



Alameda County Employees' Retirement Association
BOARD OF RETIREMENT

**ACTUARIAL COMMITTEE/BOARD MEETING
NOTICE and AGENDA**

ACERA MISSION:

To provide ACERA members and employers with flexible, cost-effective, participant-oriented benefits through prudent investment management and superior member services.

**Thursday, June 15, 2023
11:00 am**

LOCATION AND TELECONFERENCE	COMMITTEE MEMBERS	
ACERA C.G. "BUD" QUIST BOARD ROOM 475 14TH STREET, 10TH FLOOR OAKLAND, CALIFORNIA 94612-1900 MAIN LINE: 510.628.3000 FAX: 510.268.9574 The public can observe the meeting and offer public comment by using the below Webinar ID and Passcode after clicking on the below link or calling the below call-in number. https://zoom.us/join Call-In Number: 1 699 900 6833 Webinar ID: 879 6337 8479 Passcode: 699406 For help joining a Zoom meeting, see: https://support.zoom.us/hc/en-us/articles/201362193	OPHELIA BASGAL, CHAIR	APPOINTED
	HENRY LEVY, VICE CHAIR	TREASURER
	KEITH CARSON	APPOINTED
	ROSS CLIPPINGER	ELECTED SAFETY
	GEORGE WOOD	ELECTED GENERAL

The Alternate Retired Member votes in the absence of the Elected Retired Member, or, if the Elected Retired Member is present, then votes if both Elected General members, or the Safety Member and an Elected General member, are absent.

The Alternate Safety Member votes in the absence of the Elected Safety, either of the two Elected General Members, or both the Retired and Alternate Retired members.

This is a meeting of the Actuarial Committee if a quorum of the Actuarial Committee attends, and it is a meeting of the Board if a quorum of the Board attends. This is a joint meeting of the Actuarial Committee and the Board if a quorum of each attends.

Board and Committee agendas and minutes and all documents distributed to the Board or a Committee in connection with a public meeting (unless exempt from disclosure) are posted online at www.acera.org and also may be inspected at 475 14th Street, 10th Floor, Oakland, CA 94612-1900.

Public comments are limited to four (4) minutes per person in total. The order of the items on the agenda is subject to change without notice.

Note regarding accommodations: If you require a reasonable modification or accommodation for a disability, please contact ACERA between 9:00 a.m. and 5:00 p.m. at least 72 hours prior to the meeting at accommodation@acera.org or at 510-628-3000.

ACTUARIAL COMMITTEE/BOARD MEETING

NOTICE and AGENDA, Page 2 of 2 – Thursday, June 15, 2023

Call to Order: 11:00 am

Roll Call

Public Input

Action Items: Matters for Discussion and Possible Motion by the Committee

None

Information Items: These items are not presented for Committee action but consist of status updates and cyclical reports

1. Segal presentation of the deterministic and stochastic projections as part of the Risk Assessment Report based on the Actuarial Valuation and Review as of December 31, 2022

-Lisa Johnson

-Eva Yum, Segal

-Andy Yeung, Segal

Trustee Input

Future Discussion Items

September

- Presentation and discussion of the Triennial Experience for the years 2020-2022 and the economic and non-economic assumptions

October

- Discussion and possible motion to adopt the Triennial Experience for years 2020-2022


Establishment of Next Meeting Date

September 21, 2023

Adjournment



MEMORANDUM TO THE ACTUARIAL COMMITTEE

DATE: June 15, 2023
TO: Members of the Actuarial Committee
FROM: Lisa Johnson, Assistant Chief Executive Officer 
SUBJECT: Actuarial Standard of Practice No 51 (ASOP No. 51), Risk Assessment,
Including Review of Funded Status of the Pension Plan as of December 31, 2022

Executive Summary

On June 15, 2023 staff and Segal will present the results of a deterministic scenario test used to evaluate and address the risk exposure related to ACERA's Actuarial Valuation and Review as of December 31, 2022. In February 2019, staff obtained Board approval for Segal to provide risk reports that satisfy disclosure requirements for the (then) new ASOP No. 51, effective for a measurement date on or after November 1, 2018 and for ACERA's December 31, 2022 valuation.

Deterministic Scenario Test: Assesses the impact of one possible event or several events, for example, market return that is higher or lower than the assumed 7.00% in the next year.

Recommended Scenario Test for ACERA: Consider the impact of portfolio market return in 2023 at 0.00%, 7.00%, or 14.0% in December 31, 2022 risk assessment report.

Attachment:

ACERA Risk Assessment, Including Review of Funded Status of the Pension Plan as of December 31, 2022



Alameda County Employees' Retirement Association

Risk Assessment

**Including Review of Funded Status of the
Pension Plan as of December 31, 2022**

June 7, 2023

Andy Yeung, ASA, MAAA, FCA, EA

Eva Yum, FSA, MAAA, EA

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Section 1: Introduction and Executive Summary

Introduction

The purpose of this report is to assist the Board of Retirement,¹ participating employers and members and other stakeholders to better understand and assess the risk profile of the Association, as well as the particular risks inherent in using a fixed set of actuarial assumptions in preparing the results in our December 31, 2022 funding valuation for the Pension Plan (“the Plan”) of the Alameda County Employees’ Retirement Association (“ACERA”).

The results included in our December 31, 2022 funding valuation report for the Pension Plan were prepared based on a fixed set of economic and non-economic actuarial assumptions under the premise that future experience of ACERA would be consistent with those assumptions. While those assumptions are generally reviewed every three years (with the assumptions from the last triennial experience study adopted by the Board of Retirement for use starting with the December 31, 2020 valuation), there is a risk that emerging results may differ significantly as actual experience is fluid and will not completely track current assumptions.

It is important to note that this risk assessment is based on plan assets as of December 31, 2022. The Plan’s funded status does not reflect short-term fluctuations of the market, but rather is based on the market values on the last day of the plan year. Moreover, this risk assessment does not include any possible short-term or long-term impacts on mortality of the covered population that may emerge after December 31, 2022 due to COVID-19. While it is impossible to determine how the market will perform over 2023, the single year investment return scenario test included within this report provides an illustration of the impact of short term market fluctuations on the plan. Besides the stochastic projection included in this report, Segal is available to prepare other projections of selected potential outcome scenarios upon request.

Actuarial Standard of Practice on Risk Assessment

The Actuarial Standards Board approved the Actuarial Standard of Practice No. 51 (ASOP 51) regarding risk assessment when performing a funding valuation and it was effective with ACERA’s December 31, 2018 actuarial valuation for benefits provided by the Pension Plan. ASOP 51 requires actuaries to identify and assess risks that “may reasonably be anticipated to significantly affect the plan’s future financial condition.” Examples of key risks listed that are particularly relevant to ACERA are asset/liability mismatch risk, investment risk, and longevity and other demographic risks. ASOP 51 also requires an actuary to consider if there is any ongoing contribution risk to the plan; however, it does not require the

¹ This risk report has been prepared at the request of the Board of Retirement to assist in administering the Plan. This risk report may not otherwise be copied or reproduced in any form without the consent of the Board of Retirement and may only be provided to other parties in its entirety, unless expressly authorized by Segal. The measurements shown in this risk report may not be applicable for other purposes.

actuary to evaluate the particular ability or willingness of contributing entities to make contributions when due, nor does it require the actuary to assess the likelihood or consequences of future changes in applicable law.

The actuary's initial assessment can be strictly a qualitative discussion about potential adverse experience and the possible effect on future results, but it may also include quantitative numerical demonstrations where informative. The actuary is also encouraged to consider a recommendation as to whether a more detailed risk assessment would be significantly beneficial for the intended user in order to examine particular financial risks. When making that recommendation, the actuary will take into account such factors as the plan's design, risk profile, maturity, size, funded status, asset allocation, cash flow, possible insolvency and current market conditions. This report incorporates a more detailed risk assessment as agreed upon with ACERA.

The Standard also requires disclosure of plan maturity measures and other historical information that are significant to understanding the risks associated with the Pension Plan and this information is included in this report. Besides information for the Pension Plan, we have included as part of the Plan design under Article 5.5 of the Statute the amount of "excess earnings" allocated from the Association's total investment portfolio to the Supplemental Retiree Benefit Reserve (SRBR) and the change in the sufficiency periods for benefits paid out of the SRBR. Based on our understanding of the statute which authorizes the SRBR, the investment return assumption used in the funding valuation has been developed without considering the impact of any future excess earnings allocation to the SRBR. However, for informational purposes, we have included in this report the same disclosure of such allocation that we have previously included in our funding valuation report.

Plan Risk Assessment

In Section 2, we start by discussing some of the historical factors that have caused changes in ACERA's funded status and employer contribution rates. It is important to understand how the combination of decisions and experience has led to the current financial status of the plan.

We follow this with a discussion of the most significant risk factors going forward. Even though we have not included a numerical analysis of all the risk factors, based on our discussions with ACERA we have illustrated the impact on the funded status and employer contribution rates using relevant economic scenario tests. These tests illustrate the effect of future investment returns on the portfolio coming in differently from the current 7.00% annual investment return assumption used in the December 31, 2022 valuation. We have also included a projection of future results based on a stochastic modeling of future investment returns. The stochastic modeling is useful for assessing the distribution of future results based on random variations in actual investment returns each year, and introduces a relative likelihood to the range of potential outcomes. As Segal will be conducting a triennial experience study of the economic and non-economic actuarial assumptions before the next valuation as of December 31, 2023, based on our prior discussions with ACERA, we have included for illustrative purposes only, the impact on the funded status and the employer and employee

contribution rates if the Board were to lower both the inflation and investment return assumptions as part of our sensitivity tests of the two most important economic assumptions.

ASOP 51 also requires disclosure of plan maturity measures and other historical information that are significant to understanding the risks associated with the Pension Plan and this information is included in this report.

Executive Summary

Historical Funded Status and Employer Contribution Rates

The following table provides a summary of financial changes to the Plan over the last 10 valuations. The unfunded actuarial accrued liability (UAAL) and contribution rates decreased primarily as a result of additional voluntary County Safety and Livermore Area Recreation and Park District (LARPD) General contributions made by the two employers to reduce their UAAL and associated contribution rates,² expected contributions to reduce the UAAL principal, and favorable investment and non-investment experience, offset somewhat by the strengthening of the actuarial assumptions used in preparing the valuations.³

Valuation Date	Market Value Basis		Valuation Value Basis		Total (Aggregate) Employer Contribution Rate (% of Payroll)
	Funded Status	UAAL	Funded Status	UAAL	
December 31, 2013	81.7%	\$1,258.0 M	75.9%	\$1,651.0 M	23.8%
December 31, 2022	80.7%	\$2,208.6 M	86.9%	\$1,492.1 M	23.7%

² The County made voluntary County Safety contributions of \$800 million on around June 29, 2021, and LARPD also made voluntary LARPD General contributions of \$12.611 million on around June 29, 2021.

³ For instance, as a result of the last three experience studies, the UAAL increased by \$460 million, \$396 million, and \$322 million in the December 31, 2014, December 31, 2017, and December 31, 2020 valuations, respectively, for a total of \$1,178 million. Similarly, as a result of the last three experience studies, the employer's total rate (normal cost plus UAAL) increased by 3.44% of payroll, 3.49% of payroll, and 2.44% of payroll in the December 31, 2014, December 31, 2017, and December 31, 2020 valuations, respectively, for a total of 9.37% of payroll.

Supplemental Retiree Benefit Reserve

In the 10 valuations from December 31, 2012 to 2021,⁴ the assets available in the SRBR have increased from about \$576 million to about \$1,135 million. During this 10-year period, about \$447 million in excess earnings were allocated to the SRBR. In the December 31, 2012 valuation, it was estimated that the assets in the SRBR would be sufficient to pay OPEB SRBR benefits for about 16 years (until around 2028) and non-OPEB SRBR benefits for about 16 years (until around 2028). In the December 31, 2021 valuation, it was estimated that the assets in the SRBR would be sufficient to pay OPEB SRBR benefits for about 25 years (until around 2046) and non-OPEB SRBR benefits for about 22 years (until around 2043).⁵

Future Funded Status and Employer Contribution Rates

In this report, we highlight key factors besides assumption changes that may affect the financial profile of the Plan going forward. As investment experience in the past 10 years has had a significant impact on the funded status and employer contribution rates, we have also provided deterministic projections (using select scenarios for illustration) under hypothetical unfavorable and favorable future market experience so that the impact of market performance can be better understood.

The total (aggregate) employer contribution rate for the plan is 23.7% of total payroll in the December 31, 2022 valuation. Using a deterministic projection, this report shows the effect of either unfavorable (0.00%) or favorable (14.00%) hypothetical market returns for 2023 on key valuation results. In particular, the changes in the total employer contribution rate (relative to the December 31, 2022 valuation aggregate employer contribution rate of 23.7%) in the December 31, 2023 valuation and in the December 31, 2028 valuation (when all the investment gains or losses are fully recognized at the end of the five-year asset smoothing period) are as shown in the following table:

Employer Contribution Rate Change	2023 Single Plan-Year Investment Return		
	0.00%	7.00% (Baseline)	14.00%
December 31, 2023	+1.3% of payroll	+0.7% of payroll	+0.3% of payroll
December 31, 2028	+8.6% of payroll	+4.4% of payroll	+0.8% of payroll

Under the favorable (14.00%) hypothetical market return scenario for 2023, the Association would be expected to reach full funding by December 31, 2035 and the total employer contribution rate would be comprised of only normal cost contributions, resulting in a larger relative change from the baseline than the unfavorable (0.00%) hypothetical market

⁴ We have not included the results from the December 31, 2022 SRBR valuation as the finalized results from that valuation will not be available until later in 2023.

⁵ During the past 10 years, the Board took several actions to preserve the sufficiency period to pay benefits from the SRBR. For instance, the Board eliminated the Active Death Equity Benefit and froze the maximum Monthly Medical Allowance for several years.

return scenario (as provided in Chart 6). Furthermore, under all three hypothetical market return scenarios for 2023, the Association would be expected to reach full funding within 20 years and the total employer contribution rate would be expected to approach about 10% of payroll.⁶ This means that the Board's funding policy is very effective in achieving the general policy goal of achieving the long-term full funding of the costs of the benefits paid by ACERA. Under the new Actuarial Standard of Practice No. 4 (ASOP 4) that will become effective for the December 31, 2023 valuation, we will be required to include a statement similar to the one above in our funding valuation report. In addition, we will also be required to provide a new liability measure which is discussed in more detail in Section 3 of this report.

Using a stochastic projection that models market return over the next 20 years by using expected return, standard deviation and other information about ACERA's asset portfolio, there is a 50% chance that the employer contribution rates would be between 10% and 29% of payroll at the end of 10 years and between 10% and 36% of payroll at the end of 20 years. Furthermore, there is a 32% chance ACERA would be fully funded at the end of 10 years and 40% chance ACERA would be fully funded at the end of 20 years. The probability that the sufficiency period for the OPEB SRBR would be over 15 years is 64% at the end of 10 years and 70% at the end of 20 years. The probability that the sufficiency period for the non-OPEB SRBR would be over 15 years is 25% at the end of 10 years and 20% at the end of 20 years.

Plan Maturity Measures

During the past 10 valuations, the Association has become more mature as evidenced by an increase in the ratio of members in pay status (retirees and beneficiaries) to active members (as shown in *Section 2, Chart 19* on page 42) and by an increase in the ratios of plan assets and liabilities to active member payroll (as shown in *Section 2, Chart 20* on page 43 and *Chart 21* on page 44, respectively). We expect these trends to continue going forward. This is significant for understanding the volatility of both historical and future employer contribution rates because any increase in UAAL due to unfavorable investment and non-investment experience for the relatively larger group of non-active members would have to be amortized and funded over the payroll of the relatively smaller group of only active members. Put another way, as a plan grows more mature, its contribution rate becomes more sensitive to investment volatility and liability changes. As ACERA continues to mature with time, its risk profile will continue to evolve in this way and contributions will grow more sensitive to plan experience.

⁶ This is the estimated normal cost rate for the employer, assuming no further assumption changes, method changes or experience that differs significantly from assumptions.

Section 2: Key Plan Risks on Funded Status, Unfunded Actuarial Accrued Liabilities, and Employer Contribution Rates

Evaluation of Historical Trends

Funded Status and Change in Unfunded Actuarial Accrued Liabilities

One common measure of ACERA's financial status is the funded ratio. This ratio compares the valuation⁷ and market value of assets to the actuarial accrued liabilities (AAL)⁸ of ACERA. The overall level of funding of ACERA has increased mainly as a result of additional voluntary County Safety and LARPD General contributions made by the two employers in 2021 to reduce their UAAL and associated contribution rates, expected contributions to reduce the UAAL principal, and favorable investment and non-investment experience. The strengthening of the economic and non-economic assumptions especially in the last three triennial experience studies has had a somewhat offsetting impact. Those new actuarial assumptions were used starting in the December 31, 2014, 2017, and 2020 valuations. The funded ratios and the unfunded actuarial accrued liabilities⁹ for the past 10 valuations from December 31, 2013 to 2022 measured using both actuarial and market value of assets bases are provided in *Chart 1*.

The factors that caused the changes in the UAAL for each of the past 10 valuations from December 31, 2013 to 2022 are specified in *Chart 2*. *Chart 2(a)* displays the aggregate changes in UAAL by source over the last 10 years. The results in *Chart 2* show the changes in the investment return assumption from 7.80% to 7.60% in the December 31, 2014 valuation, from 7.60% to 7.25% in the December 31, 2017 valuation, and from 7.25% to 7.00% in the December 31, 2020 valuation. These reductions together with the changes in the mortality tables and other assumptions from the last three triennial experience studies have by far the most impact on the UAAL for ACERA,¹⁰ followed by the additional voluntary County Safety and LARPD General contributions in 2021 which had a somewhat offsetting impact.

⁷ The valuation value of assets is equal to the market value of assets excluding unrecognized returns from the last few years and any non-valuation reserves. Unrecognized return is equal to the difference between the actual market return and the expected return on the market value, and is recognized over a five-year period.

⁸ For the actives, the actuarial accrued liability is the value of the accumulated normal costs allocated to the years before the valuation date. For the pensioners, beneficiaries and inactive vested members, the actuarial accrued liability is the single-sum present value of the lifetime benefit expected to be paid to those members.

⁹ The amount by which the actuarial accrued liability of the plan exceeds (or is exceeded by) the assets of the plan.

¹⁰ For instance, as a result of the last three experience studies, the UAAL increased by \$460 million, \$396 million, and \$322 million in the December 31, 2014, December 31, 2017, and December 31, 2020 valuations, respectively, for a total of \$1,178 million.

Chart 2 also shows overall favorable investment experience and favorable non-investment experience. The non-investment experience included smaller salary increases received by active members and smaller cost-of-living-adjustment (COLA) increases received by retirees and beneficiaries than expected under the actuarial assumptions. The non-investment experience also included the scheduled delay in implementing the contribution rates determined in the annual valuation.

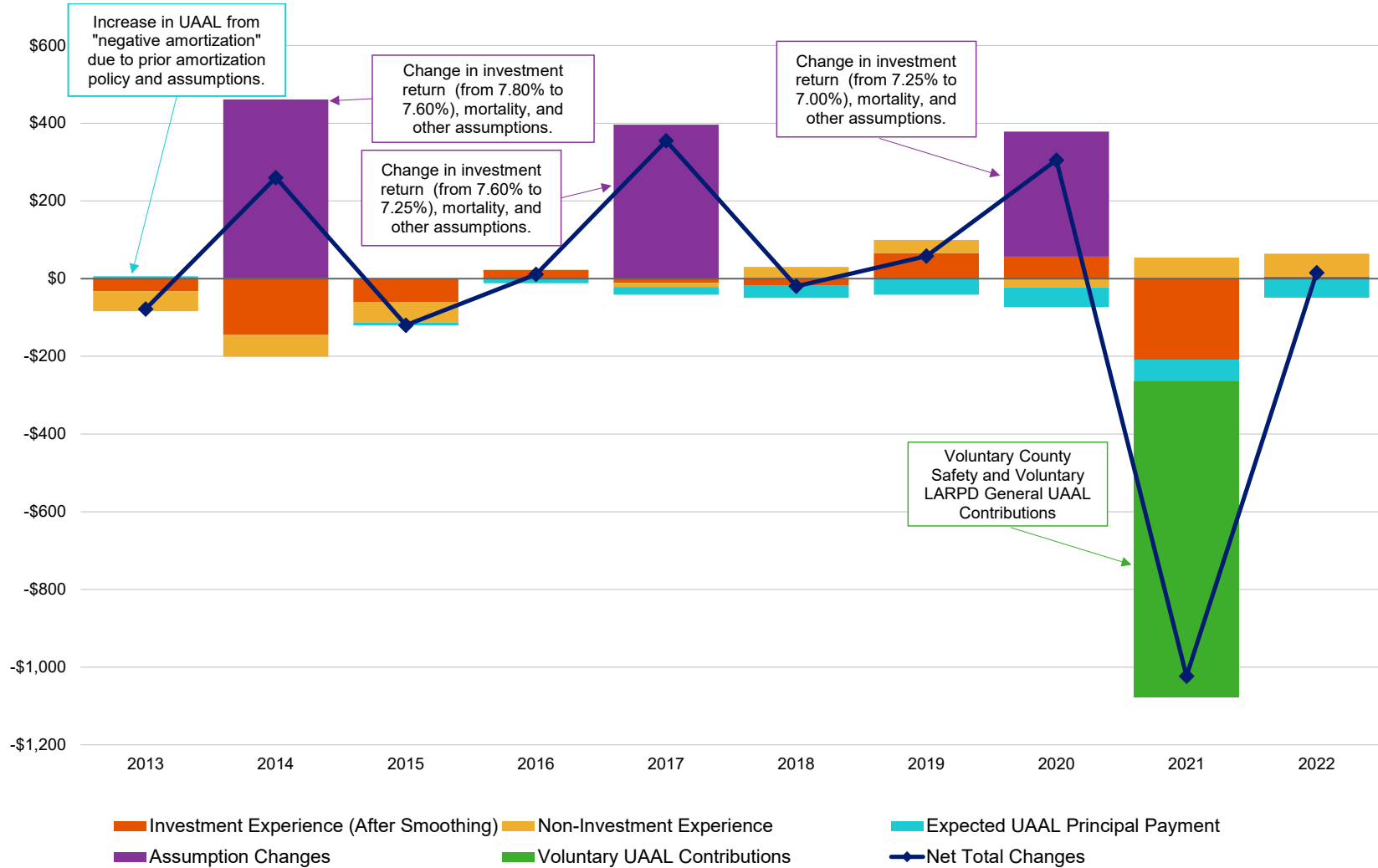
Finally, prior to 2014, *Chart 2* shows some “negative amortization” under the longer amortization periods used in these years. Current amortization policy coupled with assumptions used in developing the annual UAAL payment amount generally will not entail negative amortization in the future.

It is important to note that ACERA has taken strides in risk management and resulting long-term plan sustainability. This includes strengthening of assumptions, particularly the expected investment rate of return and mortality assumption (amount-weighted generational mortality tables for the Pension Plan), and adopting a funding policy that eliminates negative amortization and promotes intergenerational equity. Assumptions will continue to be reviewed in future experience studies to reflect the Plan’s experience as well as future expectations. Those changes may result in higher contributions in the short term, but in the medium to longer term avoid both deferring contributions and allowing unmanaged growth in the UAAL. We believe these actions are essential for ACERA’s fiscal health going forward.

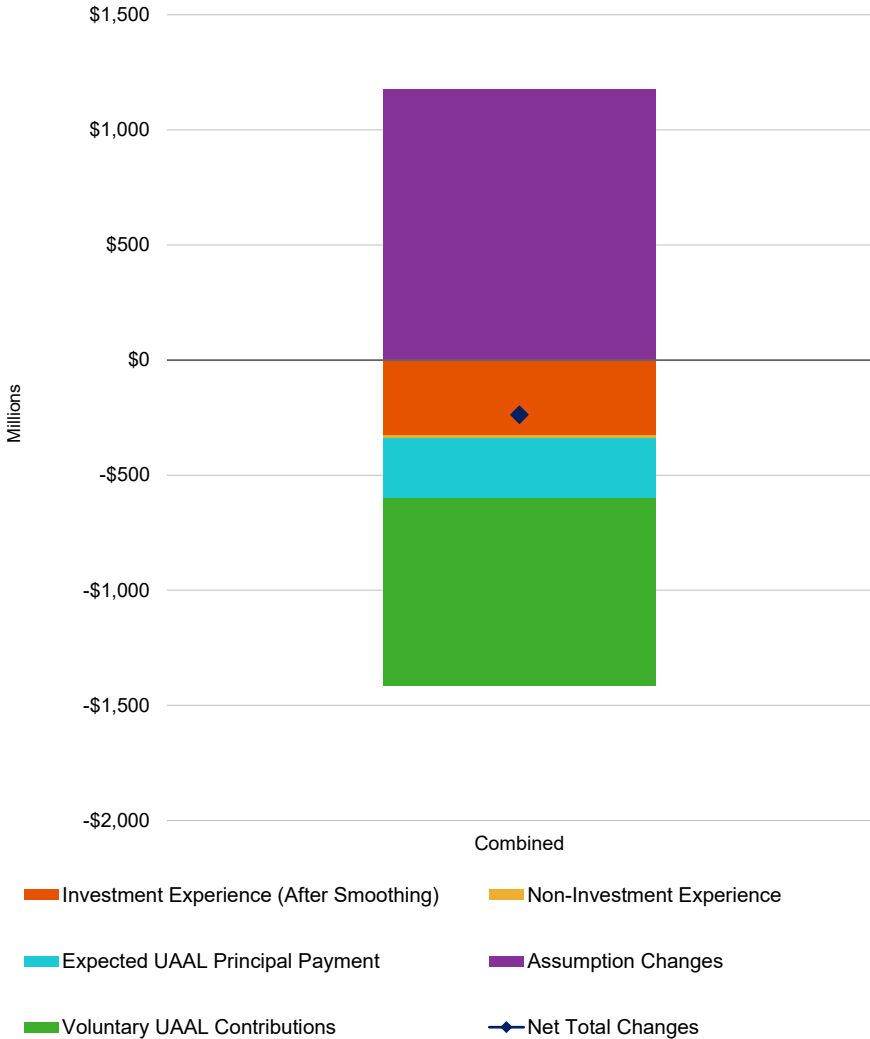
Funded Ratio (Percentages) and Dollar UAAL (\$ Millions)
in December 31, 2013 to 2022 Valuations



Factors that Changed UAAL in December 31, 2013 to 2022 Valuations (\$ Millions)



Factors that Changed UAAL in the December 31, 2013 to 2022 Valuations Combined (\$ Millions)



Note: This summation of unfunded liability changes by source does not account for the timing of when they occurred nor any resulting compounding effects. Also, the investment experience shown is investment returns after asset smoothing compared to the expected returns.

Employer Contribution Rates

The total (normal cost¹¹ plus UAAL payment) employer contribution rates determined in the December 31, 2013 to 2022 valuations are provided in *Chart 3* and the factors that caused the changes in the total aggregate employer rates¹² are provided in *Chart 4*.

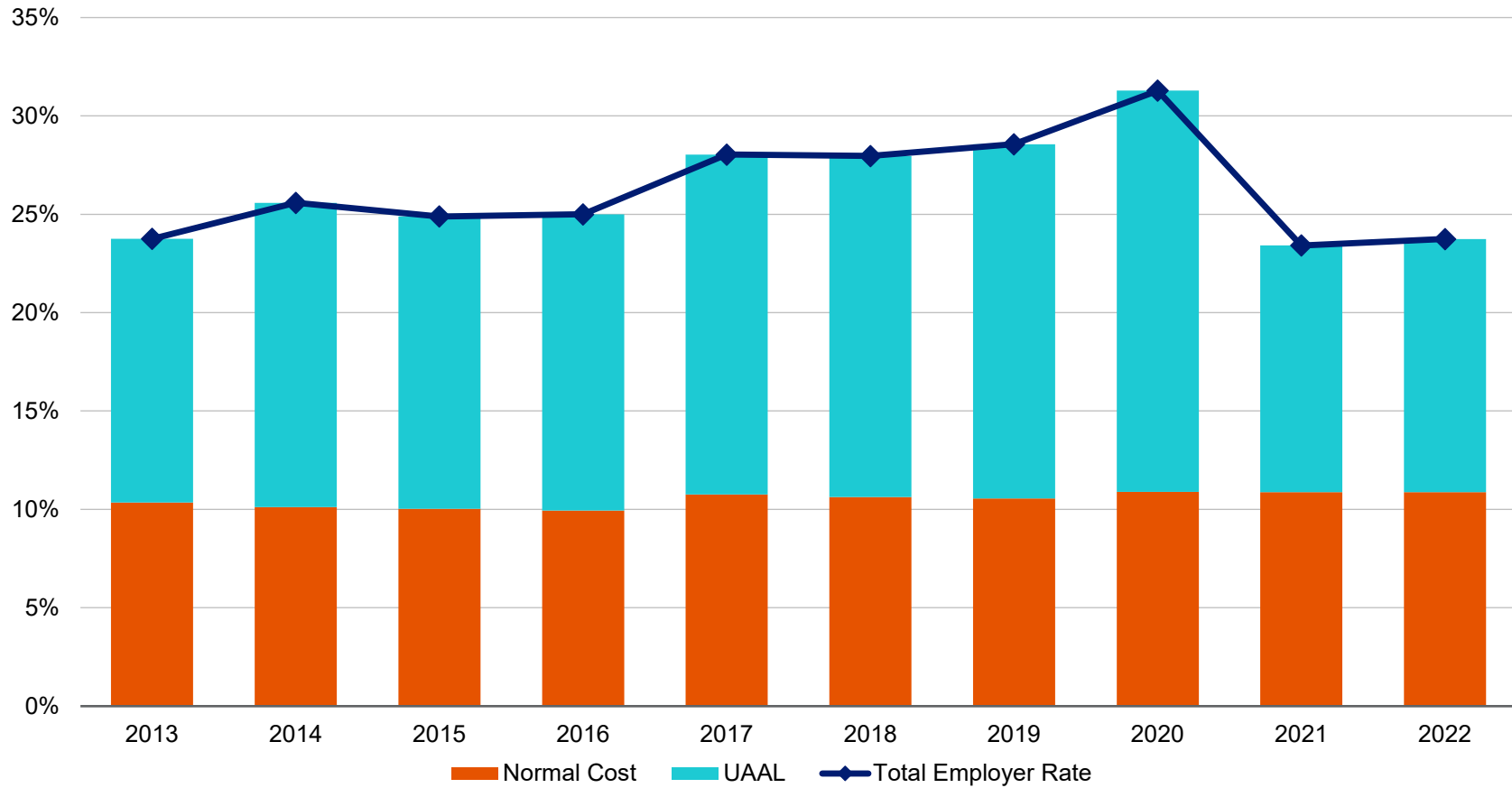
The employer's aggregate normal cost rates in *Chart 3* has stayed relatively flat during the last 10 years. There had been increases in the employer's normal cost rates due to the changes in the actuarial assumptions. However, those increases were offset to some degree by the plan changes under the Public Employees' Pension Reform Act of 2013 (PEPRA) as new members have been enrolled in the lower cost PEPRA benefit tiers starting on January 1, 2013. *Chart 4* shows that the changes in the investment return (from 7.80% to 7.60% in the December 31, 2014 valuation, from 7.60% to 7.25% in the December 31, 2017 valuation, and from 7.25% to 7.00% in the December 31, 2020 valuation), mortality tables and other assumptions from the last three triennial experience studies have by far the most impact on increasing the UAAL contribution rates¹³ for the employers. These UAAL rate increases were largely offset by the effect of the additional voluntary County Safety and LARPD General contributions in 2021.

¹¹ The normal cost is the amount of contributions required to fund the portion of the level cost of the member's projected retirement benefit that is allocated to the current year of service.

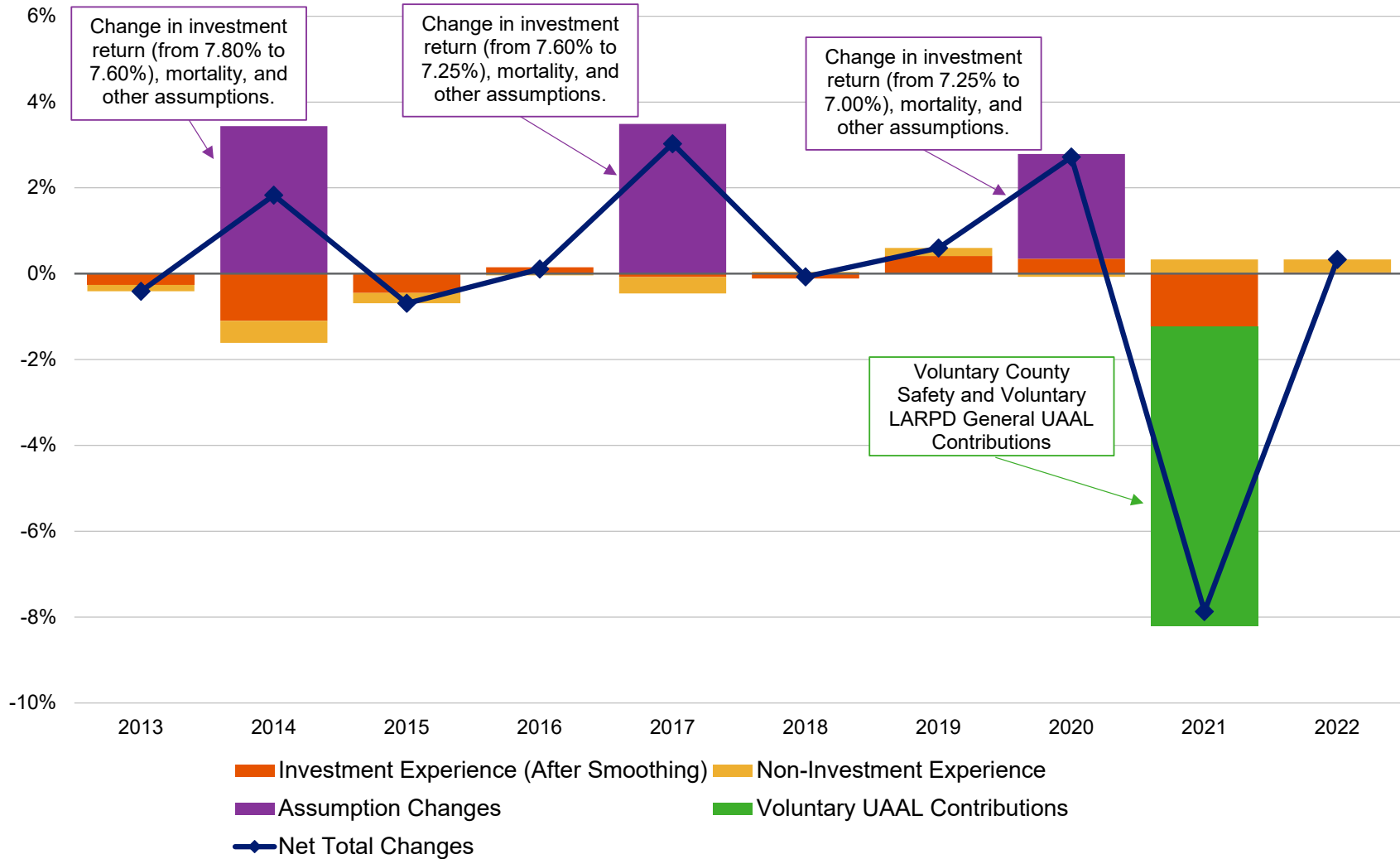
¹² There are separate contribution rates determined in the valuation for the General and Safety membership groups and for the different benefit tiers and employers. The aggregate contribution rates have been calculated based on an average of those rates weighted by the payrolls of the active members reported in those valuations.

¹³ For instance, as a result of the last three experience studies, the employer's total rate (normal cost plus UAAL) increased by 3.44% of payroll, 3.49% of payroll, and 2.44% of payroll in the December 31, 2014, December 31, 2017, and December 31, 2020 valuations, respectively, for a total of 9.37% of payroll.

Employer Contribution Rates in December 31, 2013 to 2022 Valuations
(% of Payroll)



Factors that Affected Employer Contribution Rates in December 31, 2013 to 2022 Valuations (% of Payroll)



Supplemental Retiree Benefit Reserve

As part of the Plan design, under Article 5.5 of the Statute, excess earnings¹⁴ are allocated from the Association's total investment portfolio to the SRBR. As a result, besides paying benefits from the Pension Plan, ACERA also provides benefits using assets available in the SRBR. In the most recent actuarial study for the SRBR as of December 31, 2021,¹⁵ there was about \$1,135 million in assets available at the Board's discretion to provide non-vested retiree health subsidies¹⁶ (other postemployment benefits or OPEB) and pension benefits¹⁷ (non-OPEB).

In the 10 valuations from December 31, 2012 to 2021, the assets available in the SRBR have increased from about \$576 million to about \$1,135 million. During this 10-year period, about \$447 million in excess earnings were allocated to the SRBR. In the December 31, 2012 valuation, it was estimated that the assets in the SRBR would be sufficient to pay OPEB SRBR benefits for about 16 years (until around 2028) and non-OPEB SRBR benefits for about 16 years (until around 2028). In the December 31, 2021 valuation, it was estimated that the assets in the SRBR would be sufficient to pay OPEB SRBR benefits for about 25 years (until around 2046) and non-OPEB SRBR benefits for about 22 years (until around 2043).¹⁸

¹⁴ In general under the Board's interest crediting policy, earnings at one-half of the assumed annual valuation rate is credited every 6 months to reserves for the Pension Plan and the SRBR. After accumulating a 1% Contingency Reserve, any remaining earnings (excess earnings) is allocated on a 50/50 basis between the Pension Plan and the SRBR.

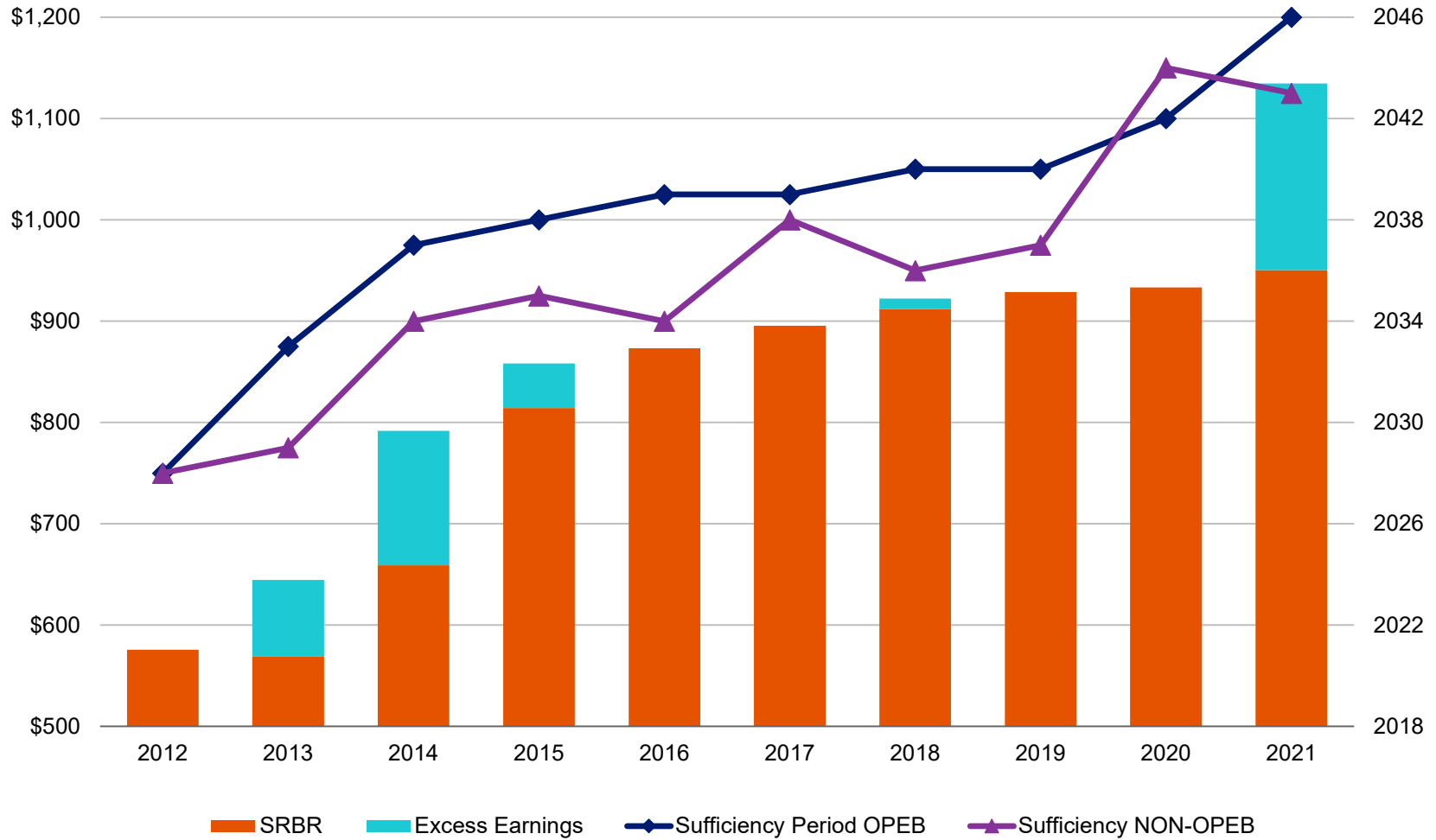
¹⁵ We have not included the results from the December 31, 2022 SRBR valuation as the finalized results from that valuation will not be available until later in 2023.

¹⁶ The non-vested OPEB benefits include the Monthly Medical Allowance, reimbursement for premiums required for dental, vision and enrollment in Medicare Part B program.

¹⁷ The non-vested pension benefits include supplemental COLAs and \$1,000 lump sum retiree death benefits.

¹⁸ During the past 10 years, the Board took several actions to preserve the sufficiency period to pay benefits from the SRBR. For instance, the Board eliminated the Active Death Equity Benefit and froze the maximum Monthly Medical Allowance for several years.

SRBR Assets (\$ million) and Periods Benefits Can be Paid
In December 31, 2012 to 2021 Valuations



Assessment of Primary Risk Factors Going Forward

As discussed in the Evaluation of Historical Trends section, in the 2013 to 2022 valuations the funded ratios and the employer contribution rates have changed mainly as a result of additional voluntary County Safety and LARPD General contributions made by the two employers in 2021 to reduce their UAAL and associated contribution rates, expected contributions to reduce the UAAL principal, and favorable investment and non-investment experience, offset somewhat by the changes in actuarial assumptions.

In general, we anticipate the following risk factors to have an ongoing influence on those financial metrics in our future valuations:

- **Asset/liability mismatch risk** – the potential that future plan experience does not affect asset and liability values in the same way, causing them to diverge.

The most significant asset/liability mismatch risk to ACERA is investment risk, as defined below. In fact, investment risk has the potential to impact asset/liability mismatch in two ways. The first mismatch is evident in annual valuations for the Pension Plan: when asset values deviate from assumptions, those changes are essentially independent from liability changes. The second mismatch can be caused when systemic asset deviations from assumptions may signal the need for an assumption change, which causes liability values and contribution rates to move in the opposite direction from the experience of the asset values.

Asset/liability mismatch can also be caused by longevity and other demographic assumption risks, which affect liabilities but have no impact on asset levels. These risks are also discussed below.

It may be informative to use the asset volatility and liability volatility ratios and associated contribution rate impacts provided in the following Plan Maturity Measures section when discussing with the employers the effect of unfavorable or favorable actuarial experience on the assets and the liabilities of ACERA.

- **Investment risk** – the potential that future market returns will be different from the current expected 7.00% annual return assumption.

The investment return assumption is a long-term, deterministic assumption for valuation purposes even though in reality market experience can be quite volatile in any given year. We have included deterministic scenario tests later in this section so that ACERA can better understand the risk associated with earning either more or less than the assumed rate.

Also, the Board has a policy of reviewing the investment return and the other actuarial assumptions generally every three years, with the next triennial experience study (recommending assumptions for the December 31, 2023 actuarial valuations) scheduled to be performed later this year. Based on our prior discussions with ACERA, we have included for illustrative purposes only, the funded status and the employer and employee contribution rates if the Board were to

lower both the inflation and investment return assumptions as part of our sensitivity tests of the two most important economic assumptions.

- **Longevity and other demographic risks** – the potential that mortality or other demographic experience will be different than expected.

The change to the amount-weighted mortality tables that reflect data from public sector retirement plans was the most major change to the non-economic assumptions in the last experience study. As can be observed from *Charts 2 and 4*, there had been relatively small impact on the UAAL and employer contribution rates due to non-investment related experience relative to the assumptions used in the last 10 valuations.

- **Plan design considerations** – the potential SRBR excess earnings allocations and the impact to investment return for the Pension Plan.

As we have previously disclosed in the funding valuation report, the 7.00% investment return assumption used in the valuation for the Pension Plan has been developed without considering the impact of any future 50/50 excess earnings allocation to the SRBR. This is based on our understanding that Article 5.5 of the Statute, which authorizes the allocation of 50% of excess earnings to the SRBR, does not allow for the use of a different investment return for funding than is used for interest credit. This would appear in effect to preclude the prefunding of the SRBR through the use of an assumption lower than the market earnings assumption of 7.00%.

Using a “stochastic” projection approach, we estimated that the 50/50 allocation of future excess earnings would have about the same impact as an “outflow” (i.e., assets not available to fund the benefits in the Pension Plan) that would average approximately 0.65% of assets over time. We note that the amount of deferred and unrecognized investment gains/losses as of the date of the valuation could have an impact on the measurement of the 50/50 allocation of excess earnings in the short term. However, as the amount of deferred and unrecognized investment gains/losses has fluctuated over time¹⁹, we have continued to disregard those deferred and unrecognized investment gains/losses in measuring the 0.65% of assets impact.²⁰

For informational purposes only, when we applied the results of our stochastic model to the December 31, 2022 valuation, we have estimated the approximate 0.65% of assets annual outflow would increase the Actuarial Accrued Liability in that valuation using a 7.00% investment return assumption by \$0.91 billion and would increase the employer's UAAL contribution rate by about 5% - 6% of payroll.

¹⁹ For instance, there were deferred and unrecognized investment gains of \$1,133 million as of December 31, 2021 and deferred and unrecognized losses of \$794 million as of December 31, 2022.

²⁰ The impact of the 50/50 allocation of future excess earnings will be updated when we perform the next triennial experience study recommending assumptions for use starting with the December 31, 2023 valuation.

- **Contribution risk** – the potential that actual future contributions will be different from expected future contributions.

ASOP 51 does not require the actuary to evaluate the particular ability or willingness of the plan sponsor or other contributing entity to make contributions to the plan when due. However, it does require the actuary to consider the potential for and impact of actual contributions deviating from expected in the future. ACERA's employers have a well-established practice of making the actuarially determined contribution (ADC) determined in the annual actuarial valuations, based on the Board of Retirement's Actuarial Funding Policy. As a result, in practice ACERA has essentially no contribution risk.

Furthermore, when ADCs determined in accordance with the ACERA Actuarial Funding Policy are made in the future by the employers (and contributions required by the statute are made by the employees), it is anticipated that the Association would have enough assets to provide all future benefits promised to the current members enrolled in the Association, if all of the actuarial assumptions used in the valuation are met.

ASOP 51 also lists interest rate risk as an example of a potential risk to consider. However, the valuations of the Plan's liabilities are not linked directly to market interest rates so the resulting interest rate risk exposure is minimal.

Scenario Tests: Deterministic Projections

Since the funded ratio, UAAL and the employer contribution rates have fluctuated as a result of deviation in investment experience in the last 10 valuations, we have examined the risk for ACERA associated with earning either lower or higher than the assumed rate of 7.00% in future valuations using projections under a deterministic approach.

To measure such risk, we have included scenario tests to study the change in the UAAL and contribution rates if ACERA were to earn a market return lower or higher than 7.00% in the next year following the December 31, 2022 valuation. In *Charts 6, 7 and 8*, we show the aggregate employer contribution rates, funded ratios, and UAAL respectively assuming that the Association’s portfolio market return in 2023 will be as follows:

Scenario 1: 0.00% (unfavorable)

Scenario 2: 7.00% (baseline)

Scenario 3: 14.00% (favorable)

The following table summarizes the resulting employer contribution changes (relative to the December 31, 2022 valuation aggregate employer contribution rate of 23.7%) in the next valuation (i.e., December 31, 2023) as well as in the December 31, 2028 valuation when all of the investment gains and losses are fully recognized in the (smoothed) valuation value of assets.

Employer Contribution Rate Change	2023 Single Plan-Year Investment Return		
	0.00%	7.00% (Baseline)	14.00%
December 31, 2023	+1.3% of payroll	+0.7% of payroll	+0.3% of payroll
December 31, 2028	+8.6% of payroll	+4.4% of payroll	+0.8% of payroll

Under the favorable (14.00%) hypothetical market return scenario for 2023, the Association would be expected to reach full funding by December 31, 2035 and the total employer contribution rate would be comprised of only normal cost contributions, resulting in a larger relative change from the baseline than the unfavorable (0.00%) hypothetical market return scenario (as provided in Chart 6). Furthermore, under all three hypothetical market return scenarios for 2023, the Association would be expected to reach full funding within 20 years and the total employer contribution rate would be expected to approach about 10% of payroll.²¹ This means that the Board’s funding policy is very effective in achieving the general policy goal of achieving the long-term full funding of the costs of the benefits paid by ACERA. Under the new

²¹ This is the estimated normal cost rate for the employer, assuming no further assumption changes, method changes or experience that differs significantly from assumptions.

Actuarial Standard of Practice No. 4 (ASOP 4) that will become effective for the December 31, 2023 valuation, we will be required to include a statement similar to the one above in our funding valuation report. In addition, we will also be required to provide a new liability measure which is discussed in more detail in Section 3 of this report.

While we have not assigned a probability on the 2023 market return coming in at these rates, the Board and other stakeholders monitoring ACERA can use these results to interpolate in order to estimate the funded status and employer contribution rates for the December 31, 2023 and next several valuations as the actual investment experience for the 2023 year becomes available throughout the year. Additionally, comparable experience in upcoming future years is likely to have a similar impact on the Association absent any significant plan or assumption changes.

SRBR Sufficiency Projection

We also provided in Charts 9, 10 and 11 the projection of the SRBR assets as well as the sufficiency period under each of the hypothetical market return Scenarios 1, 2 and 3, respectively. These projections are based on the preliminary results of the SRBR preview letter as of December 31, 2022 which estimated that the assets in the SRBR would be sufficient to pay OPEB SRBR benefits for about 28 years (until around 2050) and non-OPEB SRBR benefits for about 16 years (until around 2038). Of note is that under Scenario 3 (assuming 14.00% market return in 2023), the non-OPEB SRBR would be sufficient to pay benefits through December 31, 2038 while the OPEB SRBR would be projected to be sufficient to pay benefits through December 31, 2049.²²

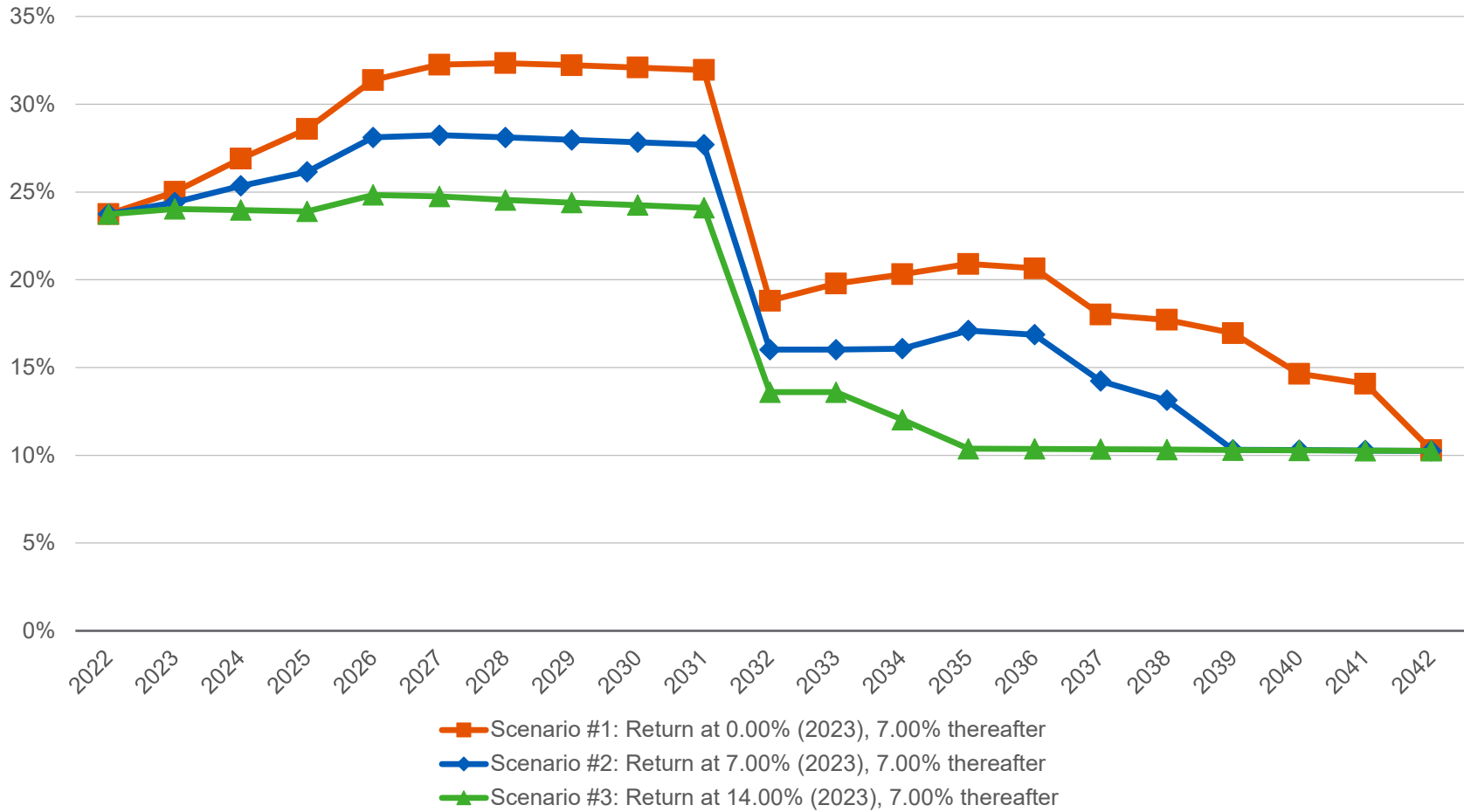
This difference can be explained by two factors. First, the sharp increase in expected non-OPEB SRBR benefits over the 20-year projection period relative to a more modest increase in expected OPEB SRBR benefits over the same period. Second, the allocation of excess earnings between the non-OPEB and OPEB reserves are assumed to be made proportional to those reserves. As the benefit levels expected to be paid from the non-OPEB SRBR rise relative to those expected to be paid from the OPEB SRBR, the value of the non-OPEB SRBR will fall relative to the value of the OPEB SRBR, and the share of excess earnings allocated to the non-OPEB SRBR will decrease.

For example, assets in the non-OPEB SRBR reserve represent just under 5% of SRBR reserves as of December 31, 2022. That means that the non-OPEB SRBR would be expected to receive about 5% of the excess earnings allocated to the SRBR in the near-term. However, by the end of the projection period non-OPEB benefits are expected to approach 15% of total SRBR benefits paid. Lower expected inflows (from excess earnings) and higher expected outflows (from benefit payments) result in less ability to pay non-OPEB benefits over the long term.

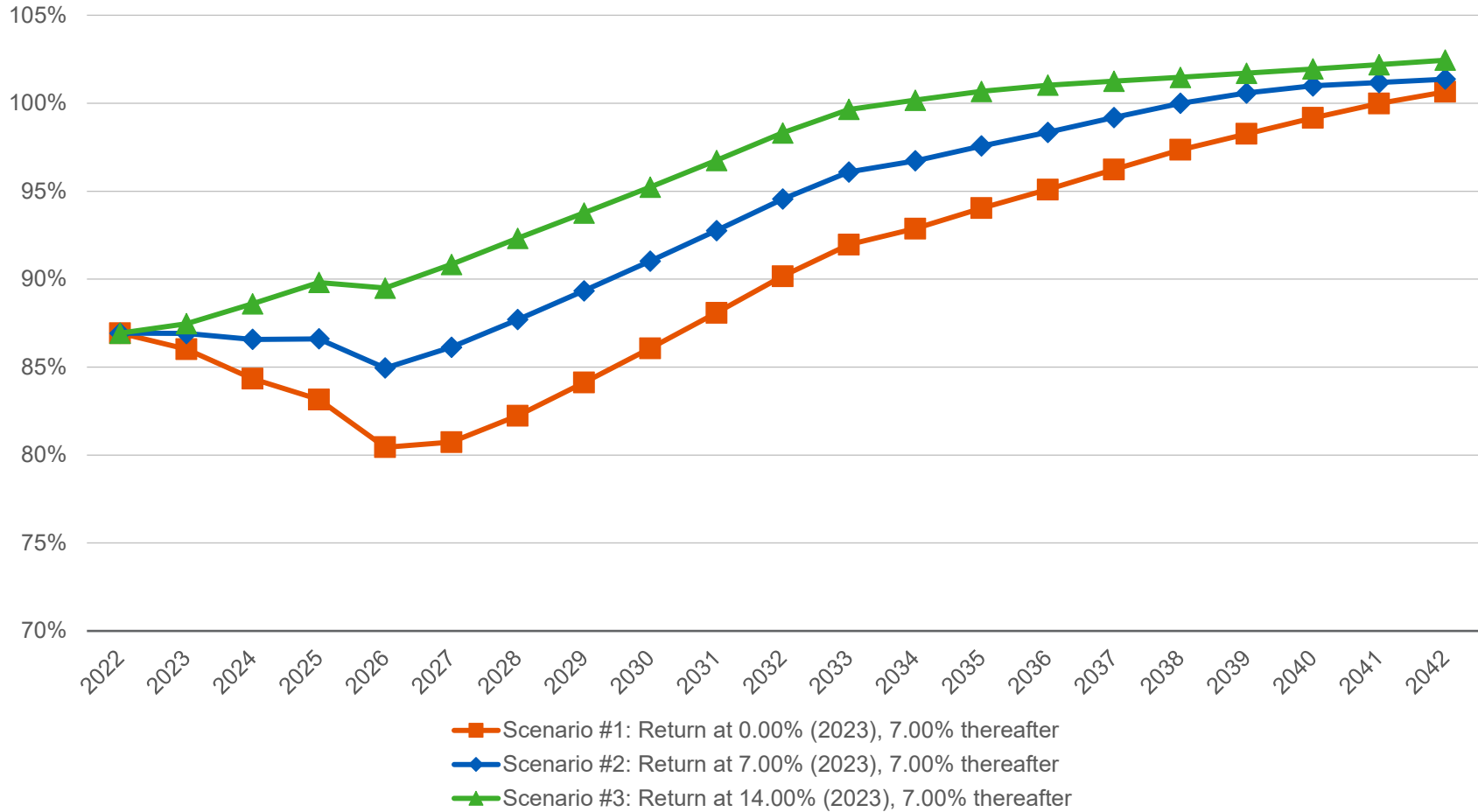
Absent any action taken by the Board to change benefits or the proportional allocation of excess earnings between the non-OPEB and OPEB reserves, it is unlikely that future excess earnings would be sufficient to fund the non-OPEB SRBR on an ongoing basis.

²² Because there is a disparity in the sufficiency period to pay non-OPEB and OPEB benefits, we have received direction from ACERA to report back with a proposal to align the assets available to provide these two benefits when we issue our full SRBR sufficiency valuation report.

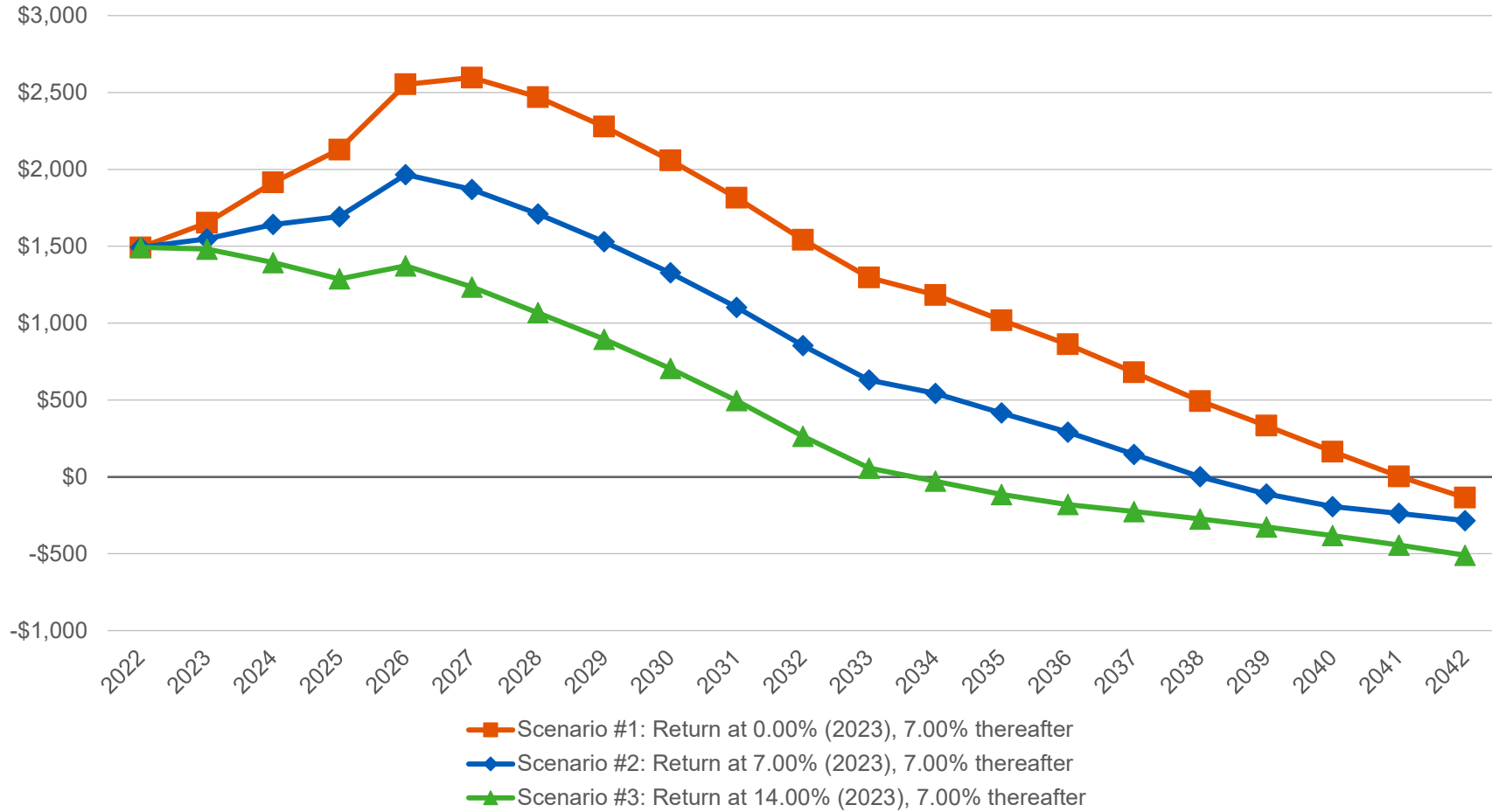
Projected Employer Contribution Rates Under Three Hypothetical Market Return Scenarios for 2023 (% of Payroll)



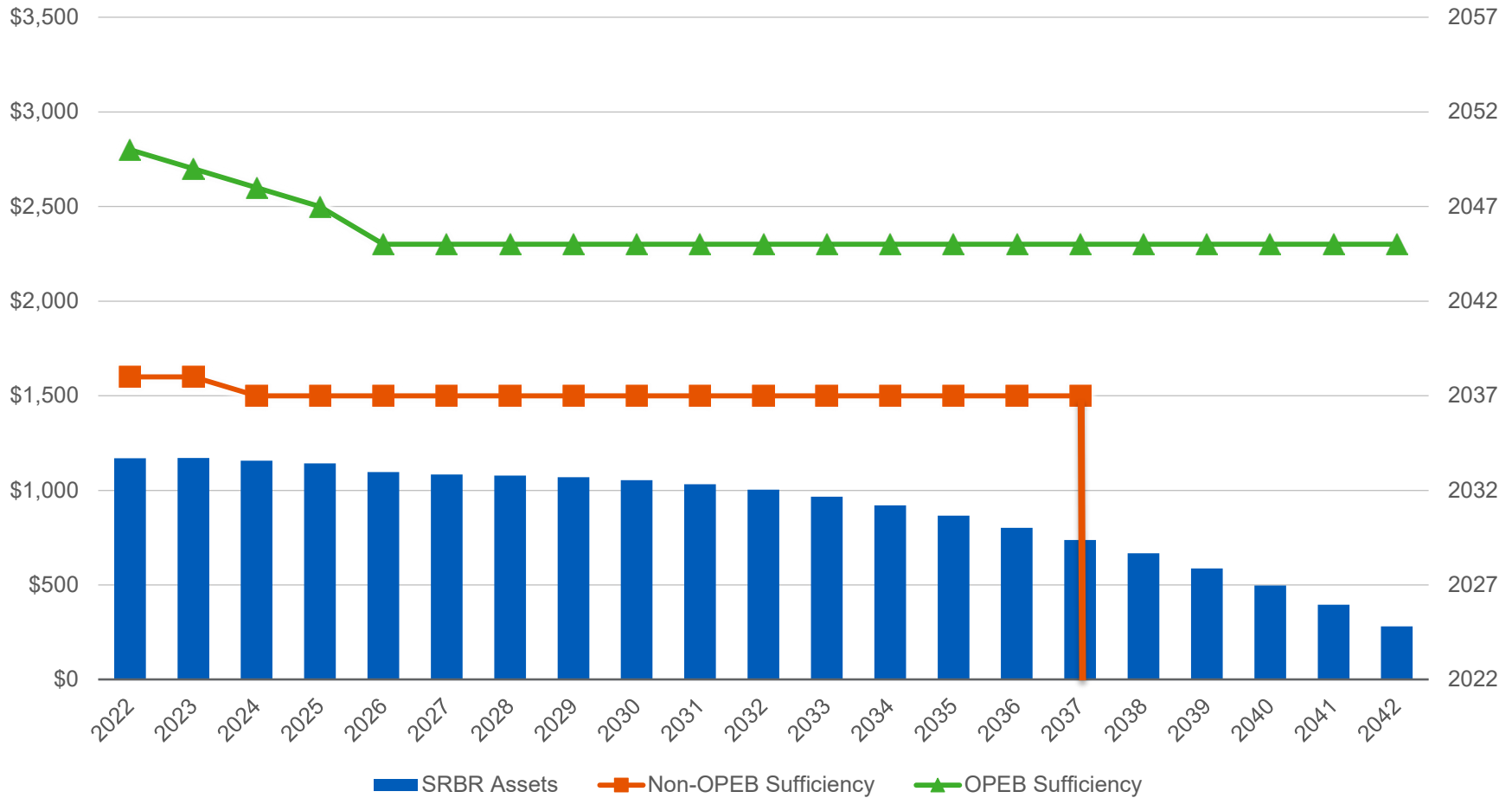
Projected Funded Ratios (on Valuation Value of Assets Basis) Under Three Hypothetical Market Return Scenarios for 2023



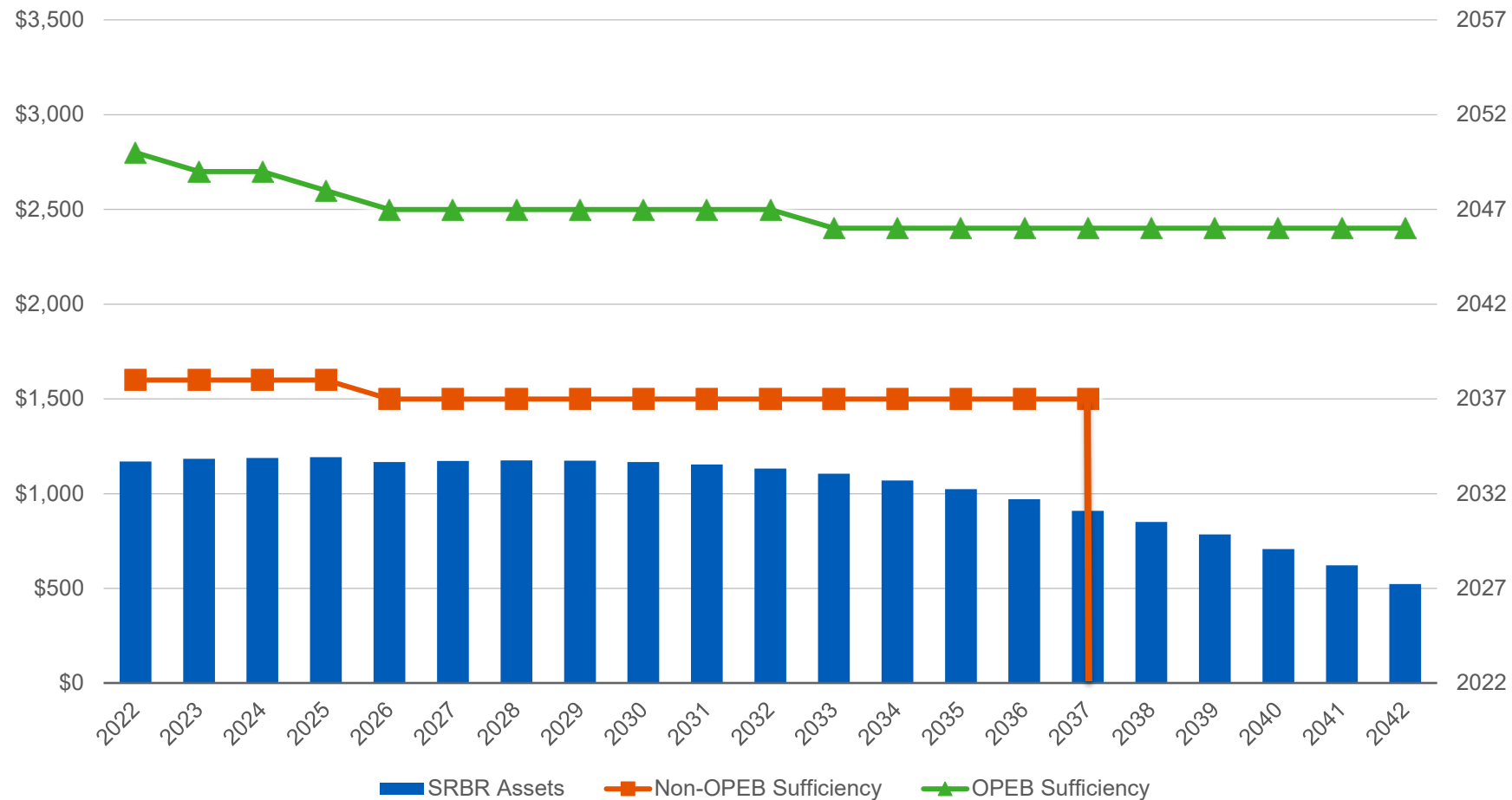
Projected UAAL (on Valuation Value of Assets Basis) Under Three Hypothetical Market Return Scenarios for 2023 (\$ Millions)



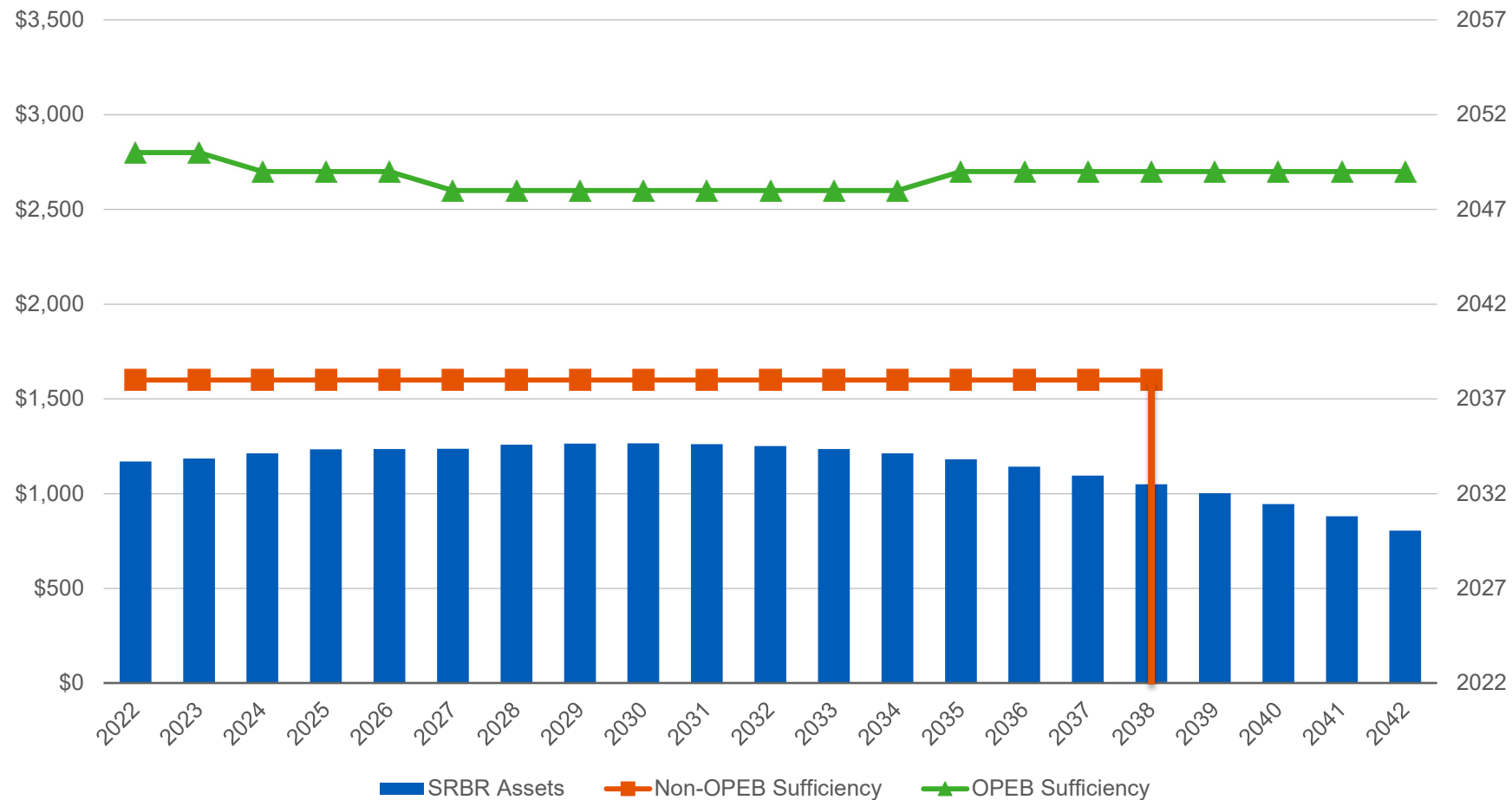
Projected SRBR Assets (\$ Millions) Sufficiency Period Under Hypothetical Market Return Scenario #1 (Return at 0.00% for 2023)



Projected SRBR Assets (\$ Millions) Sufficiency Period Under Hypothetical Market Return Scenario #2 (Return at 7.00% for 2023)



Projected SRBR Assets (\$ Millions) Sufficiency Period Under Hypothetical Market Return Scenario #3 (Return at 14.00% for 2023)



Stochastic Projection

Based on our prior discussions with ACERA, we have also supplemented the deterministic Scenario Tests by another analysis that shows the range of possible changes in funded status and contribution rates under a statistical distribution of potential market returns for 20 years following the December 31, 2022 valuation. We have accomplished the stochastic modeling of future market returns by using the expected return, standard deviation and other information about ACERA’s asset portfolio as provided in the Appendix of this report, assuming no future assumption or method changes to the plan. Because the 7.0% investment return assumption used in the December 31, 2022 valuation has been developed without reflecting changes made to the asset allocation in late 2021, we have continued to use that asset allocation in preparing our stochastic projection.

In *Chart 12*, we summarize the cumulative compounded rate of return of ACERA’s investment portfolio over the next 20 years based on performing 10,000 trial outcomes of future market returns. The projected funded ratios for those trials are provided in *Chart 13*. The UAAL and the resultant employer contribution rates are provided in *Charts 14* and *15*, respectively.

At the end of 20 years, there is a 50% chance²³ that the annual return of ACERA’s investment portfolio would average between 4.9% and 8.8%, the funded ratio would be between 75% and 117% and the corresponding UAAL would be between \$5.2 billion and a surplus (or a negative UAAL) of \$3.4 billion.

The funded ratio is about 87% in the December 31, 2022 valuation. There is a 32% chance ACERA would be fully funded at the end of 10 years and a 40% chance ACERA would be fully funded at the end of 20 years. The probabilities that the funded ratio would fall below 50%, 60% or 70% at any point in the next 20 years are as follows:

	<u>Funded Ratio</u>		
	Below 50%	Below 60%	Below 70%
Probability	5%	19%	42%

At the end of 10 years (i.e., at the December 31, 2032 valuation), there is a 50% chance that the employer contribution rates would be between 10% and 29% of payroll. At the end of 20 years (i.e., the December 31, 2042 valuation), there is a

²³ This is based on the 25th to the 75th percentile results.

50% chance that the employer contribution rates would be between 10% and 36% of payroll. 10% of payroll is about the level of the employer normal cost rate. Note that we have not offset the normal cost by any available actuarial surplus.²⁴

At the end of 20 years, there is a 50% chance (based on the results at or below 50th percentile) that the employer contribution rate is at or above 19%. The reason that the employer contribution rate does not approach the employer normal cost rate after 20 years is mainly due to the cumulative investment return as projected by the model has a 50% chance to be at or below 6.8% which is lower than the investment return assumption of 7.0%. This is due to the lower capital market assumptions from the 2022 Horizon survey that we have used in our projection even after they have been adjusted somewhat to reflect the more favorable capital market assumptions provided by some investment consultants since 2022. This would generally result in investment losses that increase UAAL and employer contribution rates.

The total employer contribution rate is about 24% payroll in the December 31, 2022 valuation. The probabilities that the total employer contribution rate would increase at least by 5%, 10% or 15% of payroll at any point in the next 20 years are as follows:

<u>Total Employer Rate Increases by at least</u>			
	5% of Payroll (to 29% of Payroll)	10% of Payroll (to 34% of Payroll)	15% of Payroll (to 39% of Payroll)
Probability	70%	56%	42%

Finally, the probabilities that the total employer contribution rate would spike by 3%, 5% or 7% of payroll in any single year during the next 20 years are as follows:

<u>Total Employer Rate Spikes in a Single Year by at least</u>			
	3% of Payroll	5% of Payroll	7% of Payroll
Probability	14%	4%	1%

²⁴ Under PEPRRA, the Association has an actuarial surplus when the funded ratio is at or over 120% and certain other conditions are met. For the purposes of these projections, we have assumed that those other conditions have not been met and therefore we did not amortize such actuarial surplus over a rolling (non-decreasing) 30-year period as described under the Board’s funding policy.

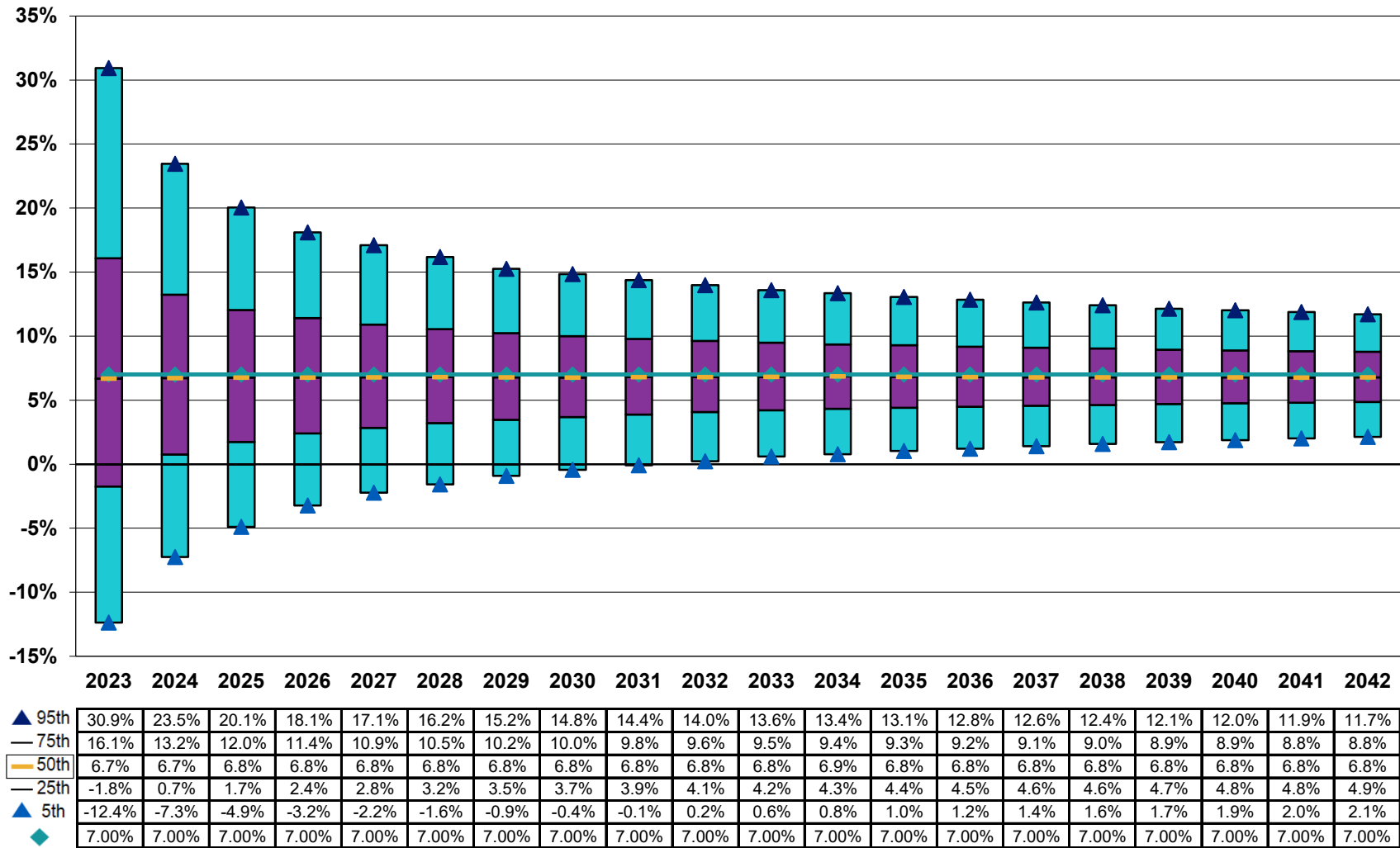
SRBR Sufficiency Projection

In *Chart 16*, we summarize the projected SRBR reserves over the next 20 years based on performing 10,000 trial outcomes of future market returns. In *Charts 17 and 18*, the sufficiency years for the OPEB and non-OPEB SRBR, respectively, are provided.

The probability that the sufficiency period for the OPEB SRBR would be over 15 years is 64% at the end of 10 years and 70% at the end of 20 years. The probability that the sufficiency period for the non-OPEB SRBR would be over 15 years is 25% at the end of 10 years and 20% at the end of 20 years. When reviewing the results at the end of 20 years, it could be observed that the Board's current SRBR Policy would remain effective in controlling costs to pay medical subsidies and other benefits and achieving ACERA's long term goal of sustaining future benefit payments for at least 15 years following the date of the future valuations. However, at the end of 20 years, unlike most of the projection scenarios for the benefits paid from the Pension Plan that would be expected to become fully funded, the benefits paid from the SRBR would remain less than fully funded.²⁵

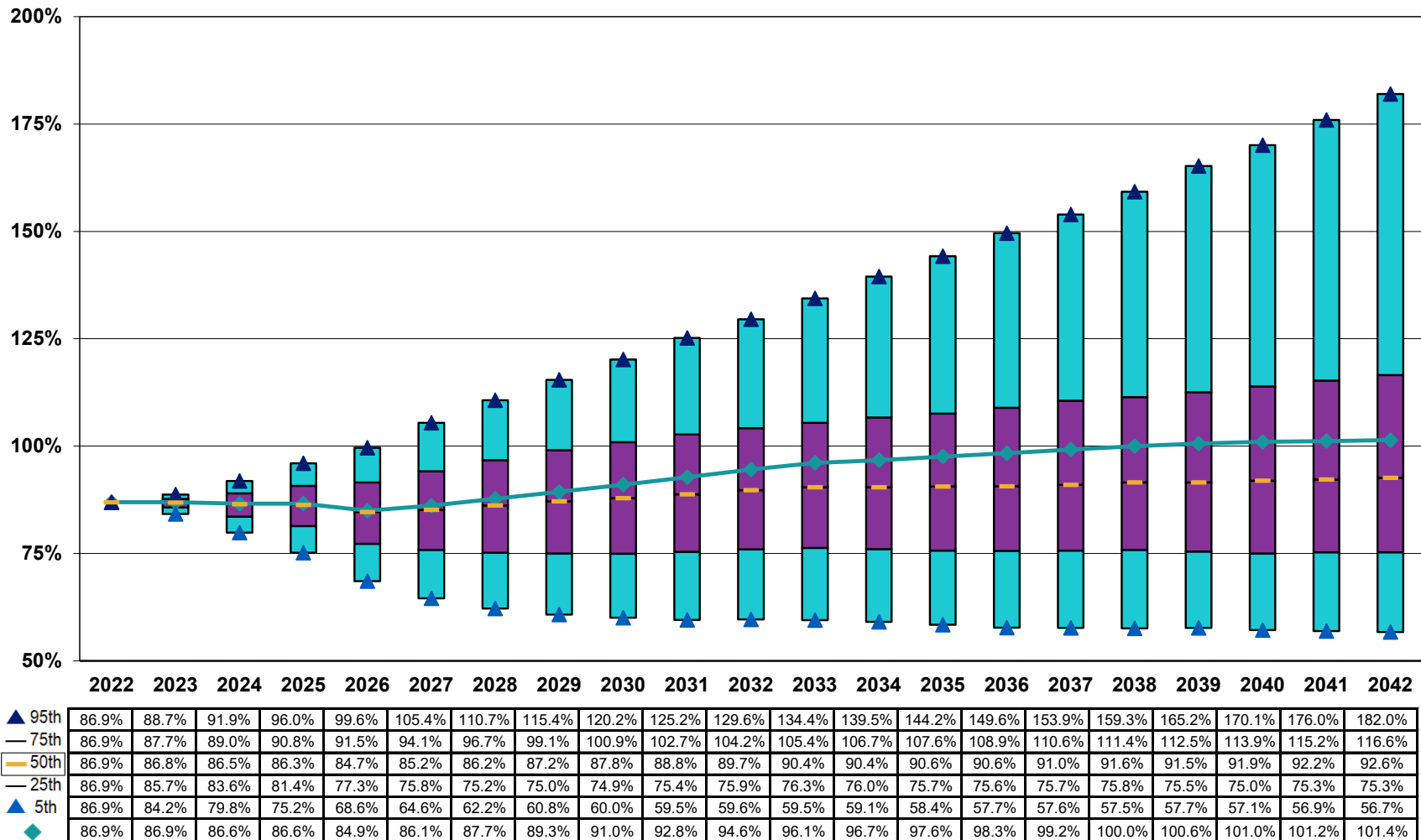
²⁵ As the non-OPEB component of the SRBR assets is expected to be depleted before the OPEB component of the SRBR assets and there is a disparity in the sufficiency period to pay non-OPEB and OPEB benefits, we have received direction from ACERA to report back with a proposal to align the assets available to provide these two benefits when we issue our full SRBR sufficiency report.

Projected Cumulative Investment Return for Plan Years Ending December 31



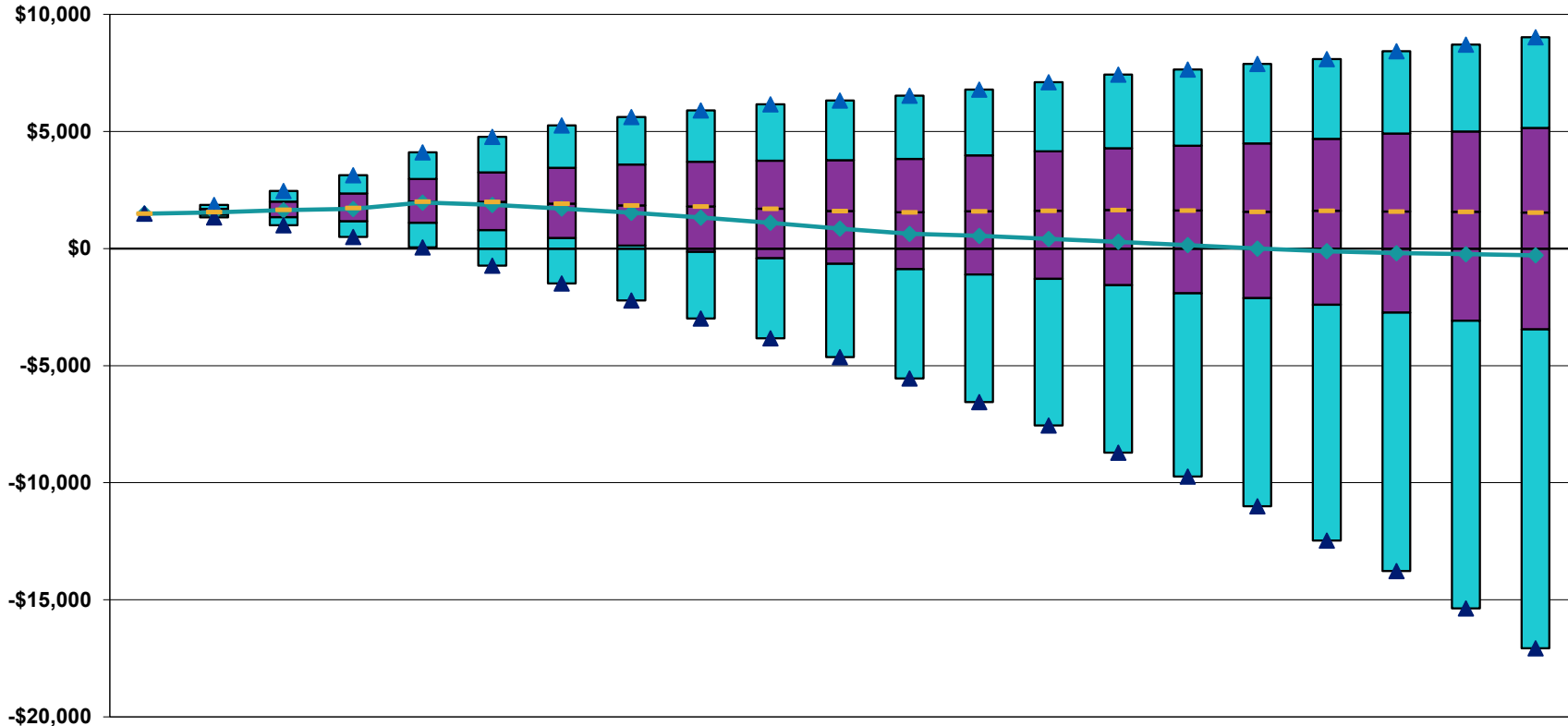
◆ Current investment return assumption

Projected Funded Ratios (on Valuation Value of Assets Basis) as of December 31,



◆ Baseline deterministic projection with current assumptions

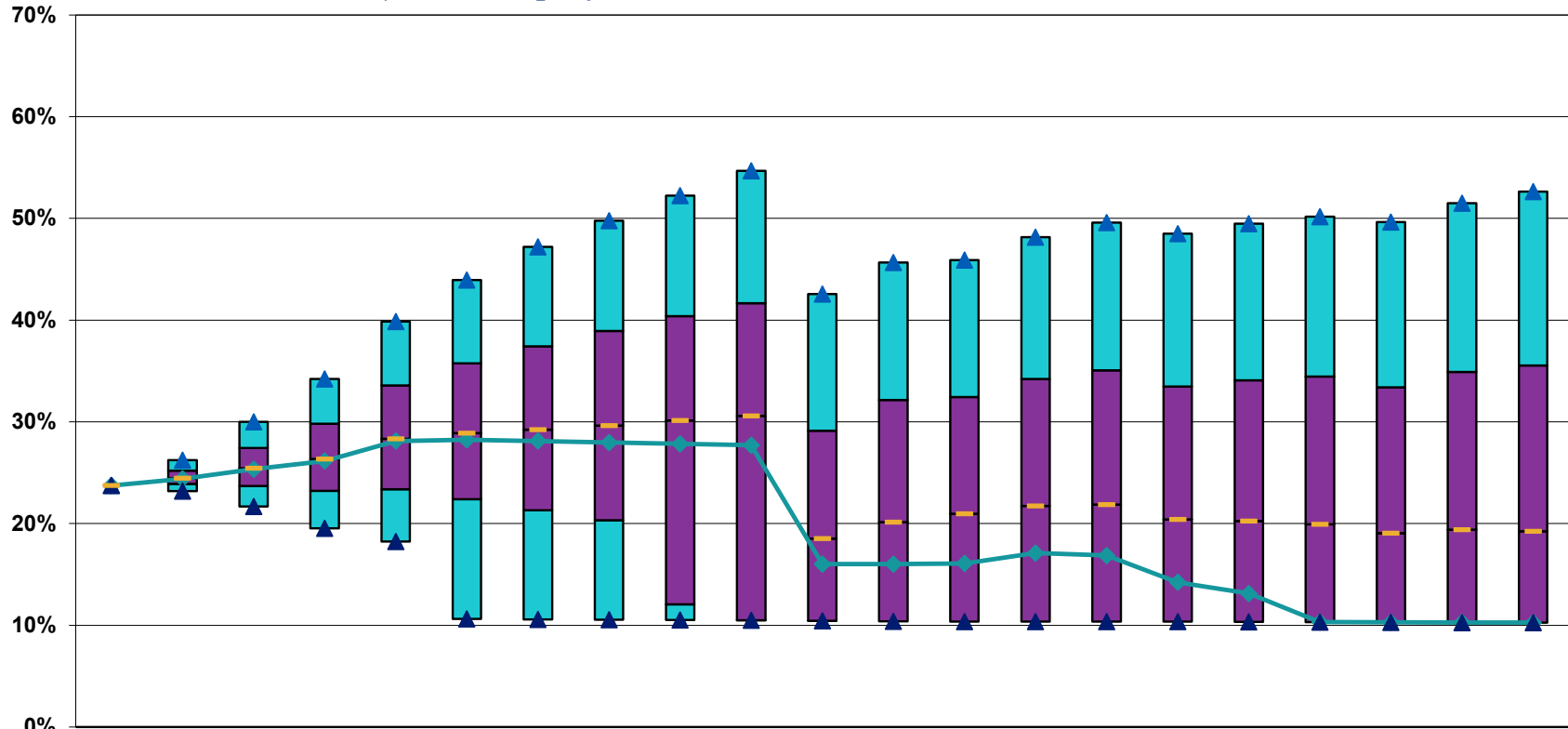
Projected UAAL (on Valuation Value of Assets Basis) as of December 31,
(\$ Millions)



	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
▲ 95th	1,492	1,334	992	502	53	-729	-1,485	-2,214	-2,982	-3,833	-4,632	-5,546	-6,552	-7,553	-8,711	-9,740	-11,010	-12,465	-13,774	-15,371	-17,070
— 75th	1,492	1,456	1,348	1,168	1,105	791	456	133	-137	-414	-653	-877	-1,112	-1,295	-1,564	-1,908	-2,122	-2,396	-2,736	-3,085	-3,449
— 50th	1,492	1,556	1,656	1,730	2,002	1,998	1,921	1,842	1,796	1,705	1,607	1,546	1,590	1,611	1,644	1,629	1,567	1,615	1,586	1,573	1,542
— 25th	1,492	1,686	2,011	2,355	2,967	3,258	3,454	3,587	3,705	3,750	3,771	3,829	3,986	4,153	4,283	4,389	4,490	4,688	4,915	5,005	5,150
▲ 5th	1,492	1,868	2,466	3,137	4,106	4,775	5,262	5,624	5,906	6,161	6,327	6,535	6,792	7,102	7,428	7,650	7,891	8,089	8,429	8,711	9,023
◆	1,492	1,547	1,641	1,693	1,966	1,869	1,710	1,529	1,327	1,102	854	630	543	415	291	146	1	-111	-193	-237	-285

◆ Baseline deterministic projection with current assumptions

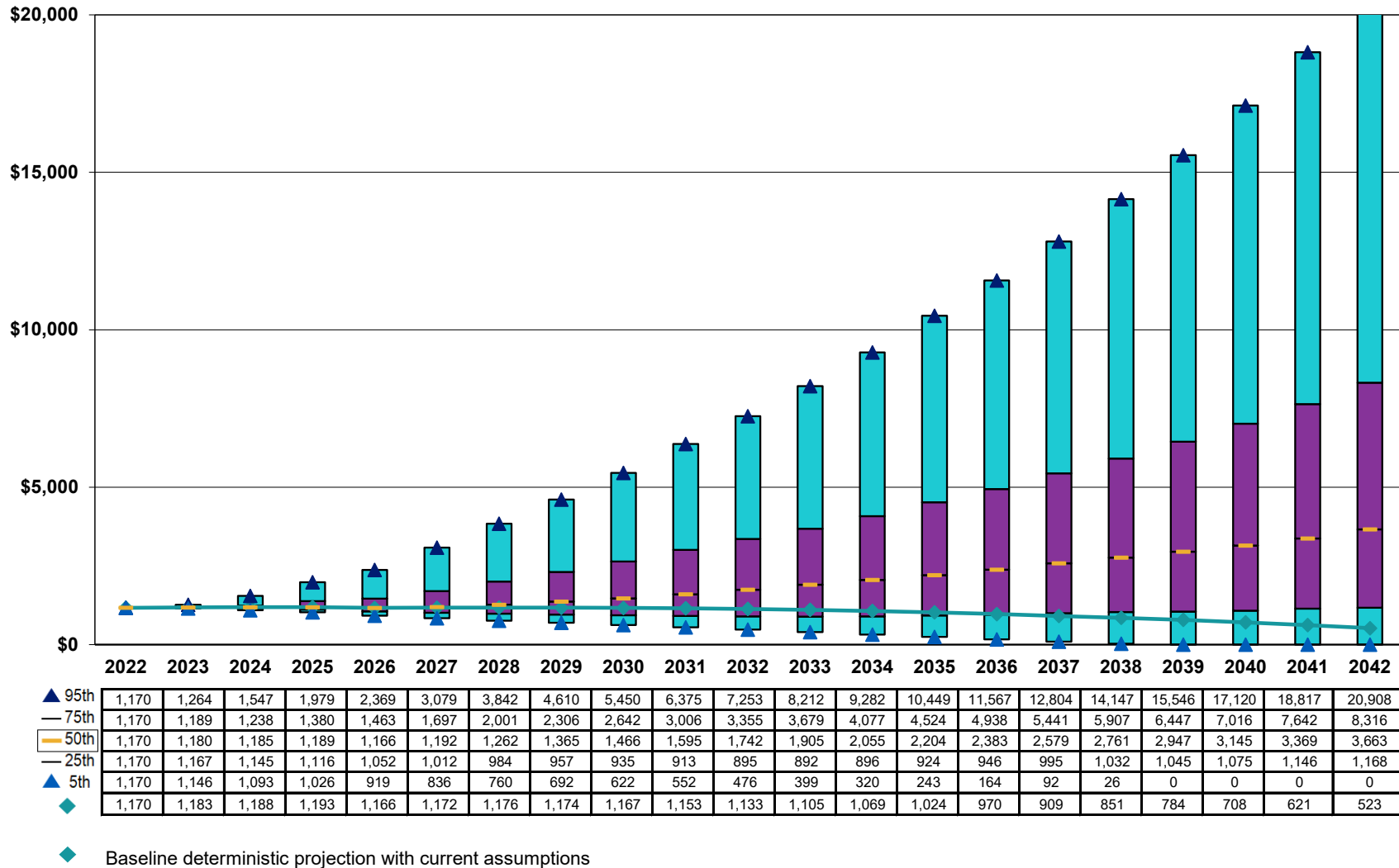
Projected Employer Contribution Rates as of December 31,



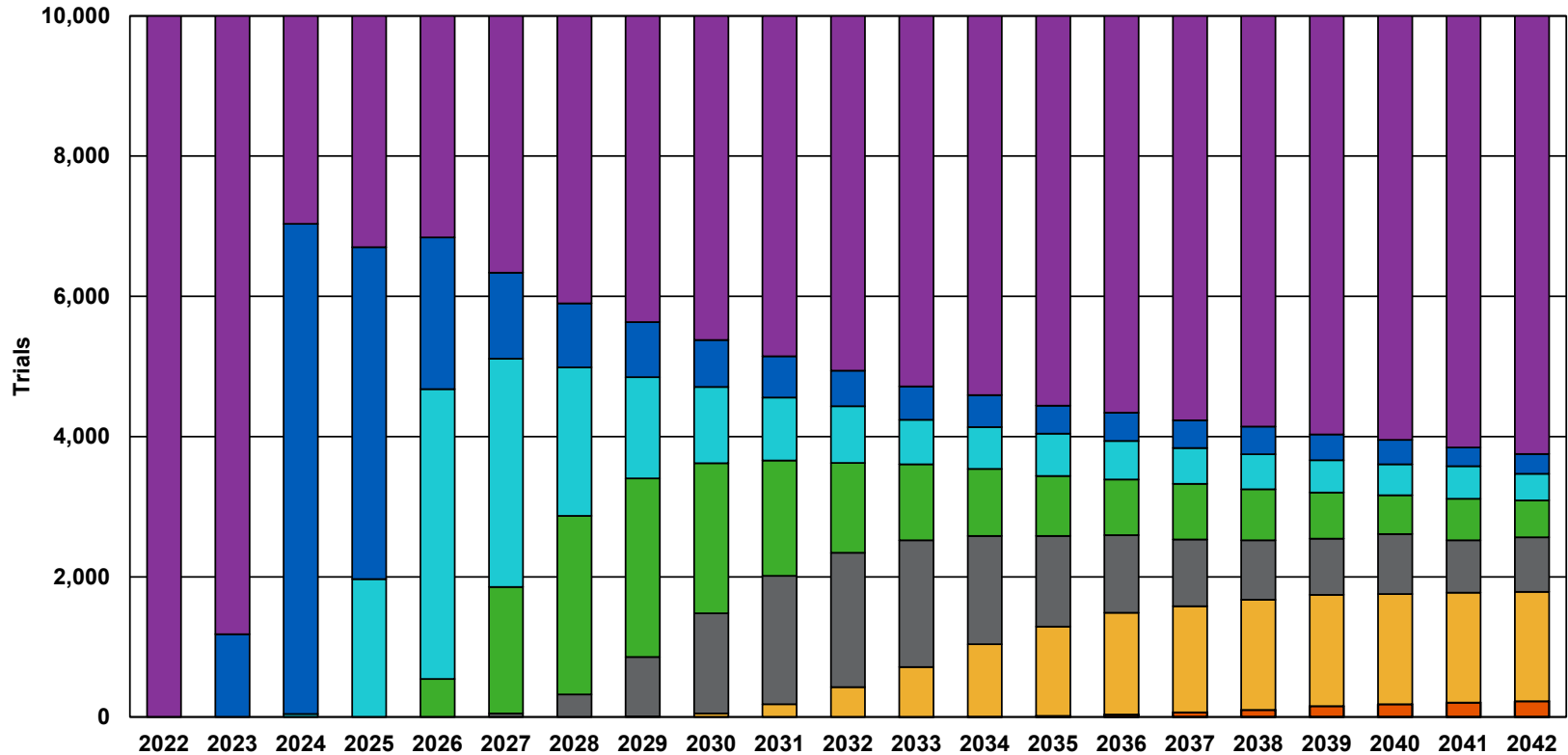
	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
▲ 95th	23.7%	23.2%	21.7%	19.5%	18.2%	10.6%	10.6%	10.6%	10.5%	10.5%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.3%	10.3%	10.3%	10.3%	10.3%
— 75th	23.7%	23.9%	23.7%	23.2%	23.4%	22.4%	21.3%	20.3%	12.1%	10.5%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.3%	10.3%	10.3%	10.3%	10.3%
— 50th	23.7%	24.5%	25.4%	26.4%	28.3%	28.9%	29.2%	29.6%	30.1%	30.6%	18.5%	20.2%	21.0%	21.7%	21.9%	20.4%	20.3%	19.9%	19.0%	19.4%	19.3%
— 25th	23.7%	25.2%	27.4%	29.8%	33.6%	35.8%	37.4%	38.9%	40.4%	41.7%	29.1%	32.2%	32.4%	34.2%	35.1%	33.5%	34.1%	34.5%	33.4%	34.9%	35.5%
▲ 5th	23.7%	26.2%	30.0%	34.2%	39.9%	43.9%	47.2%	49.8%	52.2%	54.7%	42.6%	45.7%	45.9%	48.1%	49.6%	48.5%	49.5%	50.2%	49.6%	51.5%	52.6%
◆	23.7%	24.4%	25.3%	26.1%	28.1%	28.2%	28.1%	28.0%	27.8%	27.7%	16.0%	16.0%	16.1%	17.1%	16.9%	14.2%	13.1%	10.3%	10.3%	10.3%	10.3%

◆ Baseline deterministic projection with current assumptions

Projected Supplemental Retiree Benefit Reserve as of December 31, (\$ Millions)



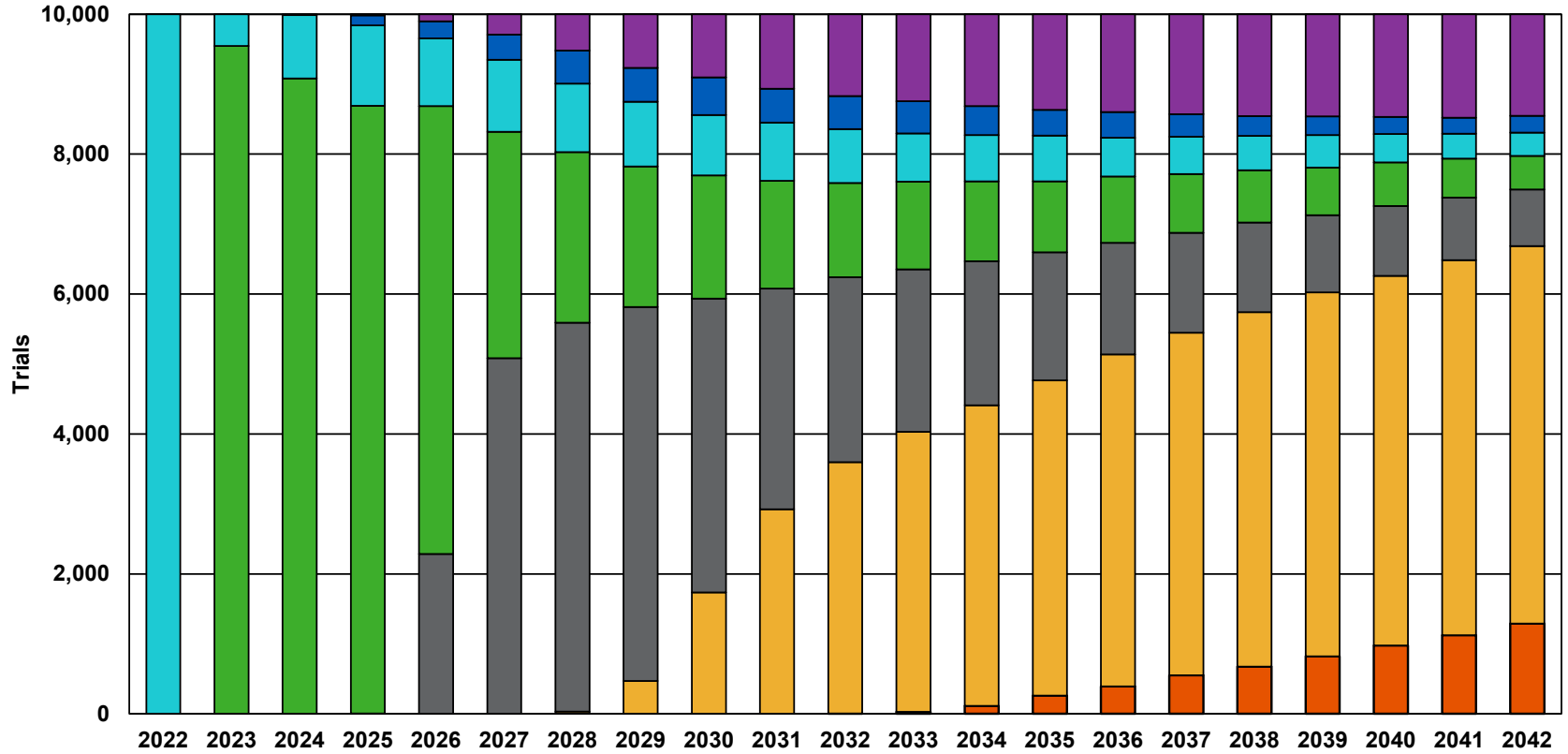
OPEB SRBR Projected Sufficiency as of December 31,



- Over 25 Years
- 21 - 25 Years
- 16 - 20 Years
- 11 - 15 Years
- 6 - 10 Years
- 1 - 5 Years
- Less than 1 Year

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Over 25 Years	100%	88%	30%	33%	32%	37%	41%	44%	46%	49%	51%	53%	54%	56%	57%	58%	59%	60%	60%	62%	63%
21 - 25 Years	0%	12%	70%	47%	22%	12%	9%	8%	7%	6%	5%	5%	5%	4%	4%	4%	4%	4%	3%	3%	3%
16 - 20 Years	0%	0%	0%	20%	41%	33%	21%	14%	11%	9%	8%	6%	6%	6%	6%	5%	5%	5%	4%	5%	4%
11 - 15 Years	0%	0%	0%	0%	5%	18%	25%	25%	21%	16%	13%	11%	10%	9%	8%	8%	7%	7%	6%	6%	5%
6 - 10 Years	0%	0%	0%	0%	0%	1%	3%	8%	14%	18%	19%	18%	15%	13%	11%	9%	8%	8%	9%	7%	8%
1 - 5 Years	0%	0%	0%	0%	0%	0%	0%	0%	1%	2%	4%	7%	10%	13%	15%	15%	16%	16%	16%	16%	16%
Less than 1 Year	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	2%	2%	2%	2%

Non-OPEB SRBR Projected Sufficiency as of December 31,



- Over 25 Years
- 21 - 25 Years
- 16 - 20 Years
- 11 - 15 Years
- 6 - 10 Years
- 1 - 5 Years
- Less than 1 Year

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Over 25 Years	0%	0%	0%	0%	1%	3%	5%	8%	9%	11%	12%	12%	13%	14%	14%	14%	15%	15%	15%	15%	15%
21 - 25 Years	0%	0%	0%	1%	2%	4%	5%	5%	5%	5%	5%	5%	4%	4%	4%	3%	3%	3%	2%	2%	2%
16 - 20 Years	100%	5%	9%	12%	10%	10%	10%	9%	9%	8%	8%	7%	7%	7%	6%	5%	5%	5%	4%	4%	3%
11 - 15 Years	0%	95%	91%	87%	64%	32%	24%	20%	18%	15%	13%	13%	11%	10%	9%	8%	7%	7%	6%	6%	5%
6 - 10 Years	0%	0%	0%	0%	23%	51%	56%	53%	42%	32%	26%	23%	21%	18%	16%	14%	13%	11%	10%	9%	8%
1 - 5 Years	0%	0%	0%	0%	0%	0%	0%	5%	17%	29%	36%	40%	43%	45%	47%	49%	51%	52%	53%	54%	54%
Less than 1 Year	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	3%	4%	6%	7%	8%	10%	11%	13%

Sensitivity Tests

The Board has a policy of reviewing the investment return and the other actuarial assumptions every three years, with the next triennial experience study (recommending assumptions for the December 31, 2023 actuarial valuation) scheduled to be performed in 2023. Even though the economic assumptions included in our sensitivity analysis might not correspond to the final investment return and inflation assumptions²⁶ that we would recommend to the Board at the next triennial experience study, the results from this analysis could still provide the stakeholders some insight of the approximate financial impact of such changes in assumptions.

The following table summarizes the resulting impact of a 0.25% reduction in the inflation assumption with no offsetting 0.25% increase in real return, and including a 0.25% margin to the COLA assumption for members in Tier 1 and 3 (which leaves the COLA assumption unchanged for those members).

<u>Increase/Decrease from Baseline Results in the December 31, 2022 Valuation due to Change in Inflation or Investment Return Assumption</u>			
Inflation/Investment Assumptions	2.75% / 7.00% (baseline)	2.50% / 6.75%	Increase/Decrease
COLA Assumptions	2.75% COLA for Tiers 1 and 3 and 2.00% COLA for other tiers	2.75% COLA²⁷ for Tiers 1 and 3 and 2.00% COLA for other tiers	No change
Employee Contribution Rate	10.1% of payroll	10.4% of payroll	+0.3% of payroll
Employer Contribution Rate	23.7% of payroll	25.7% of payroll	+2.0% of payroll
UAAL	\$1,492 million	\$1,775 million	+\$283 million
Funded Ratio	86.9%	84.8%	-2.1%

²⁶ The inflation assumption impacts the active salary increase assumption, retiree COLAs, and growth in the Association's future payroll used to develop the UAAL rate.

²⁷ Based on the observation that the average CPI for the San Francisco-Oakland-Hayward Area used by the Board to set COLA exceeded the average of the CPI for U.S. City, it would be reasonable to maintain the COLA assumption at 2.75% when the inflation assumption is lowered to 2.50%.

Plan Maturity Measures that Affect Primary Risks

The annual actuarial valuation considers the number and demographic characteristics of covered members, including active members and non-active members (inactive vested, retirees and beneficiaries). In the past 10 valuations from December 31, 2013 to 2022, ACERA has become more mature, indicated by the continued increase in the ratio of non-active to active members covered by the Association as shown in *Chart 19*. The Chart also shows the ratio of members in pay status (retirees and beneficiaries) to active members. This ratio excludes the inactive vested members who have relatively smaller liabilities. The increase in the ratios is significant because any increase in UAAL due to unfavorable future investment and non-investment experience for a plan with a relatively larger group of non-active members would have to be amortized and funded using the payroll of a relatively smaller group of active members.

Besides the ratio of members in pay status to active members, another indicator of a more mature plan is relatively large amounts of assets and/or liabilities compared to active member payroll, which leads to increasing volatility in the level of required contributions. The **Asset Volatility Ratio (AVR)**, which is equal to the market value of assets divided by total payroll, provides an indication of contribution sensitivity to changes in the current level of assets and is detailed in *Chart 20*. The **Liability Volatility Ratio (LVR)**, which is equal to the actuarial accrued liability divided by payroll, provides an indication of the contribution sensitivity to changes in the current level of liability and is detailed in *Chart 21*. Over time, the AVR should approach the LVR because when a plan is fully funded the assets will equal the liabilities. As such, the LVR also indicates the long-term contribution sensitivity to the asset volatility, as the plan approaches full funding.

In particular, ACERA's AVR was 7.3 as of December 31, 2022. This means that a 1% asset gain or loss in 2023 (relative to the assumed investment return) would amount to 7.3% of one year's payroll. Similarly, ACERA's LVR was 9.1 as of December 31, 2022, so a 1% liability gain or loss in 2023 would amount to 9.1% of one year's payroll.²⁸ Based on ACERA's policy to amortize actuarial experience over a period of 20 years, there would be a 0.5% of payroll decrease or increase in the required contribution rate for each 1% asset gain or loss, respectively, and a 0.6% of payroll decrease or increase in the required contribution rate for each 1% liability gain or loss, respectively.

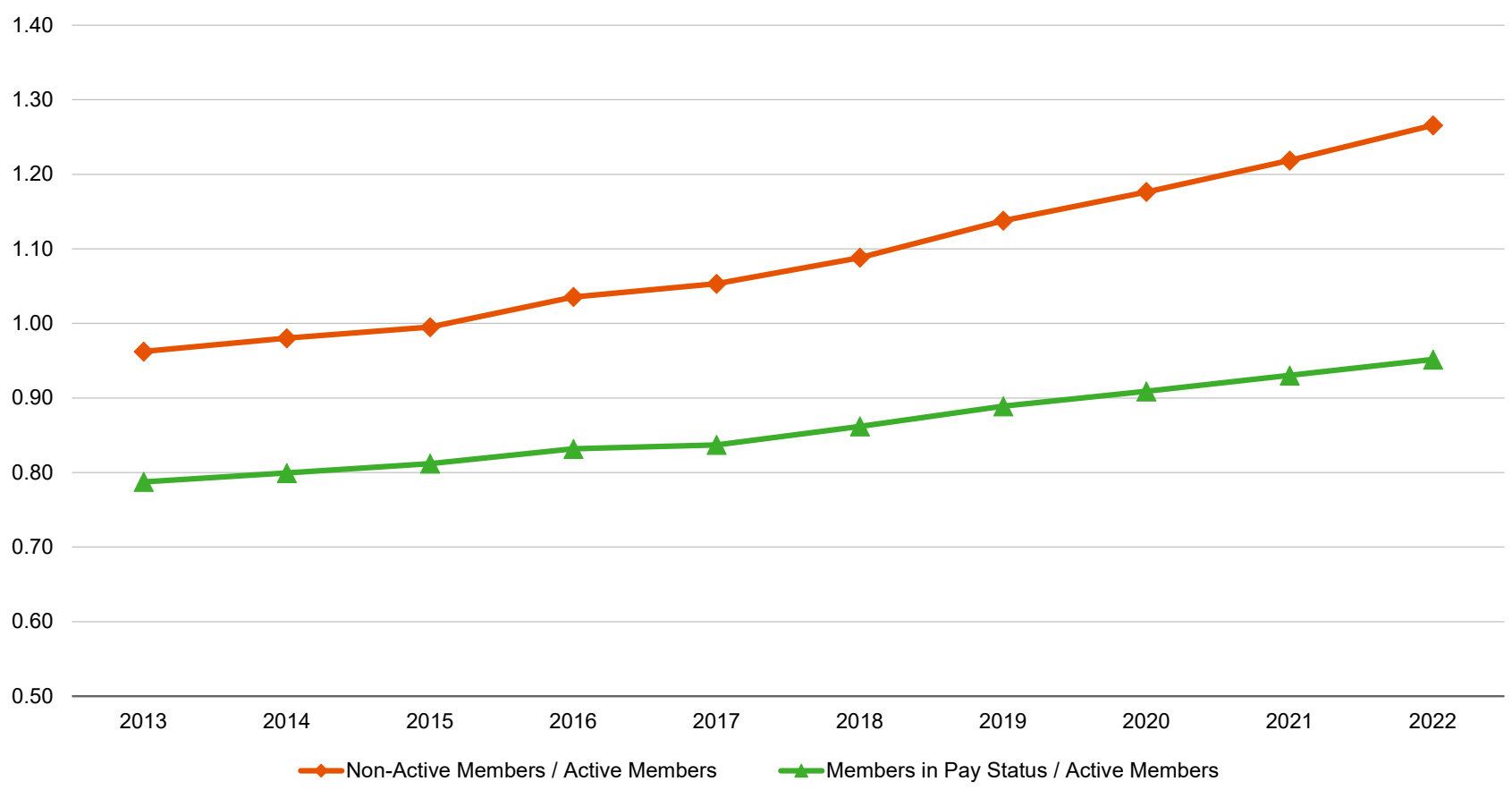
It is also informative to note that the AVR and LVR ratios for ACERA's Safety and General (LARPD) groups are higher than for the General (non-LARPD) groups. This means that both investment volatility and assumption changes will have a greater impact on the contribution rates of Safety and General (LARPD) groups than General (non-LARPD) groups. This is illustrated in the following table:

²⁸ The 7.3 and 9.1 are the AVR and LVR, respectively, for the entire Association. There are considerable differences in those ratios for the General and Safety membership groups.

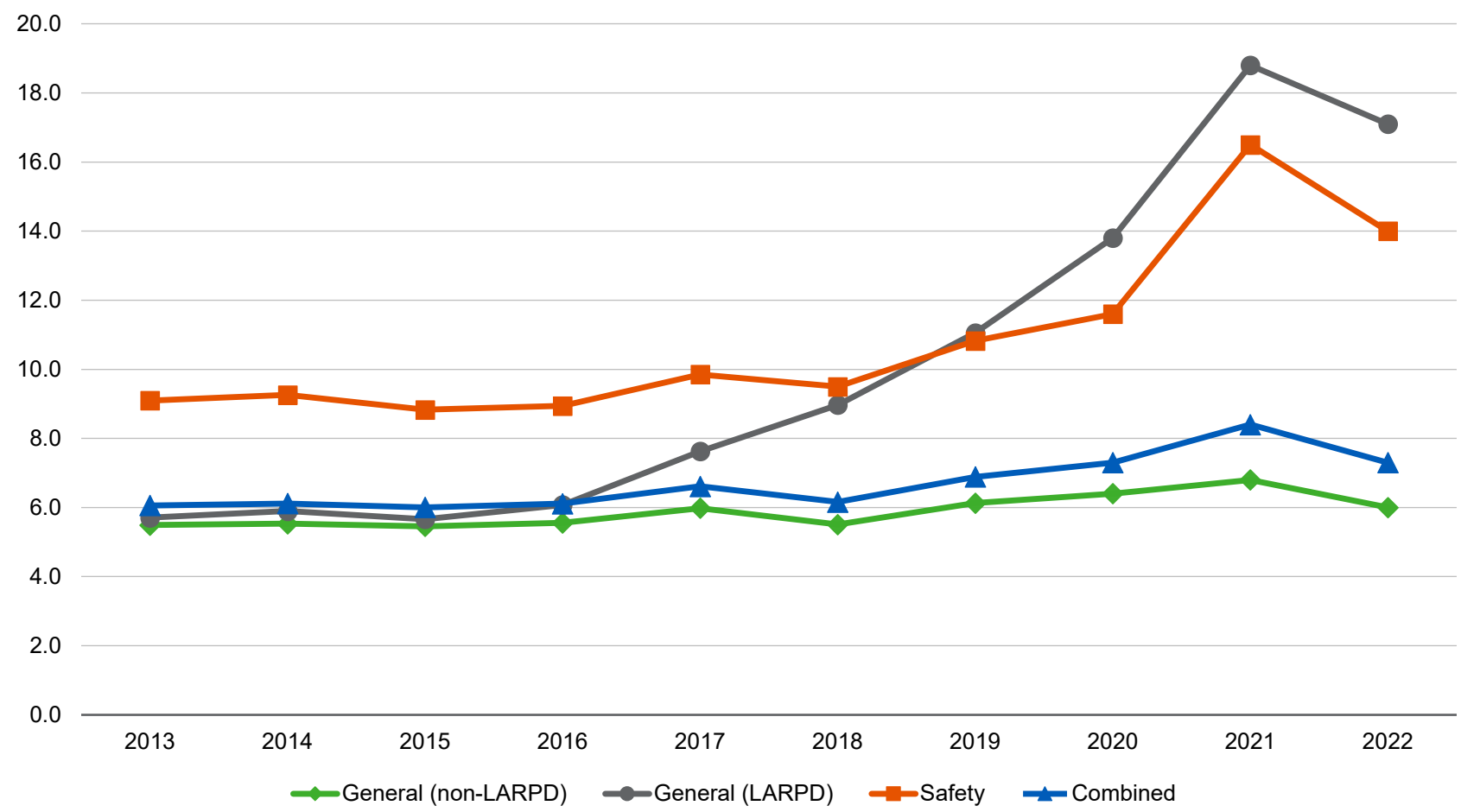
December 31, 2022

Employee Group	AVR	10% Loss Compares to	LVR	10% Change Compares to
General (non-LARPD)	6.0	60% of payroll	7.8	78% of payroll
General (LARPD)	17.1	171% of payroll	18.2	182% of payroll
Safety	14.0	140% of payroll	15.6	156% of payroll
Combined	7.3	73% of payroll	9.1	91% of payroll

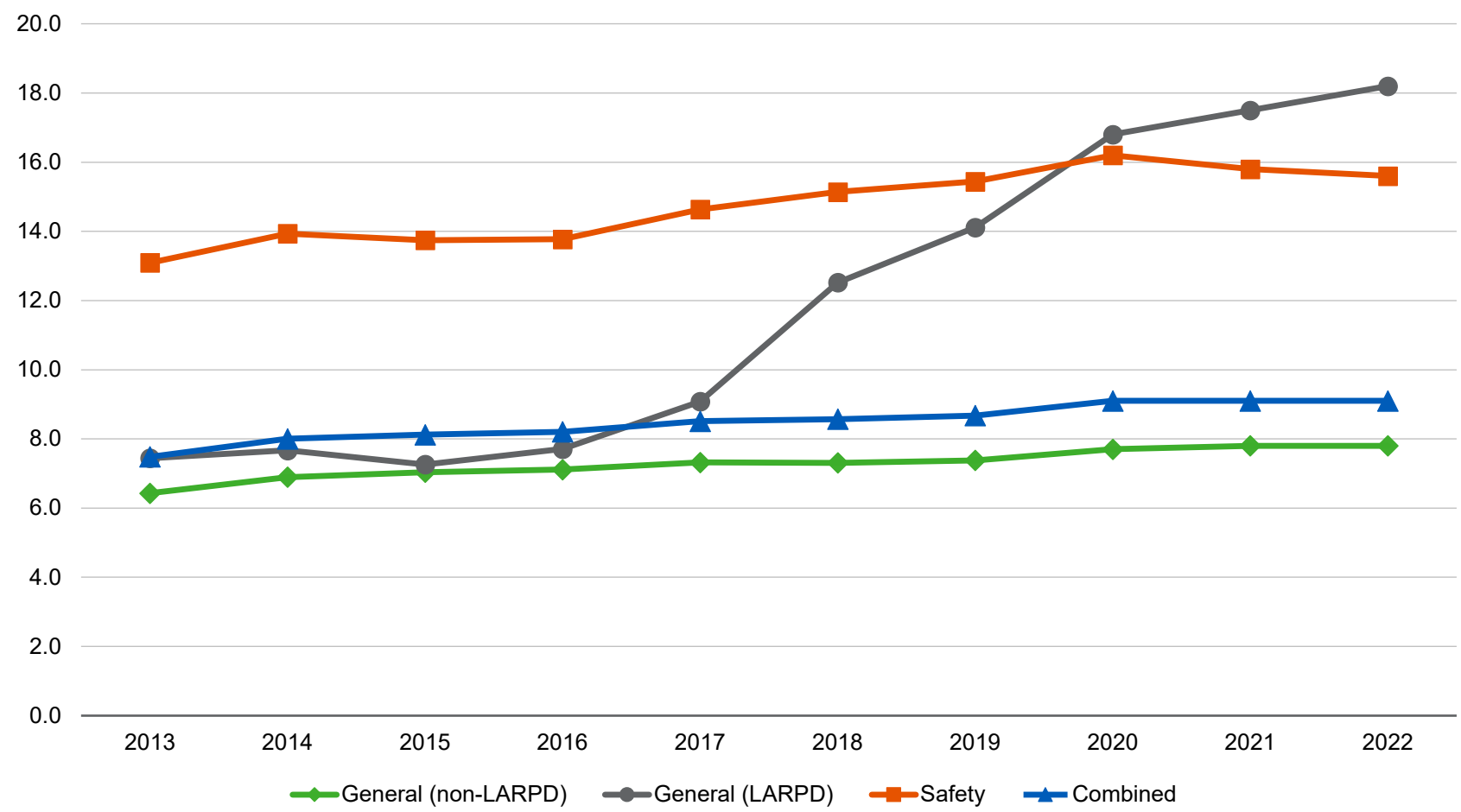
Ratios of Members in Pay-Status (Retirees and Beneficiaries) to Active Members & Non-Active Members (Inactive Vested, Retirees and Beneficiaries) to Active Members in December 31, 2013 to 2022 Valuations



Asset Volatility Ratios in December 31, 2013 to 2022 Valuations



Liability Volatility Ratios in December 31, 2013 to 2022 Valuations



Section 3: New ASOP 4 Disclosure Requirement of Low-Default-Risk Obligation Measure

Low-Default-Risk Obligation Measure

In December 2021, the Actuarial Standards Board issued a revision of Actuarial Standard of Practice No. 4 (ASOP 4) *Measuring Pension Obligations and Determining Pension Plan Costs or Contributions*. One of the revisions to ASOP 4 requires the disclosure of a Low-Default-Risk Obligation Measure (LDROM) when performing a funding valuation. The effective date of implementing this requirement for ACERA will be the December 31, 2023 funding valuation.

LDROM will be calculated using the same methodology and assumptions used to determine the Actuarial Accrued Liability used for funding, except for the discount rate. The LDROM is required to be calculated using “a discount rate ... derived from low-default-risk fixed income securities whose cash flows are reasonably consistent with the pattern of benefits expected to be paid in the future.”

The LDROM may be viewed as representing a hypothetical scenario where the assets are invested in an all-bond portfolio, generally lowering expected long-term investment returns. The discount rate selected and used for this purpose would be the Bond Buyer General Obligation 20-year Municipal Bond Index Rate, published at the end of each week.²⁹ This rate is the same rate mandated by the Governmental Accounting Standards Board as part of determining the discount rate for valuing reported public pension plan liabilities when plan assets are projected to be insufficient to make projected benefit payments, and the 20-year period reasonably approximates the duration of such plans. The LDROM is solely a disclosure requirement; the system’s funded status and Actuarially Determined Contribution Rates are determined using the expected return on assets, which reflects the actual investment portfolio as determined by the Board.

The difference between the plan’s Actuarial Accrued Liability and the LDROM can be thought of as what it would cost to invest the entire portfolio in low-default-risk securities. Alternatively, this difference could also be viewed as representing the expected taxpayer savings from investing in the plan’s diversified portfolio compared to investing only in low-default-risk securities.

ASOP 4 requires commentary to help the intended user understand the significance of the LDROM with respect to the funded status of the plan, plan contributions, and the security of participant benefits. If plan assets were invested

²⁹ For instance, the rate published around the end of 2022 is 3.72% and is lower than the 7.00% investment return assumption used in the valuation as of December 31, 2022.

exclusively in low-default-risk securities, the LDROM illustrates that reported funded status would be lower (which also implies that the Actuarially Determined Contributions would be higher), perhaps significantly. Benefit security for members of the system relies on a combination of the current assets in the plan, the investment returns generated on those assets, the anticipated future contributions from active plan members and employers, and in most cases LDROM provides little, if any, information regarding these items.

Appendix: Actuarial Assumptions & Methods and Actuarial Certification

Actuarial Assumptions & Methods

Unless otherwise noted, the results included in this report have been prepared based on the assumptions and methods used in preparing the December 31, 2022 valuation.

Segal valuation results are based on proprietary actuarial modeling software. The actuarial valuation models generate a comprehensive set of liability and cost calculations that are prepared to meet regulatory, legislative and client requirements. Deterministic cost projections are based on a proprietary forecasting model. Our Actuarial Technology and Systems unit, comprised of both actuaries and programmers, is responsible for the initial development and maintenance of these models. The models have a modular structure that allows for a high degree of accuracy, flexibility and user control. The client team programs the assumptions and the plan provisions, validates the models, and reviews test lives and results, under the supervision of the responsible actuary.

Deterministic Projection

In addition, we have prepared the deterministic projection using the following assumptions and methods applied in the December 31, 2022 actuarial valuation:

- Non-economic assumptions will remain unchanged.
- Retirement benefit formulas will remain unchanged.
- 1937 Act and PEPRA statutes will remain unchanged.
- UAAL amortization method will remain unchanged (i.e., 20-year layers and level percent of pay).
- Economic assumptions will remain unchanged, including the annual 7.00% investment earnings and 3.25% active payroll growth assumptions.
- Deferred investment gains and losses will be recognized over a five-year period.
- All other actuarial assumptions used in the December 31, 2022 actuarial valuation will be realized.

Stochastic Projection

Besides the assumptions and methods discussed above for the deterministic projection, the following additional assumptions or parameters are used in projecting ACERA’s investment portfolio over the next 20 years based on performing 10,000 trial outcomes of future market returns.

Target Asset Allocation

The target asset allocation is based on that provided by ACERA at the last triennial experience study and used by Segal to set the investment return assumption of 7.00% that was applied in the December 31, 2020, 2021 and 2022 valuations.³⁰ That target asset allocation is as follows:

Asset Class	Target Allocation
US Large Cap Equity	22.40%
US Small Cap Equity	2.50%
International Developed Equity	17.00%
International Small Cap Equity	3.00%
Emerging Markets Equity	5.00%
Core Plus Fixed Income	11.50%
High Yield Bonds	1.60%
Global Fixed Income	3.00%
Private Equity	10.50%
Core Real Estate	8.00%
Commodities	0.75%
Infrastructure	1.75%
Private Credit	4.00%
Absolute Return	9.00%
Total	100.00%

³⁰ We will apply the new target asset allocation approved by the Board in 2021 when we perform the next triennial experience study recommending assumptions for use starting with the December 31, 2023 valuation.

Simulation of Future Returns

In preparing the 10,000 trial outcomes of future market returns, we performed simulations using assumptions regarding the 20-year arithmetic returns, standard deviations and correlation matrix that were found in the 2022 survey prepared by Horizon Actuarial Services.³¹ We used the assumptions that were closest to the asset classes found in ACERA's investment portfolio.

A summary of the 20-year arithmetic returns,^{32,33} standard deviations and correlation matrix for each of the different asset classes used in the modeling is as follows:

Horizon Actuarial 2022 Survey of Capital Market Assumptions
Average Survey Assumptions

Asset Class	20-Year Horizon		Standard													
	Arith.	Geom.	Deviation	1	2	3	4	5	6	7	8	9	10	11	12	13
1 US Equity - Large Cap	7.82%	6.54%	16.33%	1.00												
2 US Equity - Small/Mid Cap	8.98%	6.99%	20.34%	0.90	1.00											
3 Non-US Equity - Developed	8.67%	7.08%	18.09%	0.82	0.77	1.00										
4 Non-US Equity - Emerging	10.67%	7.89%	23.92%	0.71	0.69	0.79	1.00									
5 US Corporate Bonds - Core	3.65%	3.49%	5.36%	0.18	0.13	0.18	0.16	1.00								
6 US Corporate Bonds - High Yield	5.43%	4.95%	9.90%	0.65	0.65	0.63	0.62	0.41	1.00							
7 Non-US Debt - Developed	2.77%	2.47%	7.51%	0.15	0.11	0.30	0.24	0.56	0.25	1.00						
8 Real Estate	7.32%	5.98%	17.00%	0.59	0.59	0.54	0.46	0.25	0.51	0.21	1.00					
9 Hedge Funds	5.84%	5.48%	7.99%	0.70	0.70	0.69	0.65	0.21	0.62	0.18	0.45	1.00				
10 Commodities	5.86%	4.23%	17.78%	0.35	0.36	0.42	0.43	0.07	0.38	0.19	0.26	0.40	1.00			
11 Infrastructure	8.18%	6.90%	16.63%	0.63	0.61	0.65	0.59	0.28	0.60	0.30	0.49	0.55	0.44	1.00		
12 Private Equity	12.50%	9.84%	22.13%	0.75	0.75	0.70	0.63	0.11	0.56	0.14	0.49	0.62	0.34	0.57	1.00	
13 Private Debt	7.83%	7.12%	11.49%	0.57	0.58	0.55	0.52	0.22	0.72	0.14	0.43	0.57	0.34	0.50	0.59	1.00
Inflation	2.45%	2.44%	2.07%													

Expected returns over a 10-year horizon include all 40 survey participants.
Expected returns over a 20-year horizon are based a subset of 24 survey participants who provided long-term assumptions.

³¹ That survey included responses from 40 investment advisors, including ACERA's investment advisor at Verus.

³² Note that only 24 investment advisors provided long-term (e.g. 20-year) capital market assumptions in the survey.

³³ These returns are gross of inflation and before any adjustment for administrative and investment expenses. The annual inflation assumption based on the Horizon Survey was 2.45%, which was adjusted to 2.75% based on the ACERA's current inflation assumption. The annual adjustment for administrative and investment expenses was 0.95%.

The above Horizon survey were released around August 2022 which reflects the 2022 capital market assumptions of investment advisors. Some of the investment advisory firms that participated in the 2022 Horizon survey have since raised their capital market assumptions. In order to apply more up-to-date capital market assumptions for 2023, we have applied an increase to the 2022 Horizon survey based on the changes of Segal's investment advisory division's capital market assumption for 2022 and 2023. This adjustment has the effect of increasing ACERA's portfolio geometric return by about 0.45%.

Other Considerations

The results presented in this report are intended to provide insight into key plan risks that can inform financial preparation and future decision making. However, we emphasize that deterministic projections, by their nature, are not a guarantee of future results. The modeling projections are intended to serve as illustrations of future financial outcomes that are based on the information available to us at the time the modeling is undertaken and completed, and the agreed-upon assumptions and methodologies described herein. Emerging results may differ significantly if the actual experience proves to be different from these assumptions or if alternative methodologies are used. Actual experience may differ due to such variables as demographic experience, the economy, stock market performance and the regulatory environment.

Actuarial Certification

The actuarial calculations in this report were completed under the supervision of Eva Yum, FSA, MAAA, Enrolled Actuary.

The actuarial opinions expressed in this report were prepared by Andy Yeung, ASA, MAAA, FCA, Enrolled Actuary and Eva Yum, FSA, MAAA, Enrolled Actuary. We are members of the American Academy of Actuaries and we meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein.



Andy Yeung, ASA, MAAA, FCA, EA
Vice President and Actuary



Eva Yum, FSA, MAAA, EA
Vice President and Actuary