San Mateo County Employees' Retirement Association

Investigation of Experience July 1, 2017 – April 30, 2020

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Board of Retirement
San Mateo County Employees' Retirement Association
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Dear Members of the Board:

It is a pleasure to submit this report of our investigation of the experience of the San Mateo County Employees' Retirement Association (SamCERA) for the period July 1, 2017 through April 30, 2020. The results of this investigation are the basis for the actuarial assumptions and methods to be used in the actuarial valuation to be performed as of June 30, 2020.

The purpose of this report is to communicate the results of our review of the actuarial methods and the economic and demographic assumptions to be used in the completion of the upcoming valuation. Several of our recommendations represent changes from the prior methods or assumptions and are designed to better anticipate the emerging experience of SamCERA.

We have provided financial information showing the estimated hypothetical impact of the recommended assumptions, if they had been reflected in the June 30, 2019 actuarial valuation. We believe the recommended assumptions provide a reasonable estimate of anticipated experience affecting SamCERA. Nevertheless, the emerging costs will vary from those presented in this report to the extent that actual experience differs from that projected by the actuarial assumptions. Future actuarial measurements may differ significantly from the current measurements presented in this report due to factors such as the following:

- Plan experience differing from the actuarial assumptions,
- Future changes in the actuarial assumptions,
- Increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as potential additional contribution requirements due to changes in the Plan's funded status), and
- Changes in the plan provisions or accounting standards.

Due to the scope of this assignment, we did not perform an analysis of the potential range of such measurements.

In preparing this report, we relied without audit on information (some oral and some in writing) supplied by SamCERA's staff. This information includes, but is not limited to, statutory provisions, employee data, and financial information. We used SamCERA's benefit provisions as stated in our June 30, 2019 Actuarial Valuation report. In our examination, after discussion with SamCERA and making certain adjustments, we have found the data to be reasonably consistent and comparable with data used for other purposes. The experience study results are dependent on the integrity of this information. If any of this information is inaccurate or incomplete, our determinations may need to be revised.

We certify that the assumptions developed in this report satisfy ASB Standards of Practice, in particular, No. 27 (Selection of Economic Assumptions for Measuring Pension Obligations) and No. 35 (Selection of Demographic and Other Non-Economic Assumptions for Measuring Pension Obligations).

This investigation of experience report recommends assumptions to be used in the valuation to provide an estimate of the System's financial condition as of a single date. The valuation can neither predict the System's future condition nor guarantee future financial soundness. Actuarial valuations do not affect the ultimate cost of System benefits, only the timing of System contributions. While the valuation is based on an array of individually reasonable assumptions, other assumption sets may also be reasonable and valuation results based on those assumptions would be different. No one set of assumptions is uniquely correct. Determining results using alternative assumptions is outside the scope of our engagement.

Milliman's work is prepared solely for the internal business use of SamCERA. To the extent that Milliman's work is not subject to disclosure under applicable public records laws, Milliman's work may not be provided to third parties without Milliman's prior written consent. Milliman does not intend to benefit or create a legal duty to any third party recipient of its work product. Milliman's consent to release its work product to any third party may be conditioned on the third party signing a Release, subject to the following exceptions:

a) The System may provide a copy of Milliman's work, in its entirety, to the System's professional service advisors who are subject to a duty of confidentiality and who agree to not use Milliman's work for any purpose other than to benefit the System.
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The consultants who worked on this assignment are retirement 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.

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 would like to acknowledge the help in the preparation of the data for this investigation given by the SamCERA staff. We look forward to our discussions and the opportunity to respond to your questions and comments at your next meeting.

We are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Sincerely,

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NC/CG/nlo

Table of Contents

1. Executive Summary

Overview

Any actuarial valuation is based on certain underlying assumptions. Determining the adequacy of the contribution rate is highly dependent on the assumptions that the actuary uses to project the future benefit payments and then to discount the value of future benefits to determine the present values. Thus, the assumptions are critical in assisting the system in adequately pre-funding for the benefits prior to retirement.

To assess the reasonableness of the assumptions used in the valuation, they should be studied regularly. This process is called an investigation of experience (or experience study).

Summary of Results

This section describes the key findings of this investigation of experience of the San Mateo County Employees' Retirement Association (SamCERA) for the period July 1, 2017 through April 30, 2020. We are recommending several changes to the demographic assumptions. If adopted, these proposed changes (primarily the service retirement assumption) will result in a moderate increase in the Statutory Contribution Rate (SCR), as discussed at the end of this section. We previously recommended economic assumptions that were adopted at the June 2020 Board of Retirement meeting. We will refer to our recommended assumptions, including the recently approved economic assumptions, as the "proposed" assumptions.

The following table shows a summary of our recommendations for all assumptions and methods studied.

Assumption	Recommendation
Price Inflation	No Change
Investment Return	No Change
General Wage Growth	No Change
Payroll Increase Assumption	No Change
Funding Method	No Change
Merit Salary Scale	Increase Safety rates
Death while Active	Change to public plan specific mortality tables
Service Retirement	Overall increase for Plans 1, 2 and 4; Implement rates by age & service
Disability Retirement	Decrease General rates; Increase Safety rates
Termination	Increase General and Safety rates
Probability of Refund	Decrease General and Safety rates
Mortality after Retirement	Change to public plan specific mortality tables
Probability of Eligible Survivor	No Change
Reciprocity	No Change
Retirement for Deferreds	No Change

If adopted, the new assumptions would result in an increase in the statutory employer contribution rate and a decrease in the Funded Ratio calculated in the next valuation, as compared to the current assumptions. A further discussion is included in the Financial Impact section at the end of the Executive Summary.

Economic Assumptions

Section 2 discusses the economic assumptions: price inflation, general wage growth (includes price inflation and productivity), future COLAs and the investment return. As with virtually all actuarial assumptions, there is not one right answer; however, we believe that the 6.50% investment return assumption adopted by the Board for the June 30, 2019 valuation remains appropriate for SamCERA. The assumption is slightly greater than the 10-year expected return of 6.30% projected by Verus's capital market assumptions; however, we note that this is based on a lower implicit CPI inflation than SamCERA is using. If future CPI inflation is higher than projected by Verus's capital market assumptions, we would expect future investment returns would be higher. Given this, we believe 6.50% remains reasonable.

The price inflation assumption of 2.50% is higher than what most economists are forecasting for national CPI; however, given that over the past several years the Bay Area has consistently experienced higher inflation than what has occurred nationally, we think it is reasonable to maintain the current assumption. The general wage growth, payroll growth, and COLA assumptions are directly related to the price inflation assumption. Given this relationship, we believe that if the price inflation remains at 2.50%, it is reasonable to retain these other assumptions.

The set of economic assumptions we recommended, and the Board approved, to be used for the next valuation includes an investment return assumption of 6.50%, a price inflation assumption of 2.50%, and a wage growth assumption of 3.00%. These are all unchanged since the June 30, 2019 valuation.

The following table shows our recommended economic assumptions.

Economic Assumption	Current Assumption	Recommended Assumption
Investment Return	6.50%	6.50%
GASB Discount Rate	6.67%	6.67%
Price Inflation[(1)]	2.50%	2.50%
General Wage Growth	3.00%	3.00%
Payroll Growth	3.00%	3.00%
Retiree COLAs	2.50% / 2.40% / 1.90%	2.50% / 2.40% / 1.90%

1. Price Inflation refers to CPI inflation for San Francisco-Oakland-Hayward, and is primarily used in determining wage and payroll growth assumptions, and retiree COLA assumptions.

A detailed analysis of the economic assumptions is provided in Section 2.

Actuarial Methods and Miscellaneous Assumptions

Section 3 discusses the actuarial methods and other miscellaneous assumptions used in the valuation and administration of the system.

We are recommending changes in this area as follows:

- A change to the member contribution rates should be made to reflect the new mortality and merit salary assumptions if they are adopted. The impact of this is discussed later in this section.
- A change to the factors used for determining optional benefits and service purchase costs, as well as the Plan 3 early retirement age factors, should be considered to reflect the new mortality assumptions if they are adopted.

Demographic Assumptions

Sections 4-9 discuss the demographic assumptions. Unlike the economic assumptions, which are more global in nature, the demographic assumptions are based heavily on recent SamCERA experience. Demographic assumptions are used to predict future member behavior (e.g., when will a member retire? How long will the member live?).

Based on the results of this study, we are recommending changes to several of the demographic assumptions. In cases where we have recommended changes, the changes for the most part only partially reflect recent experience due to the long-term nature of actuarial assumptions.

When reviewing the sections on demographic assumptions, please note the following:

- Our analysis uses the Actual-to-Expected (A/E) ratio to measure how well the current assumptions fit actual experience. For example, if the service retirement A/E is 80%, it indicates that there were 20% fewer service retirements than expected, and that we should consider decreasing the assumption. By decreasing the expected rates, this results in a higher ratio, in this case closer to 100%.
- In our analysis of the active demographic assumptions (merit salary, service retirement, disability, and termination), we also studied the impact of compensation levels by weighting the results by compensation. That is, a member with annual compensation of $80,000 has twice the impact on the observed rates in comparison to a member with annual compensation of $40,000. This is a valuable analysis tool since two members similar in all ways except for compensation level have different amounts of liability. The financial impact on the valuation is more dependent on the behavior of the member with the larger liability. Compensation is a useful proxy for liability. We observed some differences in member behavior based on compensation level. For example, members with higher levels of compensation tended to have higher probabilities of retiring at a given age.

  Similarly, we reflected the impact of benefit amounts on the retired mortality analysis. In general, we observed that retired members with higher benefits have longer life expectancies than members with smaller benefits.
- Due to scheduling considerations, the data provided to us by SamCERA was as of April 30, 2020. This was necessary to complete both the experience investigation and the valuation in time for inclusion in the Comprehensive Annual Financial Report (CAFR). Thus, the study period was two years and 10 months instead of the three years implied by the "triennial" description. We do not believe this two-month difference has a material impact on the results.
- When we refer to "Safety" members in this report, we are including both Safety and Probation members.
- When we refer to the "proposed" assumptions, these are the assumptions that we are recommending. These include the recently approved economic assumptions. The current assumptions are referred to as the "expected" assumptions.
- For many of the assumptions, we show detailed graphs of our analysis showing the actual experience for the study (blue bar), the actual experience from the prior study (black bar), the current assumption (green line), and the new proposed assumptions (orange line).

The recommended rates are shown in detail in Appendix A.

Individual Salary Increases due to Promotion and Longevity (Merit)

Section 4 discusses the individual salary increases due to promotion and longevity – the merit component of salaries. Overall, the results show increases close to what the current rates predicted for General members, and increases higher than predicted for Safety members.

We also considered longer term experience in our analysis of salary increases. We reviewed experience over the period 2005-2020 in addition to the period 2017-2020. We believe that including a study of salary increases over a longer period than the three-year period of the study helps to smooth out short-term differences, provides

additional context for salary increases over a period at least as long as a full economic cycle, and generally presents a more representative analysis of salary increase patterns. Comparing the long-term pattern with the results of the three-year study helps to identify any changes in trend.

We are recommending no change to the merit salary assumption for General members, and we are recommending increases to the merit salary assumption for Safety members to better reflect the experience of the current and longer term periods.

In recommending no increase for General members, we considered both historical experience which has been less than the assumption, and recent bargaining that increased longevity components of salary for General members. We believe that the two factors approximately offset each other, and the current assumption remains appropriate.

Additional details are included in Section 4.

Mortality

The mortality assumption is used to predict the life expectancy of both members currently in pay status and those expected to receive a benefit in the future. The results of the study are shown in the table below, observed based on both headcount and benefit weighted bases. There were slightly more deaths than expected among retired members (335 compared to 328), however the benefit weighted deaths were slightly lower than expected. This means that overall actual deaths were higher among retired members with smaller benefits.

Retirement Type	Actual	Expected	Proposed	Actual / Expected	Actual / Proposed
By Headcount					
Service (Healthy)	300	296	297	101%	101%
Disability	35	32	31	109%	113%
Total	**335**	**328**	**328**	**102%**	**102%**
Benefit Weighted					
Service (Healthy)	$882,795	$901,481	$895,455	98%	99%
Disability	97,653	97,964	94,055	100%	104%
Total	**980,448**	**999,445**	**989,510**	**98%**	**99%**

As discussed in more detail in Section 5, the Society of Actuaries recently published new mortality tables based on data from public sector retirement systems. These include specific mortality tables for general and safety members, in addition to tables for healthy and disabled retired members.

Although the current tables still provide a reasonable estimate of future mortality experience, we recommend an update to new mortality tables that are specific to public plans. The analysis shows that the new tables provide a more consistent fit by age to SamCERA's actual experience, even though in total there is not much difference. We have observed that there is a definite trend to adopt the new public plan mortality tables in other systems. In addition, we recommend retaining the mortality projection scale, which projects future improvements in mortality (i.e., increases in life expectancies over time). We continue to believe this is a reasonable estimate of future changes in mortality. Overall, the new mortality assumptions will result in very little change in life expectancy compared to the prior assumption. Additional details are provided in Section 5.

Service Retirement

Overall, the actual number of service retirements was higher than expected by the assumptions. We have observed that rates of retirement often differ based on years of service as well as age, so we studied the rates of retirement based on age and service. We found that, in general, members with more years of service have a greater probability of retiring at a given age than those with less years of service. The following table shows the results for all members eligible for retirement.

	Actual	Expected	Proposed	Actual / Expected	Actual / Proposed
By Headcount					
General	445	442	455	101%	98%
Safety	105	85	93	124%	113%
Total	**550**	**527**	**548**	**104%**	**100%**
Compensation Weighted					
General	$47,503,764	$47,773,944	$48,696,108	99%	98%
Safety	14,701,188	11,664,120	12,644,904	126%	116%
Total	**62,204,952**	**59,438,064**	**61,341,012**	**105%**	**101%**

We recommend revised service retirement rates for General and Safety/Probation members in Plans 1, 2, and 4, that are based on a member's age and years of service. These revisions result in more expected retirements overall, both on a headcount and a compensation weighted basis.

In making our recommendations, we also considered the prior study. In particular, Safety retirement rates were much lower in the 2014-2017 study period, so for that class we are recommending a revision that only partially reflects the current experience, which showed higher retirement rates for the class.

We also recommend revised retirement rates for Plans 5, 6, and 7 reflecting the lower benefits and specific retirement eligibility provisions of these plans compared to Plans 1, 2, and 4. In general, the proposed rates are equal to 80% of the corresponding Plans, 1, 2, and 4 rates, with adjustments at certain ages to reflect specific plan provisions.

We are not recommending a change to retirement rates for General Plan 3.

Further analysis is shown in Section 6 of this report.

Disability Retirement

Overall, the actual number of disability retirements from active service was lower than expected by the assumptions; however, there was also a significant number of service retired members reclassified as disabled retirements during the study period. We therefore believe that the actual number of disabled retirements is higher than shown in the following table. The actual experience shown does not fully reflect the actual experience considered in our proposed assumptions.

	Actual	Expected	Proposed	Actual / Expected	Actual / Proposed
By Headcount					
General	23	40	32	58%	72%
Safety	11	10	13	110%	85%
Total	**34**	**50**	**45**	**68%**	**76%**
Compensation Weighted					
General	$1,746,564	$3,974,532	$3,218,964	44%	54%
Safety	1,126,608	1,246,740	1,566,696	90%	72%
Total	**2,873,172**	**5,221,272**	**4,785,660**	**55%**	**60%**

Note: If reclassified disability retirements were included, the actual-to-expected ratios on a headcount basis would be 100% (40/40) for General and 240% for Safety (24/10).

We are recommending lower rates of disability retirement for General members and increased rates for Safety members. Note that the Safety group had a large relative number of service retirements reclassified as disability retirements; this is reflected in our recommendation to increase rates for Safety members.

Members may take a disability retirement on account of service connected, or non-service connected disability. Based on the observed experience we are recommending no change to the assumption that 65% of General disabilities and 100% of Safety disabilities are service connected.

Further analysis is shown in Section 7 of this report.

Termination

The actual number of terminations for both General and Safety/Probation members was higher than the assumptions predicted. The following table shows the results for the two groups.

	Actual	Expected	Proposed	Actual / Expected	Actual / Proposed
By Headcount					
General	729	632	679	115%	107%
Safety	55	41	52	136%	106%
Total	**784**	**673**	**730**	**117%**	**107%**
Compensation Weighted					
General	$64,117,998	$54,385,694	$58,053,609	118%	110%
Safety	5,629,464	4,045,773	5,143,500	139%	109%
Total	**69,747,463**	**58,431,467**	**63,197,109**	**119%**	**110%**

Overall, we are recommending increases to the rates of termination, particularly for members with fewer years of service. Further analysis is shown in Section 8 of this report.

Probability of Refund upon Vested Termination

The actual number of refunds for vested members at termination, shown in the following table, was lower than expected for General and Safety members, which is consistent with experience from the prior two studies.

	Actual	Expected	Proposed	Actual / Expected	Actual / Proposed
By Headcount					
General	44	73	60	60%	73%
Safety	7	8	8	85%	88%
Total	**51**	**81**	**68**	**63%**	**75%**

We are recommending reductions to the rates of refund for both General and Safety members to reflect this experience. Due to the small amount of experience for Safety members, this reduction is not readily apparent in the above table. Further analysis is shown in Section 9 of this report.

Financial Impact of the Recommended Assumptions

The following exhibit shows the estimated financial impact the proposed changes would have on SamCERA's funding. Note that the proposed changes would increase the expected statutory employer contribution rate and decrease the reported Funded Ratio of the system, primarily due to the recommended changes to the active decrements (retirement and termination).

The financial impact was evaluated by performing additional valuations with the June 30, 2019 valuation data and reflecting the proposed assumption changes. Note that the estimated 0.23% increase is a blended average of all plans. The Safety and Probation plans are expected to have greater increases than the General plans. The actual financial impact will vary to some extent for the June 30, 2020 valuation due to year-to-year changes in the member population and investment experience.

	Funded Ratio	Statutory Contribution Rate
June 30, 2019 Valuation	**85.8%**	**37.86%**
Retired Mortality Rates	0.3%	-0.31%
Merit Salary	0.0%	0.08%
Active Demographics	-0.5%	0.46%
Total Change	**-0.2%**	**0.23%**
June 30, 2019 Valuation with Changes	**85.6%**	**38.09%**

Impact of the Recommended Assumptions on Member Contribution Rates

If adopted, the recommended assumptions would result in an increase in the member contribution rates for all members except members of General Plan 7. The following table shows sample member rates (entry age 35 for General and 25 for Safety and Probation) based on the 2019 valuation, but using the recommended assumptions for 2020. The final member rates will be determined with the 2020 valuation.

Sample Changes in Member Rates due to Proposed Assumption Changes (Based on June 30, 2019 Actuarial Valuation[1])

	Entry Age	Current	Proposed	Increase
General Members - County				
Plan 1	35	15.32%	15.46%	0.14%
Plan 2	35	14.33%	14.47%	0.14%
Plan 4	35	13.33%	13.45%	0.12%
Plan 5	35	8.91%	9.01%	0.10%
Plan 7	All	9.11%	8.91%	-0.20%
Probation Members				
Plan 1	25	18.56%	18.96%	0.40%
Plan 2	25	18.43%	18.83%	0.40%
Plan 4	25	16.68%	17.01%	0.33%
Plan 5	25	16.37%	16.69%	0.32%
Plan 6	25	12.37%	12.68%	0.31%
Plan 7	All	14.97%	15.01%	0.04%
Safety Members [2][3]				
Plan 1	25	19.54%	19.93%	0.39%
Plan 2	25	19.88%	20.27%	0.39%
Plan 4	25	18.17%	18.50%	0.33%
Plan 5	25	16.87%	17.19%	0.32%
Plan 6	25	12.56%	12.88%	0.32%
Plan 7	All	15.28%	15.37%	0.09%

1. *Final FYB 2021 member rates will be determined based on the June 30, 2020 valuation.*
2. *Plans 1 - 6 member rates refer to all Safety members except Deputy Sheriffs. All members of Plan 7 pay the same member rates. Deputy Sheriffs are not eligible for Plan 6.*
3. *Cost sharing for non-Deputy Sheriffs in Plans 1 - 5 is 5%. Cost Sharing varies for Deputy Sheriffs as follows:*
   - *3.0% if employee is less than 45 and has less than 5 years of service.*
   - *3.5% if employee is less than 45 and has between 5 and 15 years of service.*
   - *4.5% if employee is older than 45 or has at least 15 years of service.*

Note that the sample member contribution rates are total rates and include the COLA and Cost Share portions where applicable.

Proposed Assumptions and Methods

Appendix A illustrates the Summary of Actuarial Assumptions as it will appear in the June 30, 2020 valuation report if all recommended assumptions and methods are adopted.

2. Economic Assumptions

Actuarial Standard of Practice (ASOP) No. 27, Selection of Economic Assumptions for Measuring Pension Obligations, provides guidance to actuaries giving advice on selecting economic assumptions for measuring obligations under defined benefit plans. Because no one knows what the future holds, the best an actuary can do is to use professional judgment to estimate possible future economic outcomes. These estimates are based on a mixture of past experience, future expectations, and professional judgment. The actuary should consider a number of factors, including the purpose and nature of the measurement, and appropriate recent and long-term historical economic data. However, the standard explicitly advises the actuary not to give undue weight to recent experience. To meet the standard, the assumption should reflect "the actuary's estimate of future experience" and "it has no significant bias (i.e., it is not significantly optimistic or pessimistic)…"

Each economic assumption should individually satisfy this standard. Furthermore, with respect to any particular valuation, each economic assumption should be consistent with every other economic assumption over the measurement period.

After completing the selection process, the actuary should review the set of economic assumptions for consistency. This may lead the actuary to recommend the same inflation component in each of the economic assumptions proposed.

This section will discuss the economic assumptions. We believe the current economic assumptions are reasonable and satisfy ASOP No. 27. We have not recommended any changes. The following table shows these assumptions.

Economic Assumptions	Current Assumptions
Investment Return	6.50%
GASB Discount Rate	6.67%
General Wage Growth	3.00%
Payroll Growth	3.00%
Price Inflation	2.50%
COLAs for Retirees	2.50% / 2.40% / 1.90%

1. Price Inflation & COLA Assumptions

Use in the Valuation

When we refer to inflation in this report, we are generally referring to price inflation. The price inflation assumption is not directly used in the valuation; however, it is used in the development of the assumptions for general wage increases, payroll increases and retiree COLA increases, which directly impact the valuation results. Price inflation is more specific to the Bay Area economy, as that economy will impact wage and payroll growth, and retiree COLA increases of SamCERA more than national CPI will.

CPI inflation generally refers to national inflation, or inflation over the entire economy, and is used in the development of the assumption for future investment returns. The long-term relationship between CPI inflation and investment return has long been recognized by economists. The basic principle is that the investors demand a "real return" – the excess of actual investment returns over inflation. If inflation rates are expected to be high, investors will demand investment returns that are also expected to be high enough to exceed inflation, while lower inflation rates will result in lower expected investment returns, at least in the long run.

Historical Perspective

The data for inflation shown below is based on the national Consumer Price Index, US City Average, All Urban Consumers (CPI-U) as published by the Bureau of Labor Statistics.

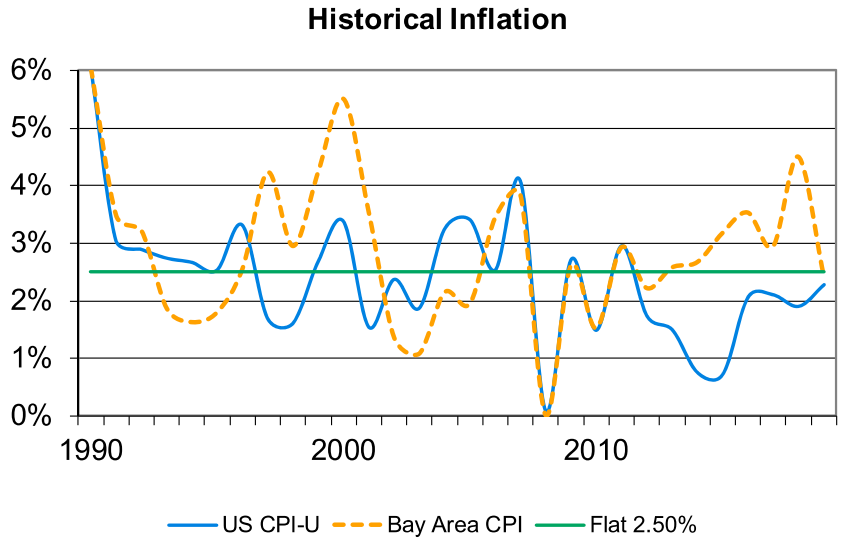
Although economic activities in general, and inflation in particular, do not lend themselves to prediction on the basis of historical analysis, historical patterns and long-term trends are a factor to be considered in developing the inflation assumption.

There are numerous ways to review historical data, with significantly differing results. The table below shows the compounded annual inflation rate for various 10-year periods, and for the 50-year period ended in December 2019. Note that the 50-year average is heavily influenced by the inflation of the late 1970s and early 1980s. The last 30 years have averaged closer to the current assumption, with a 30-year average of 2.4%.

Decade	CPI Increase
2010-2019	1.8%
2000-2009	2.5%
1990-1999	2.9%
1980-1989	5.1%
1970-1979	7.4%
Prior 50 Years	
1970-2019	3.9%

These are national statistics. The inflation assumption as it relates to the investment return assumption should be based more on national and even global inflation, whereas, the inflation assumption used in the wage growth, payroll growth, and COLA increase assumptions is tied to inflation in the Bay Area. We believe that although there have been historical differences between U.S. and Bay Area CPI changes, in the long term there should be a high correlation. For comparison, the average CPI increase for the Bay Area has been about 0.45% higher than the national average for the 30-year period 1990-2019.

The following graph shows historical CPI increases since 1990. The national CPI increase has generally been less than 2.50% over the last 10 years of the period. Also shown for comparison are CPI increases specific to the Bay Area. These were tracking fairly closely to the national statistics, although over the last eight years, local CPI has exceeded the national CPI by over 1.0% on average.



Forecasts of Inflation

Since the U.S. Treasury started issuing inflation indexed bonds, it is possible to determine the approximate rate of inflation anticipated by the financial markets by comparing the yields on inflation indexed bonds with traditional fixed government bonds. Current market prices as of June 2020 suggest investors expect inflation to be about 1.6% over the next 30 years. Most forecasts of future price inflation by economists and investment professionals are lower than 2.5%. Milliman investment consultants' long-term expectation for CPI inflation is currently 2.2%.

Additionally, we reviewed the expected increase in the CPI by the Office of the Chief Actuary for the Social Security Administration. In the 2019 Trustees Report, the projected average annual increase in the CPI over the next 75 years under the intermediate cost assumptions was 2.4%.

CPI Inflation / Price Inflation Recommendation

Neither the CPI inflation nor the price inflation assumption is used explicitly in determining SamCERA's funding and thus have no direct impact on the contribution rates. However, the price inflation assumption is a factor in our recommendations for wage growth, payroll growth, and retiree COLA assumptions. Similarly, CPI inflation is a factor in our recommendations for the investment return assumption.

We recommend maintaining the long-term assumed price inflation rate of 2.5%.

Based on Milliman investment consultant's expectations of 2.2%, we believe a long-term CPI inflation assumption of between 2.0% and 2.5% is reasonable; however we do not believe it is necessary to make an explicit assumption for CPI inflation, provided it is given due consideration in determining the investment return assumption.

Postretirement Cost-of-Living Adjustments (COLA)

The current assumption is that retiree COLAs for Plan 1 will be equal to the price inflation assumption. We recommend continuing this practice. In reality, some years, price inflation will be higher than the assumption and some years it will be lower. Over the long term, if price inflation increases average 2.5%, Plan 1 COLAs should average close to 2.5%, since the maximum COLA is much higher at 5% (3% for Probation) and there is a COLA bank.

For the other contributory plans, the maximum COLA is lower (3% for Plan 2 and 2% for the other plans) and there is no COLA bank. Since when price inflation increases are higher than 2% (or 3% for Plan 2) the COLA will be limited, but when they are lower they will not be limited (except in rare cases), we expect the actual COLAs granted will be less than the average price inflation (or the maximum COLA in the case of Plans 4-7). Our current assumption for the Plan 2 COLA is that it will be 0.1% less than the price inflation assumption, and the COLAs for Plans 4-7 will be 0.1% less than the maximum COLA amount. We feel this continues to be a reasonable assumption.

Our analysis shows that when reflecting future variability in price inflation, the COLAs granted for Plans 2-7 are projected to be fractionally less than the current assumption on average, so the current assumption reflects a small level of conservatism. For purposes of this analysis we assumed that the future price inflation averages 2.5%. We also assumed there is variability in price inflation with a 1.0% standard deviation, and that each future year is correlated to the prior year with a 50% reversion to the current assumption.

General Plan 3 does not have a COLA. Therefore, the assumed COLA is 0.0%.

COLA Recommendation

We recommend the COLA assumptions be retained if the price inflation assumption is not changed.

Plan	Annual Cost of Living Adjustment	
	Current	Recommended
Plan 1	2.5%	2.5%
Plan 2	2.4%	2.4%
Plan 3	0.0%	0.0%
Plans 4, 5, 6, and 7	1.9%	1.9%

2. Wage Growth

Use in the Valuation

Estimates of future salaries are based on two types of assumptions: 1) general wage increase and 2) merit increase. Rates of increase in the general wage level of the membership are directly related to inflation, while individual salary increases due to promotion and longevity generally occur even in the absence of inflation. The promotion and longevity assumptions, referred to as the merit scale, will be reviewed with the other demographic assumptions (see Section 5).

The current assumption is for wage growth of 0.50% above the price inflation assumption.

Historical Perspective

We have used statistics from the Social Security Administration on the National Average Wage back to 1967.

There are numerous ways to review this data. For consistency with our observations of other indices, the table below shows the compounded annual rates of wage growth for various 10-year periods and for the 50-year period ending in 2019. The excess of wage growth over price inflation represents "productivity" (or the increase in the standard of living, also called the real wage inflation rate).

Decade	Wage Growth	CPI Increase	Real Wage Inflation
2010-2019	2.8%	1.8%	1.0%
2000-2009	2.9%	2.5%	0.4%
1990-1999	4.2%	2.9%	1.3%
1980-1989	5.8%	5.1%	0.7%
1970-1979	6.9%	7.4%	-0.5%
Prior 50 Years			
1970-2019	4.5%	3.9%	0.6%

Forecasts of Future Wages

Wage inflation has been projected by the Office of the Chief Actuary of the Social Security Administration. In the 2020 Trustees Report, the ultimate long-term annual increase in the National Average Wage is estimated to be 1.1% higher than the Social Security intermediate inflation assumption of 2.4% per year.

Recommendation

Over the last 50 years, the actual experience, on a national basis, has been close to the current assumption. We believe that wages will continue to grow at a greater rate than prices over the long term, although not to the extent projected by Social Security. We are recommending that the long-term assumed real wage inflation rate remain at 0.50% per year.

Real Wage Inflation Rate	
Current assumption	0.50%
Recommended Assumption	0.50%

The wage growth assumption is the total of the consumer price inflation assumption and the real wage inflation rate. If the real wage inflation assumption remains 0.50% and the price inflation remains 2.50%, this would result in a total wage growth assumption of 3.00%.

Payroll Increase Assumption

In addition to setting salary assumptions for individual members, the aggregate payroll of SamCERA is expected to increase, without accounting for the possibility of an increase in membership. See comments on growth in membership discussed below.

The current payroll increase assumption is equal to the general wage growth assumption of 3.00%. It is our general recommendation to set these two assumptions to be equal, unless there is a specific circumstance that would call for an alternative assumption. We are recommending that the payroll increase assumption continue to be equal to the wage growth assumption of 3.00%. This assumption affects the Unfunded Actuarial Accrued Liability (UAAL) amortization payment rate.

Growth in Membership

We propose continuing the assumption that no future growth in membership will occur. This assumption affects the UAAL amortization payment rate. With no assumed growth in membership, future payroll is assumed to grow due to wage growth increases. If increases should occur because of additional members, there will be a larger pool of salaries over which to spread the UAAL, if any, resulting in a reduction in the Statutory Contribution Rate. Note that the opposite occurs in the event of a shrinking workforce.

It should be noted that membership growth could be affected by the County's "Agile" workforce program, which fills some positions with employees who would not participate in SamCERA. To the extent this occurs, membership growth could be negative, although over the past few years, the active membership has been increasing, so there does not appear to have been a significant impact so far.

3. Investment Return

Use in the Valuation

The investment return assumption is one of the primary determinants in the calculation of the projected contributions needed to pay for SamCERA's benefits, providing a discount of the future benefit payments that reflects the time value of money. This assumption has a direct impact on the calculation of liabilities, normal costs, member contribution rates, and the factors for optional forms of benefits. The current investment return assumption for SamCERA is 6.50% per year, net of all administrative and investment-related expenses.

Expected Long-Term Investment Return

Verus calculated the 10-year investment return based on their March 31, 2020 assumptions for capital markets and SamCERA's current target asset allocation as 6.3%. This expected return is the median return on a geometric basis for SamCERA's assets. That is, there is estimated to be a 50% probability the return will exceed 6.3% and a 50% probability the return will be less than 6.3%. We independently calculated the expected return using Verus's capital market assumptions, including their implicit 1.6% inflation assumption, and came close to their calculated expected return of 6.3%.

Administrative and Investment-Related Expenses

The investment return used for the valuation is assumed to be net of all administrative and investment-related expenses. The following table shows the ratio of administrative expenses to the SamCERA Plan assets over the last 10 fiscal years beginning July 1. The expense ratio is calculated as the expense amount divided by the ending asset balance at fair market value.

($millions) FYB	Market Assets	Admin. Expense[1]	Expense Ratio
2009	$ 1,591	$ 3.4	0.21%
2010	1,816	3.6	0.20
2011	2,318	5.0	0.22
2012	2,360	4.9	0.21
2013	2,728	4.9	0.18
2014	3,292	5.5	0.17
2015	3,454	6.0	0.17
2016	3,541	6.0	0.17
2017	4,039	5.8	0.14
2018	4,378	6.1	0.14

1. *Excludes technology expenses.*

Note that for purposes of this calculation we have included only the regular administrative expenses. If the information technology expense was included, the expense ratio for the fiscal year beginning July 1, 2018 would be 0.20%, instead of 0.14%.

For the administrative expenses, we are recommending retaining the current assumption of 0.17% of market assets. The actual ratio for administrative expenses has been 0.17% or less over the last five years, but when including technology expenses the ratio has been greater. Our understanding is that a significant portion of the current technology expenses are short term, so we expect the technology expenses to decline as a percentage of assets, and we believe the 0.17% assumption continues to be reasonable.

Investment expenses have been slightly less than 1% of the market value of assets. However, for purposes of our analysis of the investment return assumption, we have only accounted for passive management fees and other fixed investment expenses. The reasoning for this is that for asset classes where passive management is available, SamCERA would not use active management unless there was an expectation that the returns net of fees would be at least as great as the net return using passive management. For asset classes where passive management is not available, our understanding is that Verus's capital market assumptions are net of investment expenses.

In addition to accounting for passive management fees, we adjust for other expected investment-related expenses, such as internal investment staff (reported with administrative expenses in the CAFR), outside investment consultants, and the fund's master custodian. We have assumed these fixed investment expenses to be approximately 0.05% of assets.

The expense assumption does not have a direct impact on the actuarial valuation results under the current methods, but it does provide a measure of gross return on investments that will be needed to meet the actuarial assumption used for the valuation. For example, the current investment return assumption is 6.50%, so SamCERA needs to earn a return (net of investment expenses) on its assets of 6.67% in order to net the 6.50% for funding purposes.

Additionally, we recommend the 0.17% adjustment be added to the investment return assumption adopted to determine the discount rate used in SamCERA's GASB 67 and 68 valuations, as GASB requires the discount rate to be the long-term expected rate of return gross of administrative expenses.

Explicit Recognition of Administrative Expenses

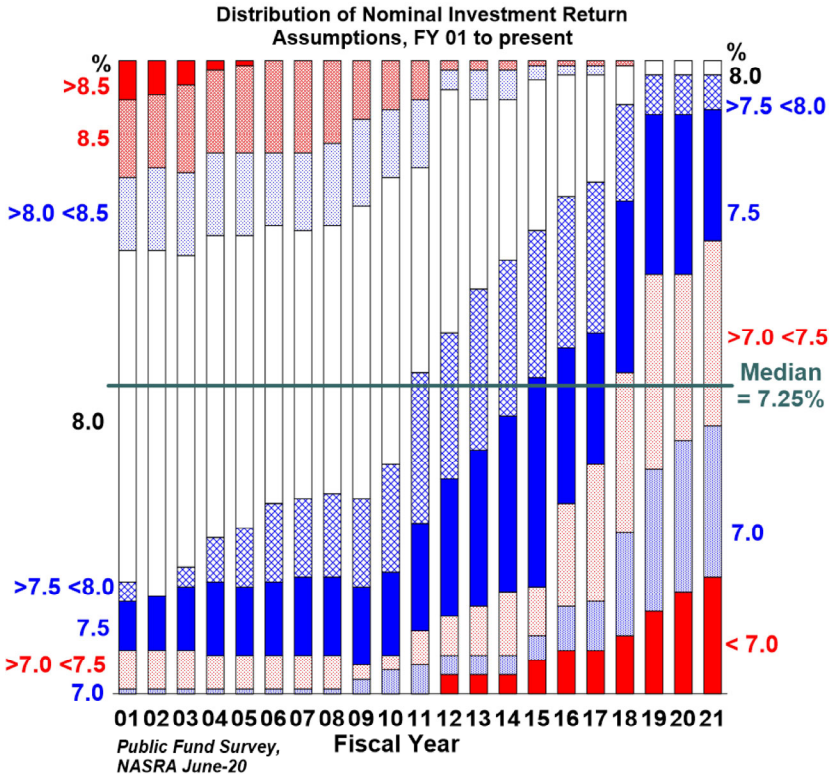
The investment return assumption used for the valuation is assumed to be net of all administrative and investment related expenses. By deducting both of these categories of expenses, the investment return assumption is less than if just the investment related expenses were deducted, resulting in higher employer and member contribution rates. A portion of these higher contribution rates is assumed to pay for administrative expenses. Consequently, the administrative expense is "implicitly" included in the rates.

About half of the '37 Act systems only deduct the investment related expenses from the investment return assumption, which does not decrease the investment return assumption as much and, correspondingly, does not increase the contribution rates as much. For these systems, however, the administrative costs are separately accounted for and then "explicitly" included in the contribution rates, which, in turn, increases the rates. For the systems that explicitly include the administrative expenses in the contribution rates, the costs can be applied to either the member or the employer or shared between the two. A sharing of these costs would be required for the PEPRA Plan 7 members if the administrative expenses are assumed to be part of the normal cost rate.

Switching from the "implicit" to "explicit" method would in essence redistribute the payment of the administrative costs among the different employers and different plan members. Either method is acceptable. Given that SamCERA currently uses the implicit method and there would be some administrative issues in changing, we are recommending continuing with the current method of implicitly recognizing administrative expenses for the 2020 valuation.

Peer System Comparison

According to the Public Fund Survey, the average investment return assumption for statewide systems has been steadily declining. As of the most recent study, the median rate is 7.25%. The following graph shows a progression of the distribution of the investment return assumptions. In 2001, very few systems had an assumption of 7.5% or lower and over 80% had an assumption of 8.0% or greater. As of June 2020, over 50% have an assumption of 7.25% or less and this is continuing to trend down.



Crediting of Reserves

Section 31592.2 of the 1937 Act provides the Retirement Board with the authority to set aside surplus earnings of the retirement fund that are in excess of the total interest credited to reserves, provided this surplus exceeds 1.00% of the total assets of the retirement system. Historically, some '37 Act systems have used these surplus earnings to increase benefits as allowed under the law. This creates a drag on the investment return, if not all earnings are used to pay for the current benefits. If this is the case, the actuary may recommend reducing the investment return assumption to account for this impact.

SamCERA's current interest crediting policy requires that any available earnings first go to crediting the basic reserves. Any remaining available earnings are then used to fill up the contingency reserve up to 3% of assets. All remaining available earnings or losses are then credited to the Undistributed Earnings/Losses Reserve. Since there is no provision for spending investment earnings on anything but the current benefits, no adjustment in the investment return assumption is needed.

Variability of Future Returns

Our focus in this analysis has been on the median expected future return. The median return indicates there is a 50% probability, based on the capital market assumptions, that the actual return will meet or exceed this amount.

For comparison, the following are the probabilities based on Verus's capital market assumptions that the actual return, net of all expenses, will exceed the following thresholds over a 30-year time period. Note that we have extrapolated Verus's 10-year capital market assumptions over a 30-year period, so this is not an exact comparison, but it does give some idea of the potential variability of the expected return.

30-Year Average Return[1]	Probability of Achieving
8.0%	17%
7.0%	33%
6.5%	42%
6.0%	52%
5.0%	71%

1. Average return is net of assumed administrative and investment expenses.

Note that the above analysis reflects a median 6.1% expected return, which is based on the expected return for SamCERA's portfolio of 6.3% using Verus's capital market assumptions, reduced by 0.2% for expenses. For purposes of the analysis, we have used a 10.9% standard deviation.

Recommendation

Based on Verus's long-term (30-year) capital market assumptions, we find there is less than a 50% probability that the current investment return of 6.5% (net of all expenses) will be met. It should be noted that Verus's capital market assumptions include a CPI inflation assumption of 1.6% annually, which is lower than the expectations of some other professionals and experts, including Milliman's investment consultants. A higher CPI inflation assumption will generally lead to a higher expected return in the long term. Although a lower investment return assumption would also be reasonable, we are recommending SamCERA retain the current 6.50% assumption and continue to monitor this assumption annually.

	Investment Return
Current assumption	6.50%
Recommendation	6.50%

3. Actuarial Methods and Miscellaneous Assumptions

As part of the triennial investigation, we have reviewed the actuarial methods and other issues related to the actuarial assumptions.

- Cost Method: The actuarial valuation is prepared using the entry age actuarial cost method (CERL 31453.5). We believe that this cost method is appropriate for SamCERA's valuation. It is also the cost method that is required for GASB Statements 67 and 68. We recommend no change. Note that this is the most common method used for public sector retirement systems, as it results in more stability in normal cost rates and provides a level allocation of costs over each individual's working lifetime.
- Funding Method (amortization of UAAL): The current method uses a 15-year closed period layered approach. We recommend no change in the amortization period. This method is consistent with guidelines published by the California Actuarial Advisory Panel (CAAP) and the Conference of Consulting Actuaries (CCA). The only exceptions are in cases of plan changes affecting inactive members and early retirement incentives. If those events were to occur, we recommend that SamCERA consider a shorter amortization period at that time to recognize any increase in liability associated with those changes.
- Valuation of Assets: We believe that the current asset valuation method which smoothes gains and losses over five years (actually 10 six-month periods) and includes an 80% to 120% corridor is appropriate for SamCERA's valuation. A five-year smoothing period is used by a majority of large public retirement systems. This method is also consistent with guidelines published by CAAP and CCA. We recommend no change.
- Adjustment to Plan 3 Normal Cost Rate: The current method increases the Plan 3 Normal Cost rate to account for Plan 3 members being eligible to transfer to Plans 2, 4 or 5 (depending on entry date) after five years of service. Under this method, the Plan 3 Normal Cost rate is 50% of the unadjusted Plan 3 Normal Cost rate and 50% of the Plan 4 Normal Cost rate. We believe this method continues to be appropriate and recommend no change.
- Plan 3 Retirement Age Factors: Plan 3 retirement age factors are intended to provide an early retirement benefit that is the actuarial equivalent of an age 65 benefit. Specifically, CERL 31497.3(f) states: "The ERA (early retirement age) factors set forth in this subdivision shall be used until adjusted by the board in accordance with the interest and mortality tables adopted by the board." If new mortality assumptions are adopted, we recommend the Board consider adopting new ERA factors to reflect the new assumptions. The expected impact would be a small change in the ERA factors.

Analysis by Compensation / Benefit Level

In our analysis of the active demographic assumptions (merit salary, service retirement, disability, and termination), we reflected the impact of compensation levels by weighting the results by compensation. That is, a member with annual compensation of $80,000 has twice the impact on the observed rates in comparison to a member with annual compensation of $40,000. We observed some differences in member behavior based on compensation. For example, members with higher levels of compensation tended to have higher probabilities of retiring at a given age. These compensation-weighted probabilities are shown as the "Actual" bars in the graphs in Section 4 through Section 9.

Similarly, we reflected the impact of benefit amounts on the retired mortality analysis. In general, we observed that retired members with higher benefits have longer life expectancy than members with smaller benefits.

Miscellaneous Assumptions

- **Reciprocity:** Members who terminate may go to work for a reciprocal employer. This can result in an increase in the member's final average compensation used in the calculation of their SamCERA benefit. We currently assume that 30% of future General terminated vested members and 40% of future Safety terminated

vested members retire with a reciprocal employer. We reviewed all current deferred vested members for this study. The actual number of deferred vested members with reciprocity is lower than expected by the assumptions. These numbers are lower than we observed in prior studies and appears to be due to underreporting of members with reciprocity. As such, we are not proposing any change to the assumption at this time. The results of the study are as follows.

Probability of Reciprocal Employer (all former members)					
Class	>= 5 Years Service	with Reciprocity	Actual	Expected	Proposed
General	912	201	22%	30%	30%
Safety	75	15	20%	40%	40%

- **Probability of Eligible Survivor:** Eligible surviving beneficiaries (spouses or qualified domestic partners of members) generally receive a 60% continuance of the member's benefit (100% continuance for service-connected disabilities and 50% for Plan 3 members). The valuation assumes a certain percentage of members will have an eligible survivor at retirement. We studied this assumption and found the results to be consistent with the current assumptions, so we are not recommending a change. The results of the study are as follows:

Retirees with Eligible Survivor			
Gender	Actual	Expected	Proposed
Male	75%	75%	75%
Female	51%	55%	55%

- **Survivor age difference:** We are not recommending a change to the assumption of the age difference between members and their eligible survivors. The current assumption is that survivors are three years younger than male members and two years older than female members. We studied the beneficiary age difference compared to the member age based on retirements during the study period where the unmodified 60% continuance was elected and found the results to be consistent with the assumptions. Specifically, male retirees were 3.6 years older than their beneficiaries, and female retirees were 1.8 years younger than their beneficiaries. Based on this analysis, we recommend no change to the assumption.

Member's Age at Retirement (as Compared to Spouse)			
Gender*	Actual	Expected	Proposed
Male	3.6	3.0	3.0
Female	-1.8	-2.0	-2.0

** Member*

- **Assumed Commencement Age for Deferred Members:** We studied the actual retirement ages of members who previously terminated and chose to defer their retirement. The results of the study and our proposed assumptions are shown in the following table. We are not recommending any changes in the assumed retirement ages. Note that experience has shown higher retirement ages than assumed for General members Plans 1, 2, 4, and 5, but this is not fully an apples-to-apples comparison, because a number of current vested terminations are over age 58 at termination. These members are more likely to retire shortly thereafter and bring up the average deferred retirement age. For Safety, we assume age 50, since for all Plans 1, 2, and 4 members this is the most valuable age.

	Deferred Retirements		Assumed Retirement Age	
Plan	Count	Average Age	Current	Proposed
G1, G2, G4, G5	122	61.7	58	58
G3	9	61.0	65	65
G7	0	N/A	62	62
Safety / Probation	16	54.3	50	50

- **Sick Leave Service Credit:** Some county retirement systems allow the conversion of unused sick leave to retirement service credit at retirement. In those cases, an assumption for an increase in service credit at retirement due to sick leave service credit may be appropriate. County employees may convert unused sick leave to contributions for purchasing health benefits but cannot convert to retirement service credit, and therefore there is no impact on the retirement service credit. We did not receive sufficient data to analyze this in this study; however, our analysis for the fiscal year ending June 30, 2016 found no additional increase in service credit at retirement. Accordingly, we recommend continuing with the current assumption of no sick leave service being converted to retirement service.

Non-Valuation Methods

- **Operating Tables:** We recommend the operating tables be updated to reflect the new mortality assumptions.

- **Member Contribution Rates:** The proposed changes to the mortality and merit salary scale will impact the basic member contribution rates. New member rates will need to be calculated during the June 30, 2020 actuarial valuation. Additionally, the Cost-of-Living portion of the member rates will be updated at that time. A sample of the estimated impact to member rates due to these proposed changes is shown in the table below.

Sample Changes in Member Rates due to Proposed Assumption Changes (Based on June 30, 2019 Actuarial Valuation[1])

	Entry Age	Current	Proposed	Increase
General Members - County				
Plan 1	35	15.32%	15.46%	0.14%
Plan 2	35	14.33%	14.47%	0.14%
Plan 4	35	13.33%	13.45%	0.12%
Plan 5	35	8.91%	9.01%	0.10%
Plan 7	All	9.11%	8.91%	-0.20%
Probation Members				
Plan 1	25	18.56%	18.96%	0.40%
Plan 2	25	18.43%	18.83%	0.40%
Plan 4	25	16.68%	17.01%	0.33%
Plan 5	25	16.37%	16.69%	0.32%
Plan 6	25	12.37%	12.68%	0.31%
Plan 7	All	14.97%	15.01%	0.04%
Safety Members [2][3]				
Plan 1	25	19.54%	19.93%	0.39%
Plan 2	25	19.88%	20.27%	0.39%
Plan 4	25	18.17%	18.50%	0.33%
Plan 5	25	16.87%	17.19%	0.32%
Plan 6	25	12.56%	12.88%	0.32%
Plan 7	All	15.28%	15.37%	0.09%

1. *Final FYB 2021 member rates will be determined based on the June 30, 2020 valuation.*
2. *Plans 1 - 6 member rates refer to all Safety members except Deputy Sheriffs. All members of Plan 7 pay the same member rates. Deputy Sheriffs are not eligible for Plan 6.*
3. *Cost sharing for non-Deputy Sheriffs in Plans 1 - 5 is 5%. Cost Sharing varies for Deputy Sheriffs as follows:*
   - *3.0% if employee is less than 45 and has less than 5 years of service.*
   - *3.5% if employee is less than 45 and has between 5 and 15 years of service.*
   - *4.5% if employee is older than 45 or has at least 15 years of service.*

Note that the sample member contribution rates are total rates and include the COLA and Cost Share portions where applicable.

Note that for purposes of calculating the member contribution rates we recommend the valuation mortality tables use a static projection to 2042 for the calculation of member rates to reflect future mortality improvement. The

year 2042 was selected because it represents the discounted weighted average of when all future payments are projected to be made to the active members whose contribution rates vary by entry age.

We are recommending no change to the male/female blend for either General (33%/67%) or Safety/Probation (75%/25%) based on the make-up of the active population.

- **Implementation:** For the Plan 3 ERA factors, the operating tables and the member contribution rates, we recommend the implementation date be July 1, 2021.

4. Salary Increases Due to Promotion and Longevity (Merit)

Results

Estimates of future salaries are based on assumptions for two types of increases:

1. Increases in each individual's salary due to promotion or longevity, which occur even in the absence of inflation (merit increases); and
2. Increases in the general wage level of the membership, which are directly related to inflation and increases in productivity.

In Section 2, we discuss the second of these rates, the general wage inflation, which is 3.00% under the proposed assumptions.

We study the merit patterns of General and Safety members separately, as we have seen differences between the two groups in previous Investigations of Experience, and this is also consistent with the patterns we generally see in other systems The results are shown in Exhibit 4-1 (General members) and Exhibit 4-2 (Safety members).

Exhibit 4-1 and Exhibit 4-2 shows the actual merit increases, over the period July 1, 2017-April 30, 2020 and also for the period July 1, 2005-April 30, 2020. We believe that including a study of salary increases over a longer period than the three-year period of the study helps to smooth out short-term differences, provides additional context for salary increases over a period at least as long as a full economic cycle, and generally presents a more representative analysis of salary increase patterns. Comparing the long-term pattern with the results of the three-year study helps to identify any changes in trend.

Increases were generally higher earlier in a member's career (lower service) and then decreased over time, consistent with the current assumptions. Overall, the actual increases were slightly higher than predicted by the current assumptions for General members, and slightly lower than predicted for Safety members.

In forming our recommendations we also considered the changes in longevity increases that have been negotiated by the County with different General member bargaining groups over the period of this study.

Recommendation

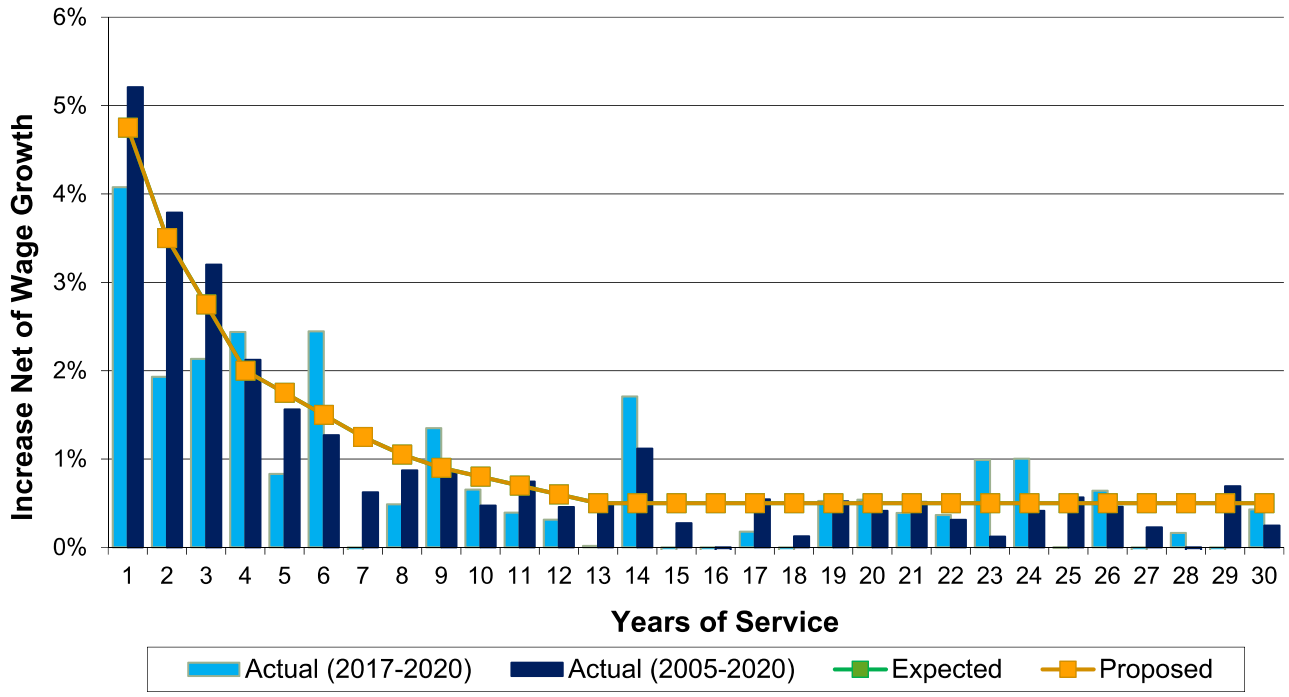
Based on the results of this analysis we are recommending the following:

- Changes in the merit component of the salary increase assumption for Safety members that overall will result in larger increases over a member's full career.
- No changes in the merit component of the salary increase assumption for General members.

Additionally, for SamCERA members currently working for a reciprocal employer (or assumed to in the future), we recommend using a 3.52% annual increase for General members and a 3.88% annual increase for Safety members. These assumptions are equal to the wage growth assumption plus the ultimate assumed merit increase for the respective class.

Exhibit 4-1
Total Annual Rates of Increase in Salary for General Members Due to Merit and Longevity

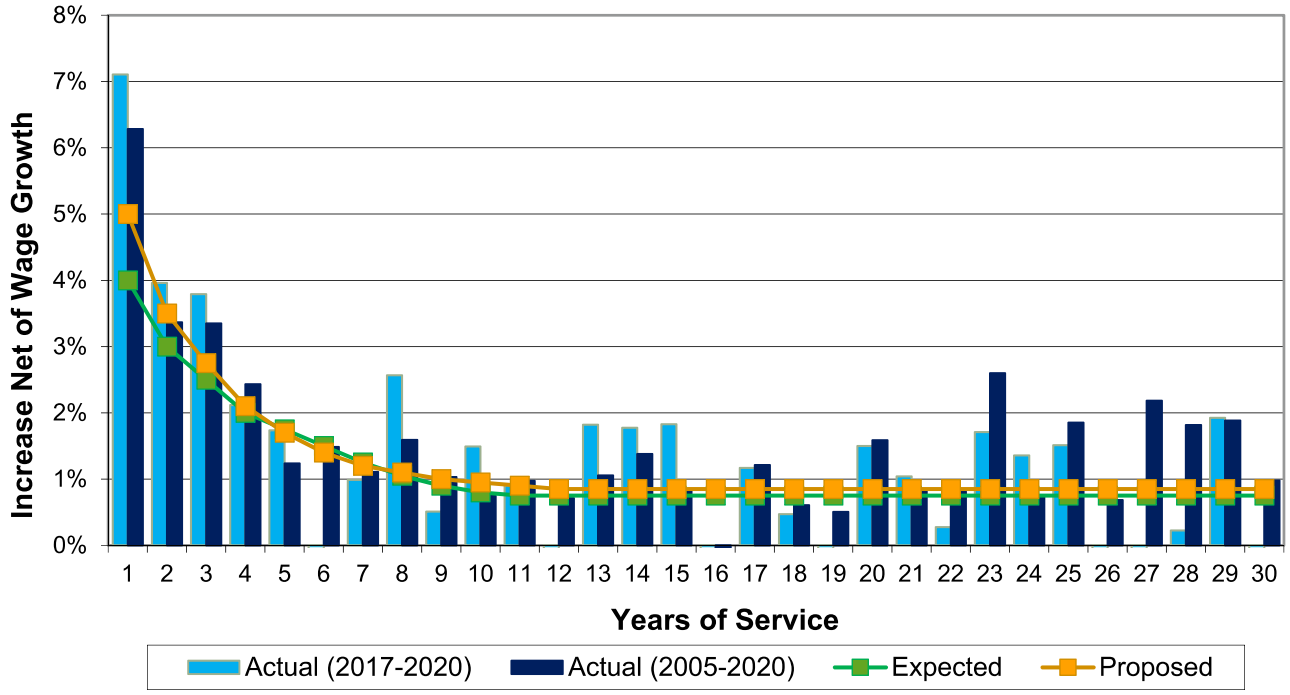
(Excluding the General Wage Growth Assumption)



Note: The proposed assumption is equal to the expected assumption. That is, no change is being recommended.

Exhibit 4-2
Total Annual Rates of Increase in Salary for Safety/Probation Members Due to Merit and Longevity

(Excluding the General Wage Growth Assumption)



5. Mortality

In this section we look at the results of the study of actual and expected death rates of retired members. We studied rates of mortality among healthy and disabled retired members. Valuation mortality is a critical assumption since it has a material impact on the estimate of the costs of the future plan obligations.

Mortality has been improving in this country and is expected to continue to improve. As such, we recommend continued use of generational mortality tables (see later discussion) to account for projected future improvements in mortality. Generational mortality is reflected by including a mortality improvement scale that projects small annual decreases in mortality rates. Therefore, generational mortality explicitly assumes that members born more recently will live longer than the members born before them.

The Actuarial Standards of Practice require expected future mortality improvements to be considered in selecting the assumption. Using generational mortality tables achieves this.

Generational Mortality Tables

Most actuarial valuations for public sector retirement systems use generational mortality tables, which explicitly reflect expected improvements in mortality. Generational mortality tables include a base table and a projection scale. The projection scale reflects the expected annual reduction in mortality rates at each age. Therefore, each year in the future, the mortality at a specific age is expected to decline slightly (and people born in succeeding years are expected to live slightly longer). This can result in significant differences in life expectancies when projecting improvements 30-plus years into the future.

One of the main benefits of generational mortality tables is that the valuation assumptions should effectively update each year to reflect improved mortality, and the mortality tables should need to be changed less frequently. During the previous investigation of experience study, SamCERA adopted a generational mortality assumption.

Projection Scale for Mortality Improvement

There is a strong consensus in the actuarial community that future improvements in mortality should be reflected in the valuation assumptions. There is less consensus, however, about how much mortality improvement should be reflected. The projection scale (which projects future improvements in mortality) published by the Society of Actuaries (SOA) in 2014 incorporates a complex matrix of rates of improvement that vary by both age and birth year. Ultimately, the projection scale (MP-2014) goes to a flat 1% annual improvement in years 2027 and later for ages 85 or less.

Our general recommendation is to use a mortality projection scale of between 100% and 120% of the ultimate portion of the MP-2014 projection scale. In other words, our recommendation is to assume 1.0% and 1.2% annual improvements in mortality (for ages less than 85). We believe this reasonably reflects the long-term expectation of mortality improvement. We have compared our recommended projection scale with actual mortality improvement from the most recent 60 years of experience of the US Social Security system and found them to be reasonably consistent.

SamCERA currently uses a mortality projection equal to 100% of the MP-2014 ultimate projection scale. That is, the current projection scale is a flat 1.0% improvement through age 85. For subsequent ages, the projected improvement is fractionally less, grading down to 0.0% at age 115.

New Public Plan-Specific Mortality Tables

The Society of Actuaries recently published new mortality tables based on data from public sector retirement systems. In particular, tables specific to general and safety members were included. We compared how well the

current SamCERA mortality tables and the new class-specific mortality table matched the actual experience. Based on our analysis, we found that the new public plan-specific mortality tables matched well with the retired mortality experience.

Results – Service and Disabled Retirees

Overall, we found there were slightly more deaths than the current rates predicted: 335 actual compared to 328 expected. We also studied how the amount of an individual's benefits affected their mortality. We found that as the amount of benefit increased the mortality rates decreased. When we weighted the experience by benefit amount we found that the amount of benefits of members who died were slightly lower than were expected to die. The following is a comparison of the actual-to-expected deaths of retired members by class and gender for the study period, weighted by benefit amount.

Retiree Mortality (weighted by benefit amounts)

Service Retirement

	Deaths			Actual to	Actual to
Group	Actual	Expected	Proposed	Expected	Proposed
General Male	$346,485	$335,304	$344,051	103%	101%
General Female	398,135	420,897	407,522	95%	98%
Safety Male	134,392	135,402	134,227	99%	100%
Safety Female	3,783	9,878	9,655	38%	39%
Total Svc Ret	**882,795**	**901,481**	**895,455**	**98%**	**99%**

Disability Retirement

	Deaths			Actual to	Actual to
Group	Actual	Expected	Proposed	Expected	Proposed
General Male	$34,139	$25,836	$22,226	132%	154%
General Female	29,907	41,993	41,970	71%	71%
Safety Male	33,607	27,159	27,023	124%	124%
Safety Female	-	2,976	2,836	0%	0%
Total Dis Ret	**97,653**	**97,964**	**94,055**	**100%**	**104%**
Grand Total	**980,448**	**999,445**	**989,510**	**98%**	**99%**

The values in the table are weighted by monthly benefit amount, so the first line of the table indicates the General male retirees with total monthly benefits of $346,485 died compared to the expected value of monthly benefits associated with General male retiree deaths of $335,304 based on the valuation assumption.

Results are shown graphically on the following pages. Note that analysis of Safety females is not shown in graph form due to the small number of actual and expected deaths.

Results – Active Member Mortality

Compared to retiree mortality, active member mortality is a less material assumption. Typically the number of deaths from active status is quite low. In this study period there were 21 total deaths from active service (19 General and 2 Safety). 11 of the 19 General deaths occurred among members greater than 60 years of age.

The following is a comparison of the actual-to-expected deaths of active members by plan and gender for this study period, weighted by compensation level. There were more deaths than expected among General males

(weighted by compensation level) and fewer deaths than expected among other classes / genders. Given the small number of deaths observed, it is not surprising the expected and proposed rates to do not closely match the observed experience

Active Mortality (weighted by compensation)					
	Deaths			Actual to	Actual to
Group	Actual	Expected	Proposed	Expected	Proposed
General Male	$1,471,560	$959,532	$660,264	153%	223%
General Female	568,332	886,680	664,896	64%	85%
Safety Male	185,904	430,560	171,036	43%	109%
Safety Female	-	100,560	36,600	0%	0%
Total	**2,225,796**	**2,377,332**	**1,532,796**	**94%**	**145%**

Recommendation

We recommend an update to the mortality assumptions to reflect the new public plan specific mortality tables and retaining the mortality projection scale. Note that the total service retirement actual / proposed ratio under the proposed assumptions is 101% on a headcount-weighted basis compared to 99% on a benefit-weighted basis. We believe the combination of the recommended mortality tables with the current projection scale allows for a reasonable expectation of future life expectancy increases.

SamCERA uses standard mortality tables adjusted to best fit the patterns of mortality among its retirees. The table below describes the new tables being recommended for healthy and disabled retirees. These are based on the recent study of public plan retirees. Note that for beneficiaries of healthy and disabled retirees, we recommend that the mortality for healthy general retirees be used.

The recommended retiree mortality rates are based on the PubG-2010 and PubS-2010 Healthy Retiree and Disabled Retiree mortality tables and all assume generational mortality improvement based on 100% of the MP-2014 Ultimate projection scale, as follows:

			Mortality Tables[2]	
Class	Type[1]	Sex	Current Table	Proposed Table
General	Healthy	Male	RP-2014 (95%) Healty Annuitant Male	PubG-2010 (100%) Healthy Retiree Male
General	Healthy	Female	RP-2014 (95%) Healty Annuitant Female	PubG-2010 (100%) Healthy Retiree Female
Safety	Healthy	Male	RP-2014 (95%) Healty Annuitant Male	PubS-2010 (100%) Healthy Retiree Male
Safety	Healthy	Female	RP-2014 (95%) Healty Annuitant Female	PubS-2010 (100%) Healthy Retiree Female
General	Disabled	Male	Avg of: RP-2014 (95%) Healty Annuitant Male RP-2014 (105%) Disabled Retiree Male Minimum blended rate = 1.0%	PubG-2010 Disabled Retiree Male[3]
General	Disabled	Female	Avg of: RP-2014 (95%) Healty Annuitant Female RP-2014 (105%) Disabled Retiree Female Minimum blended rate = 0.5%	PubG-2010 Disabled Retiree Female[3]
Safety	Disabled	Male	RP-2014 (105%) Healty Annuitant Male Minimum blended rate = 1.0%	PubS-2010 (100%) Disabled Retiree Male
Safety	Disabled	Female	RP-2014 (105%) Healty Annuitant Female Minimum blended rate = 0.5%	PubS-2010 (100%) Disabled Retiree Female

1. Beneficiaries are assumed to have the same mortality as a healthy General member of the same sex.
2. Generational Projections using 100% of the MP-2014 Ultimate projection scale.
3. Disabled General mortality rates are applied at 100% at ages 85 and above; 60% at ages 65 and below; and graded from 60% to 100% at 2% per year between age 65 and age 85.

For active employees, we recommend the PubG-2010 and PubS-2010 Employee mortality tables with generational mortality based on 100% of the MP-2014 Ultimate projection scale. Like the proposed tables for retiree mortality, these tables are based on public plan mortality experience. The proposed active mortality tables project significantly lower mortality among younger members than do the current tables. Given the small number of deaths observed, it is not surprising the proposed rates to do not closely match the observed experience, with the most noticeable difference being for General males. However, as the SamCERA retiree population, where there is significantly more observed mortality experience, appears to very similar to the new public plan mortality tables, we believe it is reasonable to assume the active population would also be similar to the public plan tables.