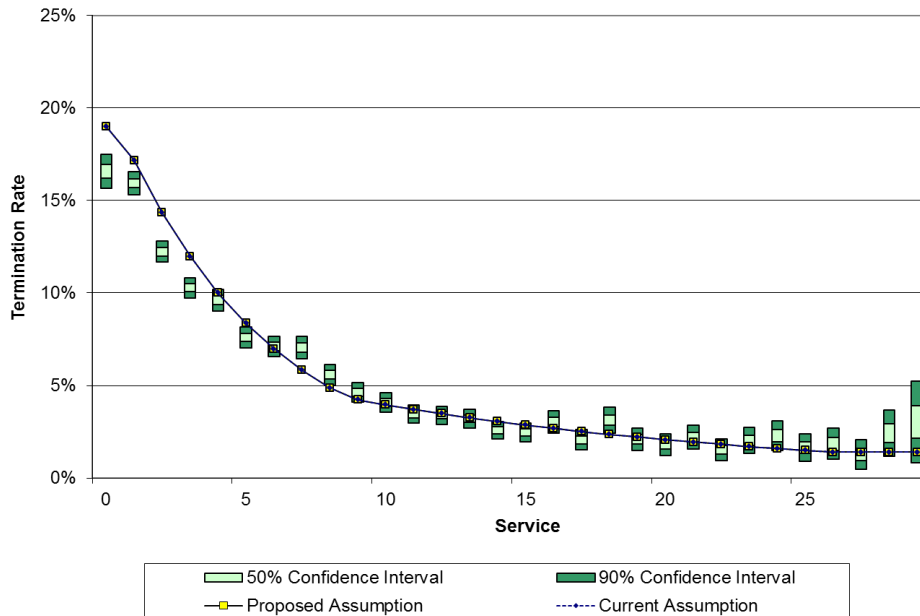
Termination Assumptions (continued)

School District Female



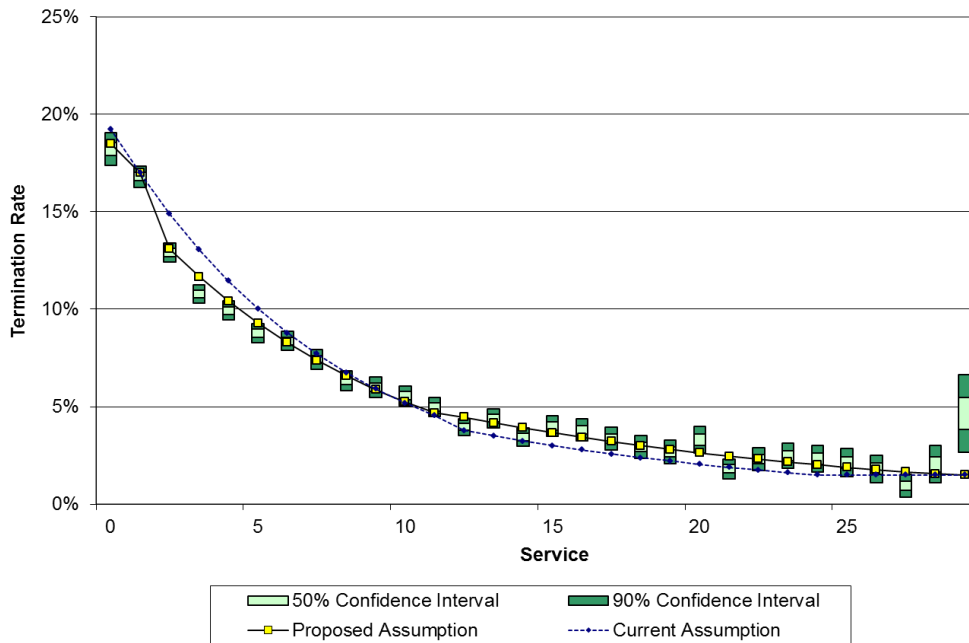
General Service

Other General Service Male



Termination Assumptions (continued)

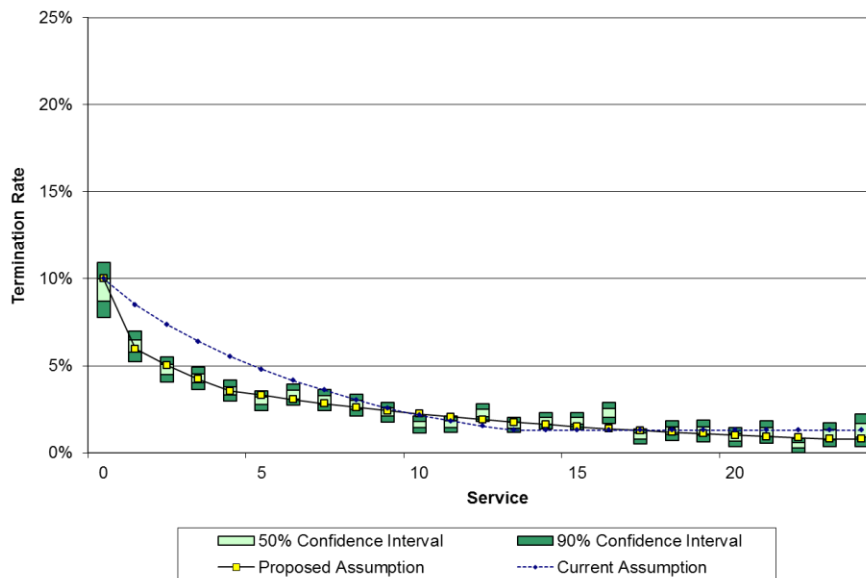
Other General Service Female



Police & Fire

All police & fire members were rated together, with no variation by group or gender.

Police & Fire



Salary Increase Assumptions

The salary increase assumptions analyzed with demographic experience were:

- Merit scale increases
- Unused sick leave adjustments
- Unused vacation cash out adjustments

Merit Scale

The merit scale assumption is used in conjunction with the inflation and real wage growth assumptions to project individual member salaries to retirement. To focus on the merit and longevity component of salary increases, actual inflation and assumed long-term real wage growth were subtracted from observed salary increases. Our analysis assumes a one-year lag in the impact of actual inflation on a member’s salary increase. For example, actual inflation during 2013 is expected to impact the ratio of salary during 2014 to salary during 2013. In our analysis, the 1.00 percent assumed level of annual real wage growth adopted by the PERS Board was used instead of the actual annual changes in the Average Wage Index (AWI) published by the Social Security Administration. A stable annual productivity assumption was judged to be a more appropriate measure for the salary increase expectations of members and employers in, for example, a bargaining process to set salary increases.

In order to capture experience across a broader range of budget, collective bargaining, and economic cycles, the analysis covered observed salary experience from 2006 through 2014. As shown in the table below, actual inflation was measured using CPI-U and the assumed real growth in wages is the 1.00 percent assumption adopted by PERS.

Year	Actual Inflation (CPI-U)	Assumed Real Wage Growth
2006	2.54%	1.00%
2007	4.08%	1.00%
2008	0.09%	1.00%
2009	2.72%	1.00%
2010	1.50%	1.00%
2011	2.96%	1.00%
2012	1.74%	1.00%
2013	1.50%	1.00%

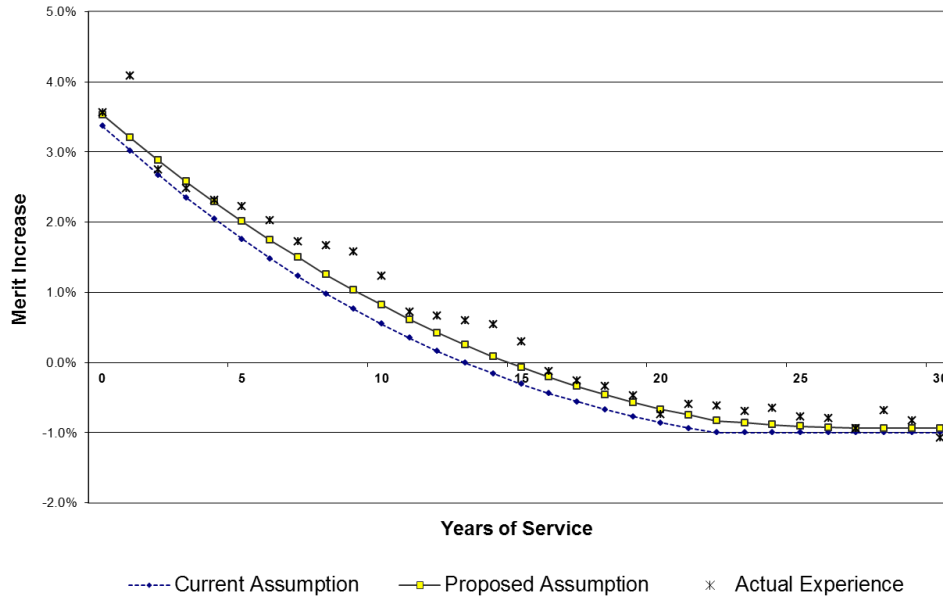
In the past, separate assumptions have been set for:

- School Districts
- Other General Service
- Police & Fire

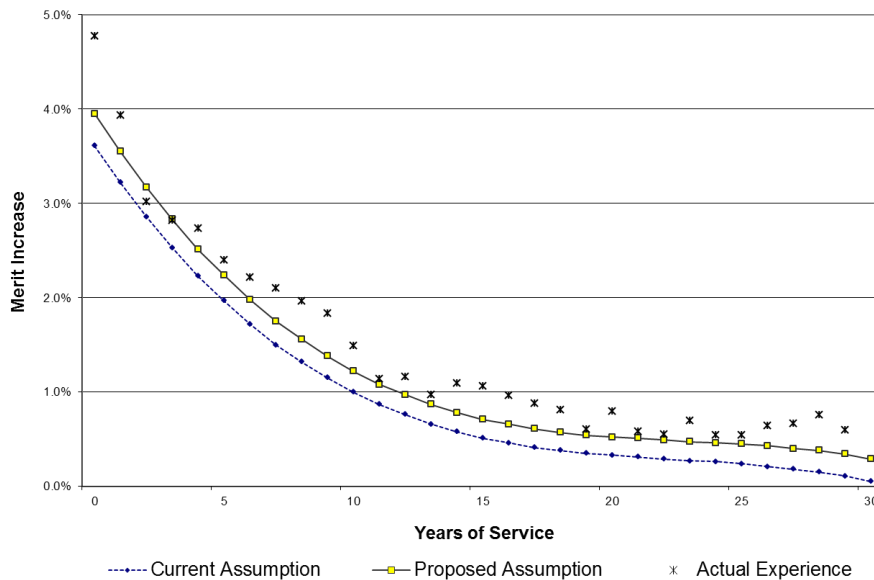
The following charts show the current assumed rates of merit salary increases, the eight-year average of merit increases based on observed experience, and the recommended rates of merit salary increases. We recommend increases in the merit salary increase assumptions for all groups. Our proposed new assumptions strike a balance between the previous assumptions and the experience observed in the study period. This is partially because the increase observed since the previous study is largely driven by relatively larger merit increases in 2013 and 2014, which may not persist in the future.

Salary Increase Assumptions (continued)

School Districts

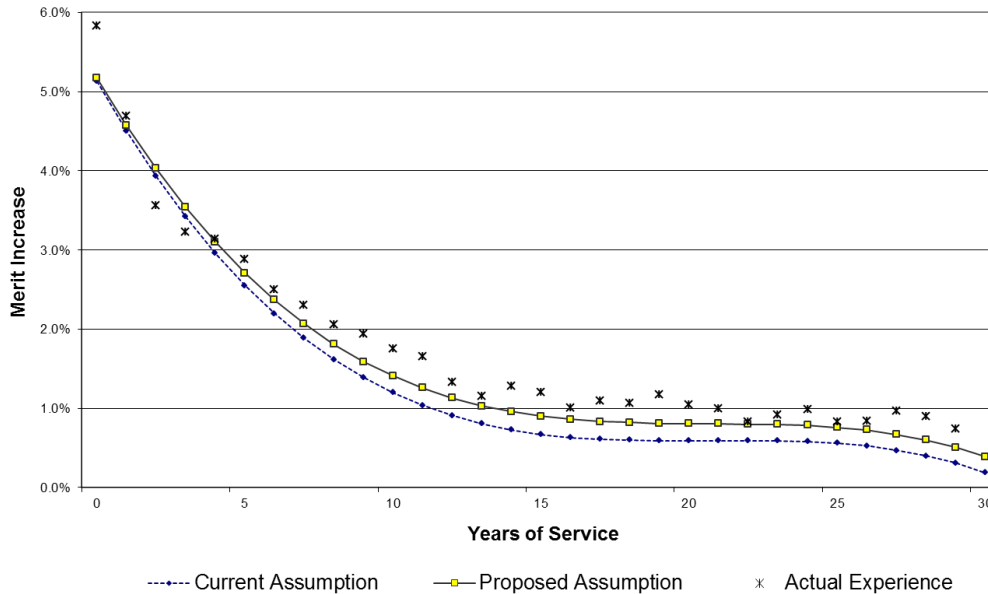


Other General Service



Salary Increase Assumptions (*continued*)

Police & Fire



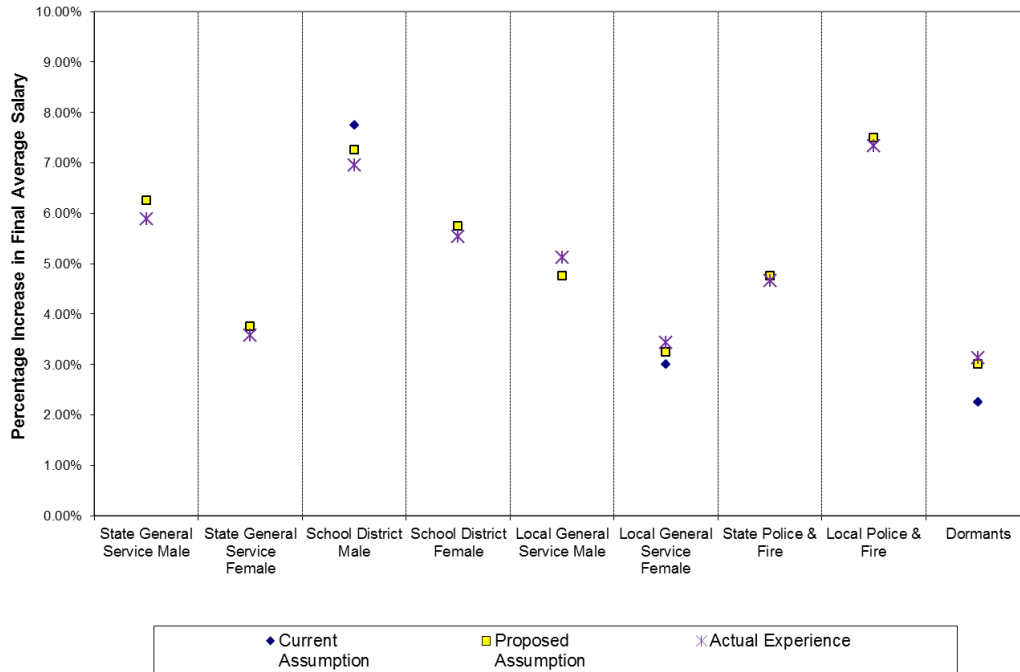
Unused Sick Leave Adjustment

Employers may elect to participate in the Unused Sick Leave Program. This program allows Tier 1/Tier 2 members to convert the value of one-half of their accumulated sick leave into additional retirement benefits. The assumption represents the percentage increase in a member’s final average pay due to the inclusion of the value of 50 percent of the member’s accumulated sick leave, and is only applied to employers who participate in the program.

For active members, there are currently eight sets of rates developed by employer group, employment category (general service or police & fire), and gender. In addition, a single rate is developed for eligible dormant members. The chart below shows the current assumption, the four-year average of the observed experience, and the recommended assumption for each of the groups studied. If the current assumption is not visible on the chart, it is the same as the proposed assumption.

Salary Increase Assumptions (*continued*)

Unused Sick Leave Adjustment



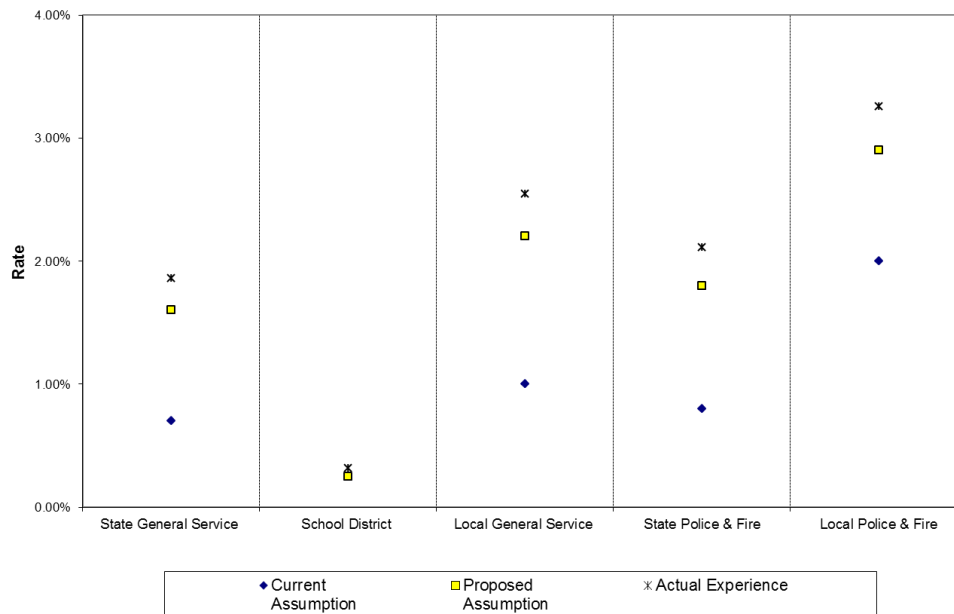
Due to the volatility in experience from one study to the next, for the groups where we recommended changes the recommended change is between the prior assumption and the actual observed experience. How closely the recommended assumption is set to the recently observed experience is influenced by the sample size of the particular group.

Unused Vacation Cash Out Adjustment

Tier 1 members are eligible to include the value of any lump sum payment of unused vacation pay in the calculation of their final average salary. The assumption shown below represents the percentage increase in a member's final average salary expected to result from this provision.

Salary Increase Assumptions (*continued*)

Unused Vacation Cash Out Adjustment



Retiree Healthcare Assumptions

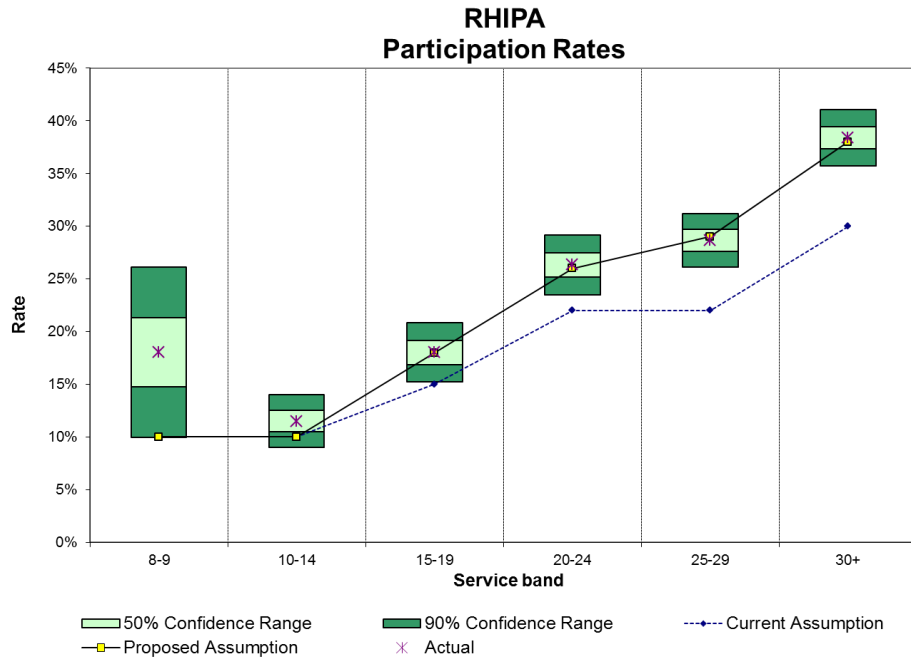
There are two retiree healthcare programs offered to eligible members, the Retiree Health Insurance Premium Account (RHIPA) and the Retiree Health Insurance Account (RHIA).

RHIPA

RHIPA is a program for eligible retirees from State of Oregon employment that provides a subsidized pre-Medicare insurance plan. In the previous valuation, the participation rate assumption for future eligible retirees varied based on service at the time of retirement, as the level of employer-paid benefits in the RHIPA program varies by service level. We recommend continuing this structure for the assumption.

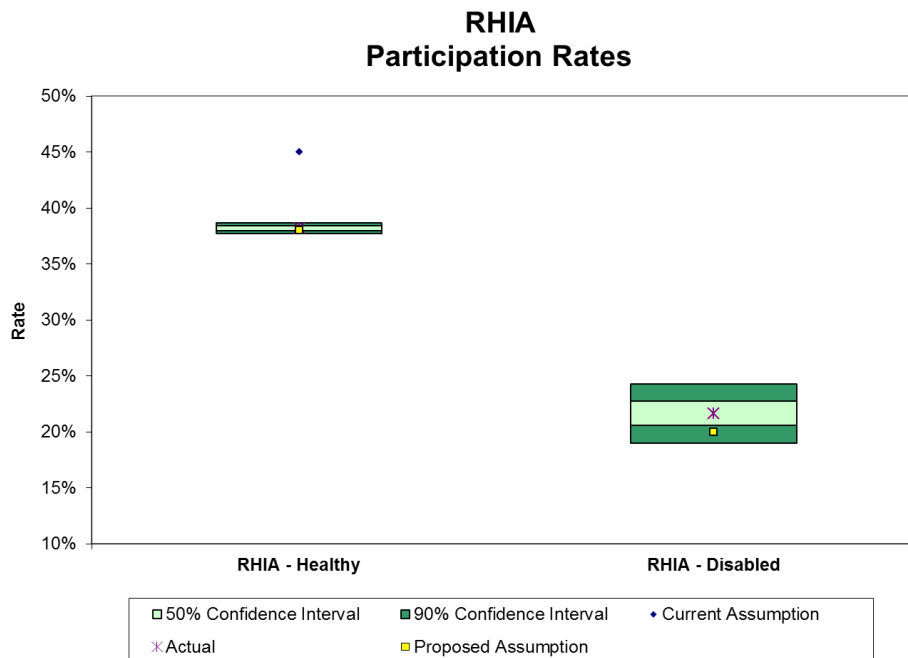
We further recommend increasing the assumed participation level at certain age ranges, as shown below. We believe this change will increase the liability and lower the funded status for the program, which already had a very low funded status at the most recent valuation. This level of participation in RHIPA may be affected, at least in part, by economic conditions, cost of coverage, competition from alternative programs available to retirees, and the impact of healthcare reform legislation becoming effective. Since changes in these factors could change participation rates in RHIPA quickly and because the program's funded status is very low, we recommend that PERS closely monitor participation on a regular basis.

Retiree Healthcare Assumptions (continued)



RHIA

RHIA is a subsidized Medicare supplemental insurance program offered to all eligible retirees. Participation rates during the period of study decreased to approximately 38 percent for healthy retirees compared to the current assumption of 45 percent. For disabled retirees, the participation followed the current assumption of 20 percent fairly closely. As shown in the table below, we recommend decreasing the healthy assumption to 38 percent and maintaining the disabled assumption of 20 percent.



5. Appendix

Data

Except where noted, the analysis in this study was based on data for the experience period from January 1, 2011 to December 31, 2014 as provided by the Oregon Public Employees Retirement System (PERS). PERS is solely responsible for the validity, accuracy and comprehensiveness of this information; the results of our analysis can be expected to differ and may need to be revised if the underlying data supplied is incomplete or inaccurate.

The member data was summarized according to the actual and potential member decrements for each year in the study. Actual and potential decrements were grouped according to age or service depending on the demographic assumption.

Assumption Tables

A complete listing of all the assumptions, methods and procedures presented to the Board for review on July 31, 2015 that are to be used in the December 31, 2014 and December 31, 2015 actuarial valuations are summarized on the following pages.

Methods and Procedures

Actuarial cost method: Entry Age Normal

UAL amortization method: Level percent of combined Tier 1, Tier 2, and OPSRP payroll

UAL amortization period:

- Closed amortization from the first rate setting valuation in which the experience is recognized
 - Tier 1/Tier 2 – 20 years
 - OPSRP – 16 years
 - RHIA/RHIPA – 10 years
- New side accounts are aligned with the new Tier 1/Tier 2 base from the most recent rate-setting valuation.
- New transition liabilities are amortized over the 18-year period beginning when the employer joins the SLGRP.

Asset valuation method: Market value

Excluded reserves: Contingency Reserve, Capital Preservation Reserve. Rate Guarantee Reserve is excluded only when it is positive.

Contribution Rate Stabilization Method: Contribution rates for a rate pool (e.g. Tier 1/Tier 2 SLGRP, Tier 1/Tier 2 School Districts, OPSRP) are confined to a collar based on the prior contribution rate (prior to application of side accounts, pre-SLGRP liabilities, and 6 percent Independent Employer minimum). The new contribution rate will generally not increase or decrease from the prior contribution rate by more than the greater of 3 percentage points or 20 percent of the prior contribution rate. If the funded percentage excluding side accounts drops below 60% or increases above 140%, the size of the collar doubles. If the funded percentage excluding side accounts is between 60% and 70% or between 130% and 140%, the size of the rate collar is increased on a graded scale.

Liability Allocation for Actives with Several Employers: Allocate Actuarial Accrued Liability 25% (0% for police & fire) based on account balance with each employer and 75% (100% for police & fire) based on service with each employer.

Allocate Normal Cost to current employer.

Allocation of Benefits-In-Force (BIF) Reserve: The BIF is allocated to each rate pool in proportion to the retiree liability attributable to the rate pool.

Recommended Economic Assumptions

Inflation	2.50%
Real wage growth	1.00%
Payroll growth	3.50%
Investment Return	7.50% (as selected at July 2015 Board meeting)
Interest Crediting	
▪ Regular account	Equal to investment return assumption
▪ Variable account	Equal to investment return assumption
Health cost trend rates	
▪ 2015 trend rate	7.00%
▪ Ultimate trend rate	4.40%
▪ Year reaching ultimate trend	2094

Demographic Assumptions (continued)

Disabled Retired Mortality			Non-Annuitant Mortality													
Age	Male	Female	Other General Service													
Year of Birth	1950	1950	Age	School District Male	Male	Police & Fire Male	School District Female	Other Female								
Birth	1950	1950	Year of Birth	1950	1960	1950	1960	1950	1960	1950	1960	1950	1960	1950	1960	
	70% of RP2000 Disabled male, Generational w/BB	95% of RP2000 Disabled female, Generational w/BB	% of Annuitant Rates	60%	60%	75%	75%	75%	75%	55%	55%	60%	60%			
45	0.015800	0.007078	30	0.000236	0.000236	0.000309	0.000309	0.000309	0.000309	0.000309	0.000309	0.000129	0.000129	0.000172	0.000172	
46	0.016693	0.007775	31	0.000247	0.000247	0.000335	0.000335	0.000335	0.000335	0.000335	0.000335	0.000136	0.000136	0.000195	0.000195	
47	0.017587	0.008511	32	0.000266	0.000266	0.000368	0.000368	0.000368	0.000368	0.000368	0.000368	0.000145	0.000145	0.000218	0.000218	
48	0.018483	0.009286	33	0.000299	0.000299	0.000407	0.000407	0.000407	0.000407	0.000407	0.000407	0.000169	0.000169	0.000242	0.000242	
49	0.019381	0.010102	34	0.000337	0.000337	0.000449	0.000449	0.000449	0.000449	0.000449	0.000449	0.000193	0.000193	0.000265	0.000265	
50	0.020283	0.010958	35	0.000379	0.000379	0.000491	0.000491	0.000491	0.000491	0.000491	0.000491	0.000217	0.000217	0.000288	0.000288	
51	0.021124	0.011818	36	0.000421	0.000421	0.000536	0.000536	0.000536	0.000536	0.000536	0.000536	0.000239	0.000239	0.000311	0.000311	
52	0.021962	0.012706	37	0.000464	0.000464	0.000581	0.000581	0.000581	0.000581	0.000581	0.000581	0.000261	0.000261	0.000334	0.000334	
53	0.022795	0.013618	38	0.000505	0.000505	0.000624	0.000624	0.000624	0.000624	0.000624	0.000624	0.000283	0.000283	0.000360	0.000360	
54	0.023621	0.014488	39	0.000542	0.000542	0.000668	0.000668	0.000668	0.000668	0.000668	0.000668	0.000305	0.000305	0.000389	0.000389	
55	0.024440	0.015328	40	0.000578	0.000578	0.000712	0.000712	0.000712	0.000712	0.000712	0.000712	0.000329	0.000329	0.000422	0.000422	
56	0.025253	0.016125	41	0.000613	0.000613	0.000758	0.000758	0.000758	0.000758	0.000758	0.000758	0.000356	0.000356	0.000460	0.000460	
57	0.025882	0.016871	42	0.000647	0.000647	0.000808	0.000808	0.000808	0.000808	0.000808	0.000808	0.000388	0.000388	0.000504	0.000504	
58	0.026452	0.017559	43	0.000685	0.000685	0.000865	0.000865	0.000865	0.000865	0.000865	0.000865	0.000422	0.000422	0.000553	0.000553	
59	0.026967	0.018188	44	0.000729	0.000729	0.000931	0.000931	0.000931	0.000931	0.000931	0.000931	0.000469	0.000469	0.000607	0.000607	
60	0.027433	0.018763	45	0.000779	0.000779	0.001005	0.001005	0.001005	0.001005	0.001005	0.001005	0.000515	0.000515	0.000655	0.000655	
61	0.027859	0.019293	46	0.000838	0.000838	0.001091	0.001091	0.001091	0.001091	0.001091	0.001091	0.000566	0.000566	0.000727	0.000727	
62	0.028249	0.019790	47	0.000905	0.000905	0.001175	0.001175	0.001175	0.001175	0.001175	0.001175	0.000618	0.000618	0.000793	0.000793	
63	0.028615	0.020538	48	0.000970	0.000970	0.001267	0.001267	0.001267	0.001267	0.001267	0.001267	0.000673	0.000673	0.000862	0.000862	
64	0.028964	0.021341	49	0.001040	0.001040	0.001361	0.001361	0.001361	0.001361	0.001361	0.001361	0.000729	0.000729	0.000933	0.000933	
65	0.029304	0.022215	50	0.001116	0.001116	0.001461	0.001461	0.001461	0.001461	0.001461	0.001461	0.000789	0.000789	0.001010	0.001010	
66	0.029645	0.023176	51	0.001193	0.001193	0.001560	0.001560	0.001560	0.001560	0.001560	0.001560	0.000850	0.000850	0.001107	0.001107	
67	0.029992	0.024237	52	0.001275	0.001275	0.001679	0.001679	0.001679	0.001679	0.001679	0.001679	0.000916	0.000916	0.001196	0.001196	
68	0.030348	0.025406	53	0.001456	0.001456	0.001949	0.001949	0.001949	0.001949	0.001949	0.001949	0.001009	0.001009	0.001294	0.001294	
69	0.031313	0.026687	54	0.001581	0.001581	0.002120	0.002120	0.002120	0.002120	0.002120	0.002120	0.001097	0.001097	0.001402	0.001402	
70	0.032380	0.028084	55	0.001724	0.001724	0.002306	0.002306	0.002306	0.002306	0.002306	0.002306	0.001196	0.001196	0.001544	0.001544	
71	0.033555	0.029593	56	0.001883	0.001883	0.002597	0.002597	0.002597	0.002597	0.002597	0.002597	0.001301	0.001301	0.001623	0.001623	
72	0.034840	0.031213	57	0.002129	0.002129	0.002977	0.002977	0.002977	0.002977	0.002977	0.002977	0.001443	0.001443	0.001905	0.001905	
73	0.036240	0.032938	58	0.002460	0.002460	0.003250	0.003250	0.003250	0.003250	0.003250	0.003250	0.001620	0.001620	0.002152	0.002152	
74	0.037752	0.034766	59	0.002716	0.002716	0.003560	0.003560	0.003560	0.003560	0.003560	0.003560	0.001796	0.001796	0.002324	0.002324	
75	0.039371	0.036692	60	0.003009	0.003009	0.003912	0.003912	0.003912	0.003912	0.003912	0.003912	0.001991	0.001991	0.002575	0.002575	
76	0.041088	0.038713	61	0.003338	0.003338	0.004342	0.004342	0.004342	0.004342	0.004342	0.004342	0.002212	0.002212	0.002881	0.002881	
77	0.042891	0.040833	62	0.003721	0.003721	0.004850	0.004850	0.004850	0.004850	0.004850	0.004850	0.002465	0.002465	0.003211	0.003211	
78	0.044765	0.043053	63	0.004149	0.004149	0.005454	0.005454	0.005454	0.005454	0.005454	0.005454	0.002769	0.002769	0.003644	0.003644	
79	0.046691	0.045380	64	0.004630	0.004630	0.006147	0.006147	0.006147	0.006147	0.006147	0.006147	0.003092	0.003092	0.004072	0.004072	
80	0.048651	0.047824	65	0.005167	0.005167	0.006811	0.006811	0.006811	0.006811	0.006811	0.006811	0.003510	0.003510	0.004550	0.004550	
81	0.050625	0.050401	66	0.005670	0.005670	0.007531	0.007531	0.007531	0.007531	0.007531	0.007531	0.003908	0.003908	0.005095	0.005095	
82	0.052599	0.053130	67	0.006224	0.006224	0.008300	0.008300	0.008300	0.008300	0.008300	0.008300	0.004348	0.004348	0.005626	0.005626	
83	0.054559	0.056025	68	0.006831	0.006831	0.009169	0.009169	0.009169	0.009169	0.009169	0.009169	0.004848	0.004848	0.006181	0.006181	
84	0.056496	0.059106	69	0.007378	0.007378	0.009623	0.009623	0.009623	0.009623	0.009623	0.009623	0.005319	0.005319	0.006786	0.006786	
85	0.058404	0.062387	70	0.007925	0.007925	0.010467	0.010467	0.010467	0.010467	0.010467	0.010467	0.005899	0.005899	0.007503	0.007503	
86	0.062255	0.065881	71	0.008560	0.008560	0.011546	0.011546	0.011546	0.011546	0.011546	0.011546	0.006343	0.006343	0.008305	0.008305	
87	0.068128	0.069595	72	0.009555	0.009555	0.012577	0.012577	0.012577	0.012577	0.012577	0.012577	0.007060	0.007060	0.009134	0.009134	
88	0.074726	0.073536	73	0.010414	0.010414	0.013749	0.013749	0.013749	0.013749	0.013749	0.013749	0.007741	0.007741	0.010031	0.010031	
89	0.080826	0.077701	74	0.011389	0.011389	0.015072	0.015072	0.015072	0.015072	0.015072	0.015072	0.008507	0.008507	0.010984	0.010984	
90	0.100190	0.085478	75	0.012495	0.012495	0.016571	0.016571	0.016571	0.016571	0.016571	0.016571	0.009342	0.009342	0.011984	0.011984	
91	0.113829	0.094185	76	0.013731	0.013731	0.018231	0.018231	0.018231	0.018231	0.018231	0.018231	0.010230	0.010230	0.013069	0.013069	
92	0.128066	0.104909	77	0.015094	0.015094	0.020078	0.020078	0.020078	0.020078	0.020078	0.020078	0.011158	0.011158	0.014243	0.014243	
93	0.143680	0.117219	78	0.016571	0.016571	0.022073	0.022073	0.022073	0.022073	0.022073	0.022073	0.012146	0.012146	0.015544	0.015544	
94	0.160775	0.130137	79	0.018157	0.018157	0.024262	0.024262	0.024262	0.024262	0.024262	0.024262	0.013217	0.013217	0.016982	0.016982	
95	0.179050	0.143653	80	0.019873	0.019873	0.026642	0.026642	0.026642	0.026642	0.026642	0.026642	0.014395	0.014395	0.018608	0.018608	
96	0.198852	0.163086	81	0.021755	0.021755	0.029198	0.029198	0.029198	0.029198	0.029198	0.029198	0.015701	0.015701	0.020432	0.020432	
97	0.224315	0.178284	82	0.023811	0.023811	0.032196	0.032196	0.032196	0.032196	0.032196	0.032196	0.017147	0.017147	0.022460	0.022460	
98	0.247375	0.184754	83	0.026250	0.026250	0.035430	0.035430	0.035430	0.035430	0.035430	0.035430	0.018752	0.018752	0.024727	0.024727	
99	0.295705	0.199711	84	0.028887	0.028887	0.039333	0.039333	0.039333	0.039333	0.039333	0.039333	0.020538	0.020538	0.027246	0.027246	
100	0.284148	0.204344	85	0.031717	0.031717	0.042649	0.042649	0.042649	0.042649	0.042649	0.042649	0.022531	0.022531	0.030051	0.030051	
101	0.295606	0.221070	86	0.034745	0.034745	0.046691	0.046691	0.046691	0.046691	0.046691	0.046691	0.024757	0.024757	0.033108	0.033108	
102	0.323171	0.229336	87	0.037990	0.037990	0.051096	0.051096	0.051096	0.051096	0.051096	0.051096	0.027250	0.027250	0.036452	0.036452	
103	0.334267	0.252304	88													

Demographic Assumptions (continued)

Retirement Assumptions (Tier 1/Tier 2)

Retirement from Active Status (Tier 1/Tier 2)

Age	Police & Fire			General Service / School Districts						Judges	
	<13 Years	13 - 24	25+ Years	General Service			School Districts				
				< 15 years	15-29 Years	30+ Years	< 15 years	15-29 Years	30+ Years		
< 50						15.00%				15.00%	
50	1.50%	2.00%	24.00%			15.00%				15.00%	
51	1.50%	2.00%	17.50%			15.00%				15.00%	
52	1.50%	2.00%	17.50%			15.00%				25.00%	
53	1.50%	2.00%	17.50%			17.50%				25.00%	
54	1.50%	2.00%	17.50%			17.50%				25.00%	
55	5.00%	8.00%	23.50%	1.50%	3.00%	17.50%	1.50%	4.50%		25.00%	
56	5.00%	8.00%	23.50%	1.50%	3.00%	17.50%	1.50%	4.50%		25.00%	
57	5.00%	8.00%	23.50%	1.50%	3.00%	20.00%	1.50%	4.50%		25.00%	
58	5.00%	8.00%	23.50%	1.50%	10.00%	20.00%	2.50%	14.50%		32.00%	
59	5.00%	8.00%	23.50%	3.50%	10.00%	20.00%	4.50%	14.50%		28.50%	
60	5.00%	11.00%	23.50%	6.00%	10.00%	20.00%	6.50%	14.50%		28.50%	10.00%
61	5.00%	14.00%	23.50%	6.00%	10.00%	24.00%	8.00%	14.50%		28.50%	10.00%
62	15.00%	25.00%	38.00%	12.50%	19.50%	31.00%	15.00%	25.00%		34.00%	10.00%
63	7.00%	17.00%	38.00%	12.50%	16.50%	22.00%	13.00%	22.00%		26.50%	10.00%
64	7.00%	17.00%	17.00%	12.50%	16.50%	26.00%	13.00%	19.50%		31.50%	10.00%
65	100.00%	100.00%	100.00%	19.50%	28.00%	32.00%	25.50%	33.50%		38.00%	10.00%
66				25.50%	35.00%	38.00%	21.50%	36.50%		38.00%	10.00%
67				22.50%	25.00%	26.00%	19.50%	34.50%		38.00%	10.00%
68				19.50%	25.00%	26.00%	19.50%	28.00%		28.50%	10.00%
69				19.50%	25.00%	26.00%	19.50%	28.00%		28.50%	30.00%
70				100.00%	100.00%	100.00%	100.00%	100.00%		100.00%	100.00%

Demographic Assumptions (continued)

Retirement Assumptions (OPSRP)

Retirement from Active Status (OPSRP)

Age	Police & Fire			General Service / School Districts					
	<13 Years	13 - 24	25+ Years	General Service			School Districts		
				< 15 years	15-29 Years	30+ Years	< 15 years	15-29 Years	30+ Years
50	1.00%	1.50%	5.50%						
51	1.00%	1.50%	5.50%						
52	1.00%	1.50%	5.50%						
53	1.00%	1.50%	25.00%						
54	1.00%	1.50%	17.50%						
55	4.00%	5.00%	23.50%	1.00%	2.50%	5.00%	1.00%	2.50%	5.00%
56	4.00%	5.00%	23.50%	1.00%	2.50%	5.00%	1.00%	2.50%	5.00%
57	4.00%	5.00%	23.50%	1.00%	2.50%	7.50%	1.00%	2.50%	7.50%
58	4.00%	5.00%	23.50%	1.00%	3.00%	30.00%	1.00%	3.00%	30.00%
59	4.00%	5.00%	23.50%	1.50%	3.00%	25.00%	1.50%	3.00%	25.00%
60	4.00%	15.00%	23.50%	3.00%	3.75%	20.00%	3.00%	3.75%	20.00%
61	4.00%	8.50%	23.50%	3.00%	5.00%	20.00%	3.00%	5.00%	20.00%
62	12.00%	25.00%	38.00%	8.00%	12.00%	30.00%	6.00%	12.00%	30.00%
63	7.00%	17.00%	38.00%	7.00%	10.00%	20.00%	6.00%	10.00%	20.00%
64	7.00%	17.00%	17.00%	6.00%	10.00%	20.00%	6.00%	10.00%	20.00%
65	100.00%	100.00%	100.00%	13.00%	35.00%	20.00%	12.00%	35.00%	20.00%
66				15.50%	33.00%	20.00%	14.00%	33.00%	20.00%
67				15.50%	22.00%	30.00%	11.00%	22.00%	30.00%
68				13.00%	17.00%	20.00%	9.00%	17.00%	20.00%
69				13.00%	17.00%	20.00%	9.00%	17.00%	20.00%
70				100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Lump Sum Option at Retirement

Partial Lump Sum	4.5% for all years
Total Lump Sum	3.0% for 2015, declining by 0.5% per year until reaching 0.0%

Purchase of Credited Service at Retirement

Money Match Retirements	0%
Non-Money Match Retirements	60%

Disability Assumptions

Age	Duty Disability		
	Police & Fire	General Service	Ordinary Disability
20	0.006%	0.000%	0.015%
25	0.009%	0.000%	0.022%
30	0.013%	0.001%	0.032%
35	0.020%	0.001%	0.049%
40	0.032%	0.001%	0.079%
45	0.052%	0.002%	0.130%
50	0.090%	0.004%	0.180%
55	0.169%	0.008%	0.180%
60	0.241%	0.011%	0.180%

Termination Assumptions

Duration	School District	School District	General	General	Police & Fire
	Male	Female	Service Male	Service Female	
0	20.00%	15.50%	19.00%	18.50%	10.00%
1	16.00%	14.05%	17.16%	17.00%	5.97%
2	13.55%	12.34%	14.34%	13.09%	5.02%
3	11.48%	10.83%	11.98%	11.67%	4.22%
4	9.72%	9.51%	10.00%	10.41%	3.54%
5	8.24%	8.35%	8.36%	9.29%	3.31%
6	6.98%	7.33%	6.98%	8.28%	3.06%
7	5.91%	6.44%	5.83%	7.38%	2.83%
8	5.01%	5.66%	4.87%	6.59%	2.61%
9	4.60%	4.97%	4.23%	5.87%	2.41%
10	4.23%	4.36%	3.96%	5.24%	2.23%
11	3.89%	3.83%	3.71%	4.67%	2.06%
12	3.57%	3.55%	3.48%	4.46%	1.90%
13	3.28%	3.35%	3.26%	4.18%	1.76%
14	3.02%	3.16%	3.06%	3.91%	1.63%
15	2.78%	2.98%	2.86%	3.66%	1.50%
16	2.55%	2.81%	2.68%	3.43%	1.39%
17	2.35%	2.66%	2.51%	3.21%	1.28%
18	2.16%	2.51%	2.36%	3.00%	1.19%
19	1.98%	2.37%	2.21%	2.81%	1.10%
20	1.82%	2.23%	2.07%	2.63%	1.01%
21	1.68%	2.11%	1.94%	2.46%	0.94%
22	1.54%	1.99%	1.82%	2.31%	0.87%
23	1.42%	1.88%	1.70%	2.16%	0.80%
24	1.30%	1.77%	1.59%	2.02%	0.80%
25	1.20%	1.67%	1.49%	1.89%	0.80%
26	1.20%	1.58%	1.40%	1.77%	0.80%
27	1.20%	1.50%	1.40%	1.66%	0.80%
28	1.20%	1.50%	1.40%	1.55%	0.80%
29	1.20%	1.50%	1.40%	1.50%	0.80%
30 +	1.20%	1.50%	1.40%	1.50%	0.80%

Merit Salary Increase Assumptions

Duration	School	Other General	
	District	Service	Police & Fire
0	3.53%	3.95%	5.17%
1	3.20%	3.55%	4.57%
2	2.88%	3.17%	4.03%
3	2.58%	2.83%	3.54%
4	2.29%	2.51%	3.10%
5	2.01%	2.24%	2.71%
6	1.74%	1.98%	2.37%
7	1.50%	1.75%	2.07%
8	1.25%	1.56%	1.81%
9	1.03%	1.38%	1.59%
10	0.82%	1.22%	1.41%
11	0.61%	1.08%	1.26%
12	0.42%	0.97%	1.13%
13	0.25%	0.87%	1.03%
14	0.08%	0.78%	0.96%
15	-0.07%	0.71%	0.90%
16	-0.21%	0.66%	0.86%
17	-0.34%	0.61%	0.83%
18	-0.46%	0.57%	0.82%
19	-0.57%	0.54%	0.81%
20	-0.67%	0.52%	0.81%
21	-0.75%	0.51%	0.81%
22	-0.83%	0.49%	0.80%
23	-0.86%	0.47%	0.80%
24	-0.89%	0.46%	0.79%
25	-0.91%	0.45%	0.76%
26	-0.93%	0.43%	0.73%
27	-0.94%	0.40%	0.67%
28	-0.94%	0.38%	0.60%
29	-0.94%	0.34%	0.51%
30	-0.94%	0.29%	0.39%
31 +	-0.94%	0.00%	0.00%

Unused Sick Leave Adjustment

Actives	
• State General Service Male	6.25%
• State General Service Female	3.75%
• School District Male	7.25%
• School District Female	5.75%
• Local General Service Male	4.75%
• Local General Service Female	3.25%
• State Police & Fire	4.75%
• Local Police & Fire	7.50%
Dormants	3.00%

Unused Vacation Cash Out Adjustment

Tier 1	
• State General Service	1.60%
• School District	0.25%
• Local General Service	2.20%
• State Police & Fire	1.80%
• Local Police & Fire	2.90%
Tier 2	0.00%

Retiree Healthcare Assumptions

Retiree Healthcare Participation

RHIPA	
• 8 – 9 years of service	10.0%
• 10 – 14 years of service	10.0%
• 15 – 19 years of service	18.0%
• 20 – 24 years of service	26.0%
• 25 – 29 years of service	29.0%
• 30+ years of service	38.0%
RHIA	
• Healthy Retired	38.0%
• Disabled Retired	20.0%

Healthcare Cost Trend Rates

Year	Rate
2015	7.00%
2016	6.30%
2017	6.00%
2018	5.40%
2019	5.30%
2020	5.40%
2021-2024	5.40%
2025-2027	5.50%
2028	6.40%
2029	6.50%
2030-2034	6.40%
2035	6.30%
2036	6.20%
2037	6.10%
2038	6.00%
2039-2040	5.90%
2041-2043	5.80%
2044-2045	5.70%
2046-2049	5.60%
2050-2055	5.50%
2056-2061	5.40%
2062	5.30%
2063	5.20%
2064	5.10%
2065	5.00%
2066	4.90%
2067	4.80%
2068	4.70%
2069	4.70%
2070	4.60%
2071-2093	4.50%
2094+	4.40%

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