

Los Angeles City Employees' Retirement System

Risk Assessment

**Including Review of Funded Status of the
Retirement and Health Plans as of June 30, 2019**

February 19, 2020

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Section 1: Introduction and Executive Summary

Introduction

The purpose of this report is to assist the Board of Administration,¹ participating employers and members and other stakeholders to better understand and assess the risk profile of the Los Angeles City Employees' Retirement System (LACERS), as well as the particular risks inherent in using a fixed set of actuarial assumptions in preparing the results in our June 30, 2019 funding valuations for LACERS.

The results included in our June 30, 2019 funding valuation reports for the Retirement and Health Plans were prepared based on a fixed set of economic and non-economic actuarial assumptions under the premise that future experience of LACERS 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 Administration for use starting with the June 30, 2018 valuation), there is a risk that emerging results may differ significantly as actual experience is fluid and will not completely track current assumptions.

New Actuarial Standard of Practice on Risk Assessment

The Actuarial Standards Board approved the new Actuarial Standard of Practice No. 51 (ASOP 51) regarding risk assessment when performing a funding valuation and it is effective with LACERS' June 30, 2019 actuarial valuation for benefits provided by the Retirement Plan.² 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 LACERS are asset/liability mismatch risk, investment risk, and longevity and other demographic risks. The Standard also requires an actuary to consider if there is any ongoing contribution risk to the plan; however, it does not require the 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

¹ This risk report has been prepared at the request of the Board of Administration to assist in administering the Fund. This risk report may not otherwise be copied or reproduced in any form without the consent of the Board of Administration 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.

² ASOP 51 does not actually apply to actuaries performing services related to other post-employment benefits; however, as the same kind of information is useful for the administration of the Health Plan, after discussions with LACERS the System has requested Segal to include information on the Health Plan in this risk report.

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 LACERS.

Plan Risk Assessment

In Section 2, we start by discussing some of the historical factors that have caused changes in LACERS' 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 LACERS 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 System's portfolio coming in differently from the current 7.25% annual investment return assumption used in the June 30, 2019 valuations. The Standard also requires disclosure of plan maturity measures and other historical information that are significant to understanding the risks associated with the Retirement and Health Plans 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 Retirement and Health Plans over the last 10 valuations by showing the beginning and ending year results over that period. The full set of results for each of the 10 years is provided in *Appendix D*.

The unfunded actuarial accrued liability (UAAL)³ and contribution rates⁴ increased primarily as a result of the strengthening of the actuarial assumptions used in preparing the valuations and unfavorable investment experience that were offset to some degree by favorable non-investment experience.

Valuation Date	Market Value Basis		Valuation Value Basis		Total (Aggregate) Employer Contribution Rate (% of Payroll – Contributions Received on July 15)
	Funded Status	UAAL	Funded Status	UAAL	
June 30, 2010	60.5%	\$5.9B	74.0%	\$3.8B	27.66%
June 30, 2019	73.1%	\$6.5B	73.1%	\$6.5B	29.12%

Future Funded Status and Employer Contribution Rates

In this report, we highlight key factors that may affect the financial profile of the Plans 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 favorable and unfavorable future market experience so that the impact of market performance can be better understood.

The total (aggregate) employer contribution rate is 29.12% of total payroll in the June 30, 2019 valuations. Using a deterministic projection, this report shows the effect of either favorable (14.50%) or unfavorable (0.00%) hypothetical

³ For example, the UAAL increased by \$422.0 million in the June 30 2011 valuations, \$920.7 million in the June 30, 2014 valuations, \$461.9 million in the June 30, 2017 valuations, and \$593.6 million in the June 30, 2018 valuations (for a total of \$2.4B), as a result of the assumptions adopted by the Board following the economic assumptions study and the experience studies over the last ten years.

⁴ For example, the increase in the employer's total rate (normal cost plus UAAL) was 1.37% in the June 30, 2011 valuations, 3.20% in the June 30, 2014 valuations, 2.03% in the June 30, 2017 valuations, and 2.09% in the June 30, 2018 valuations (for a total of 8.69%), as a result of the assumptions adopted by the Board following the economic assumptions study and the experience studies over the last ten years.

market returns for 2019/2020 on key valuation results. In particular, the changes in the total employer contribution rate (relative to the June 30, 2019 valuation aggregate employer contribution rate of 29.12%) in the June 30, 2020 valuation and in the June 30, 2026 valuation (when all the investment gains or losses are fully recognized at the end of the seven-year asset smoothing period) are as shown in the following table:

Contribution Rate Change	2019/2020 Single Plan-Year Investment Return		
	14.50%	7.25% (Baseline)	0.00%
June 30, 2020	-1.0% of payroll	-0.3% of payroll	+0.4% of payroll
June 30, 2026	-7.6% of payroll	-3.1% of payroll ⁵	+2.6% of payroll

As of June 30, 2019, the longest-duration amortization base is 23 years and will be fully amortized on June 30, 2042. While under the unfavorable (0.00%) hypothetical market return scenario for 2019/2020, the last portion of the deferred investment loss under the seven-year asset smoothing method will be recognized in the June 30, 2026 valuations and paid off in 15 years on June 30, 2041, this is one year earlier than when the 23-year base will be fully amortized. This implies that regardless of the hypothetical market return scenario for 2019/2020, the System would be expected to reach full funding at the end of 23 years and the total employer contribution rate would be expected to approach about 8% of payroll on June 30, 2042.⁶

Plan Maturity Measures

During the past 10 valuations, the Plans have become more mature as evidenced by an increase in the ratio of members in pay status (retirees and beneficiaries) to active members and by an increase in the ratios of plan assets and liabilities to active member payroll. 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 and 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 the Plans continue to mature with time, its risk profile will continue to evolve in this way and contributions will grow more sensitive to plan experience.

⁵ Primarily due to the June 30, 2009 ERIP amortization layer being fully recognized on June 30, 2024.

⁶ 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 – Retirement and Health Plans

Funded Status and UAAL

One common measure of LACERS' financial status is the funded ratio. This ratio compares the valuation⁷ and market value of assets to the actuarial accrued liabilities (AAL)⁸ of LACERS. After accounting for contributions made at the Actuarially Determined Contribution (ADC) amount, the overall level of funding of LACERS has remained level as a result of favorable non-investment experience, offset by the change in actuarial funding method, the strengthening of the actuarial assumptions, and unfavorable investment experience. The funded ratios and UAAL are provided separately for the Retirement and Health Plans for the past 10 valuations from June 30, 2010 to 2019 measured using both valuation and market value of assets in *Charts 1a* and *1b*, respectively.

The factors that caused the changes in the UAAL for the past 10 valuations from June 30, 2010 to 2019 are specified, separately for the Retirement and Health Plans, in *Charts 2a* and *2b*, respectively.⁹ The results in *Charts 2a* and *2b* reflect that the reductions in the investment return assumption in the June 30, 2011, 2014, and 2017¹⁰ valuations, together with the changes in the mortality tables and other assumptions from the three triennial experience studies recommending assumptions used in the June 30, 2011, 2014, and 2018¹⁰ valuations, have had the most impact on the UAAL for LACERS,¹¹ followed by the investment experience, especially during 2009 to 2013.

⁷ The valuation value of assets is the portion of the total actuarial value of assets allocated for the Retirement and Health Plans. The actuarial value of assets is equal to the market value of assets less unrecognized returns in each of the last seven years. 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 seven-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 For the Health Plan, *Chart 2b* shows changes only for the past six valuations, from June 30, 2014 to 2019, since detailed information regarding the change in UAAL is not readily available in Segal's valuation reports from June 30, 2010 to 2013.

¹⁰ The Board has a practice of reviewing the investment return and other actuarial assumptions at the same time in the triennial experience study. However, the full (economic and non-economic) 2017 experience study was delayed one year to 2018 to allow more time for Segal to study and the Board to discuss and approve the assumptions, and a 2017 economic assumptions study was completed as part of the June 30, 2017 valuations.

¹¹ For example, for the Retirement and Health Plans combined, the UAAL increased by \$422.0 million in the June 30 2011 valuations, \$920.7 million in the June 30, 2014 valuations, \$461.9 million in the June 30, 2017 valuations, and \$593.6 million in the June 30, 2018 valuations (for a total of \$2.4B), as a result of the assumptions adopted by the Board following the economic assumptions study and the experience studies over the last ten years.

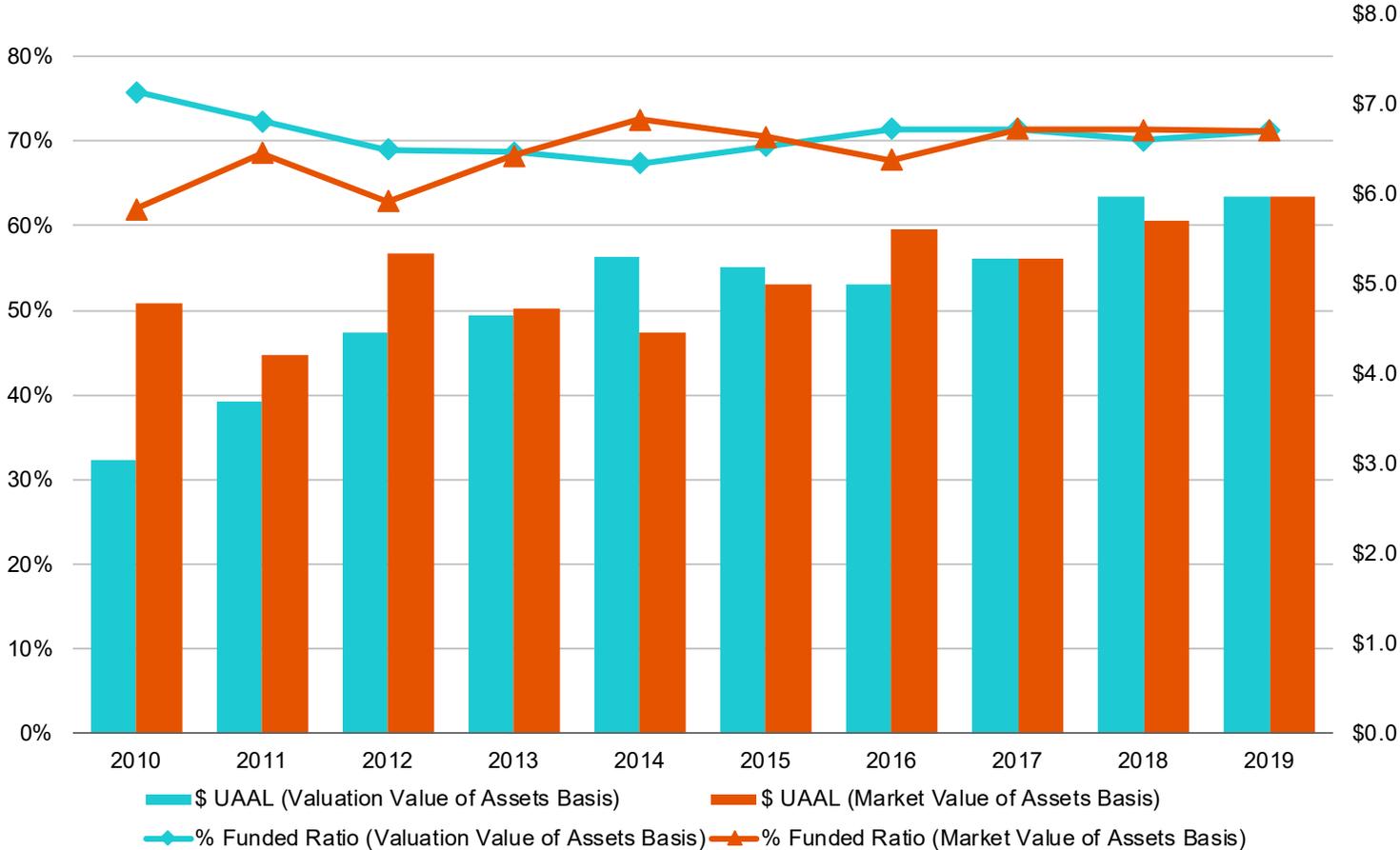
Charts 2a and *2b* also show that the unfavorable investment experience was offset to some extent by favorable non-investment experience. The non-investment experience included lower than expected COLAs granted to retirees and beneficiaries, and lower than expected salary increases for continuing actives. The non-investment experience also included the scheduled 12-month delay in implementing the contribution rates determined in the annual valuation.

Finally, *Charts 2a* and *2b* show some “negative amortization” due to the initial 30-year amortization of the combined base established June 30, 2012. The negative amortization from the combined base is expected to continue through June 30, 2022. Current assumptions and amortization policy generally will not entail negative amortization in the future.

It is important to note that LACERS has strengthened the assumptions over time, particularly lowering the expected investment rate of return, utilizing a generational mortality assumption, and adopting a funding policy that controls future negative amortization. These 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 LACERS’ fiscal health going forward.

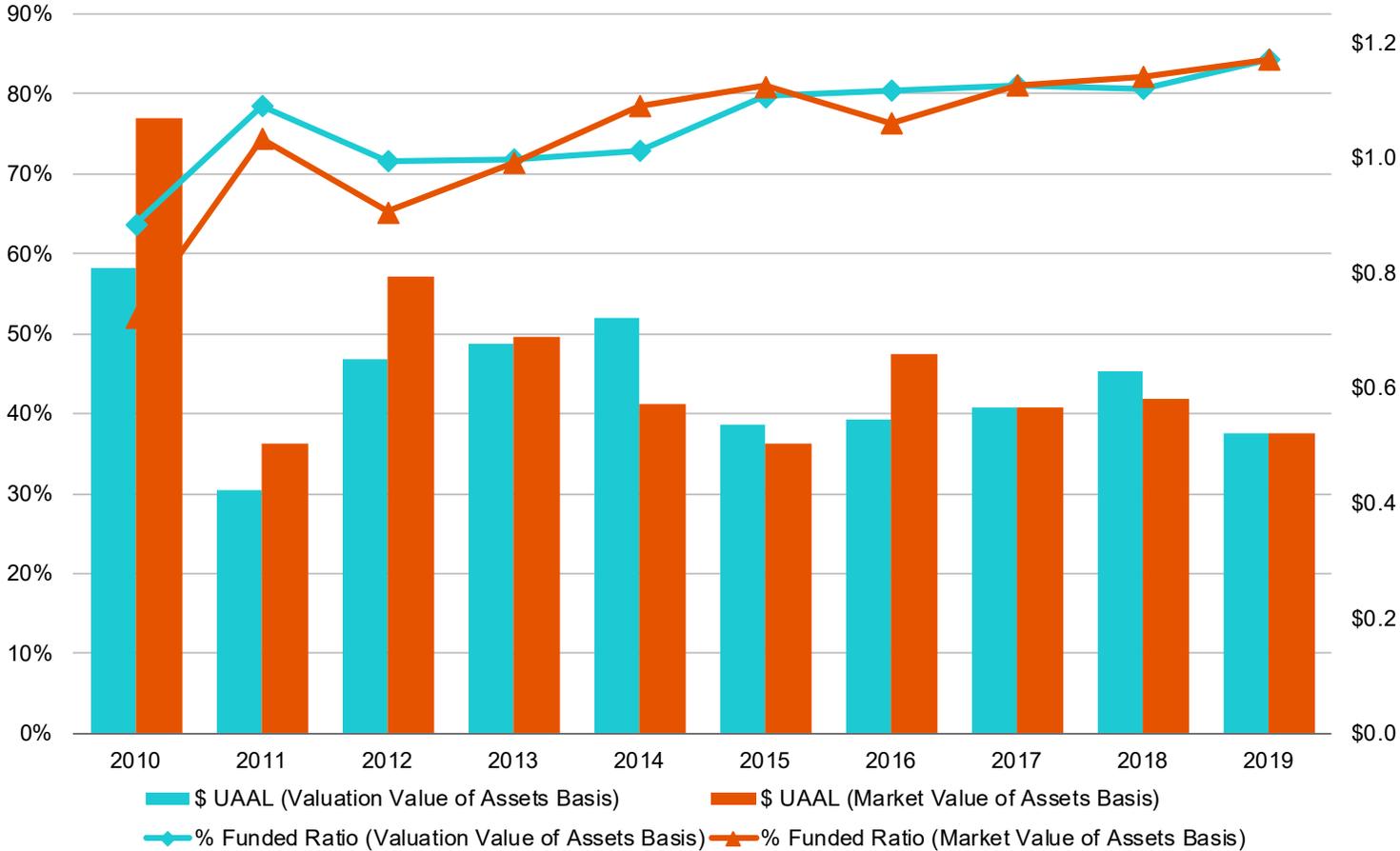
RETIREMENT PLAN

Funded Ratio (Percentages) and Dollar UAAL (\$ Billions)
in June 30, 2010 to 2019 Valuations



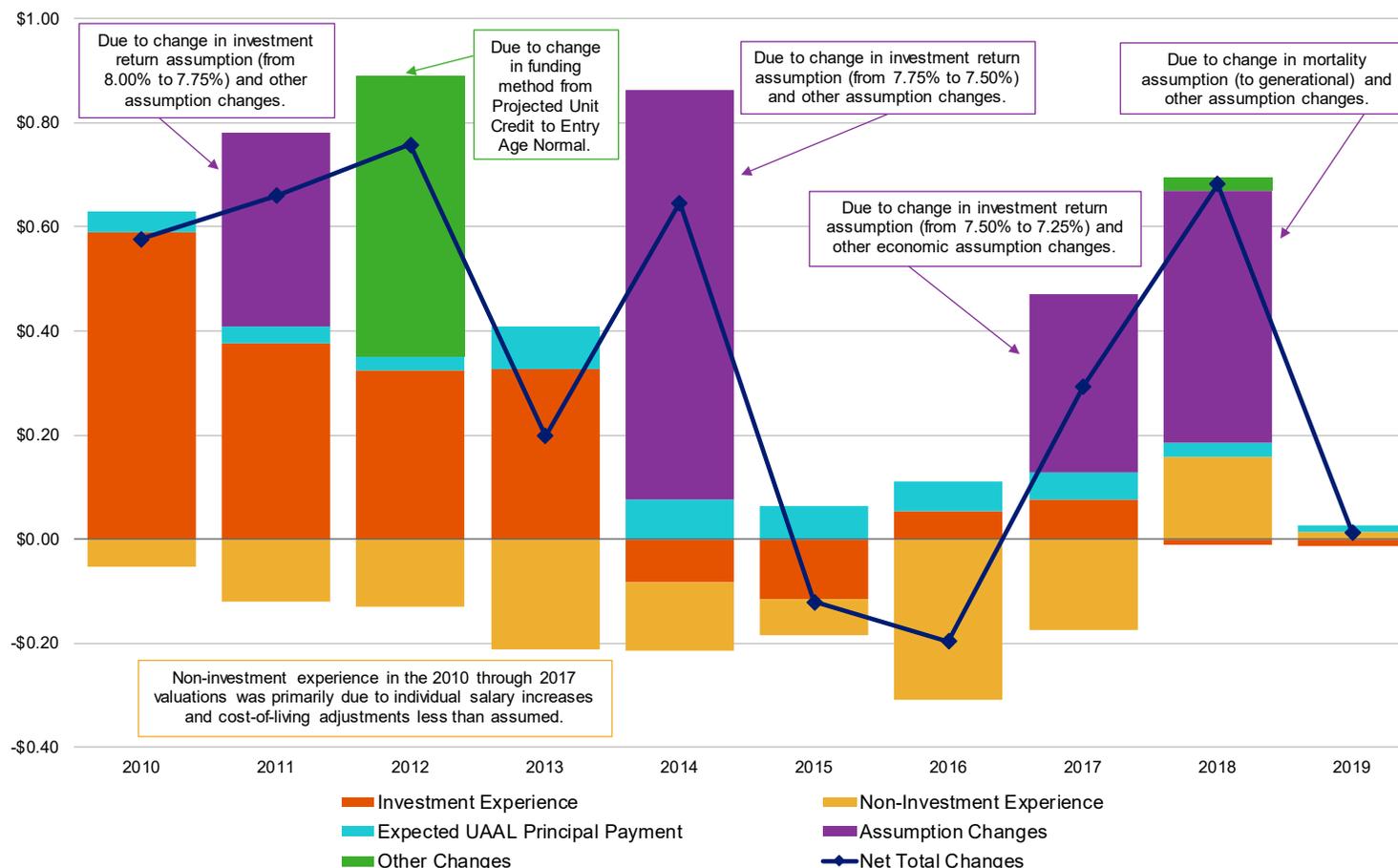
HEALTH PLAN

Funded Ratio (Percentages) and Dollar UAAL (\$ Billions) in June 30, 2010 to 2019 Valuations



RETIREMENT PLAN

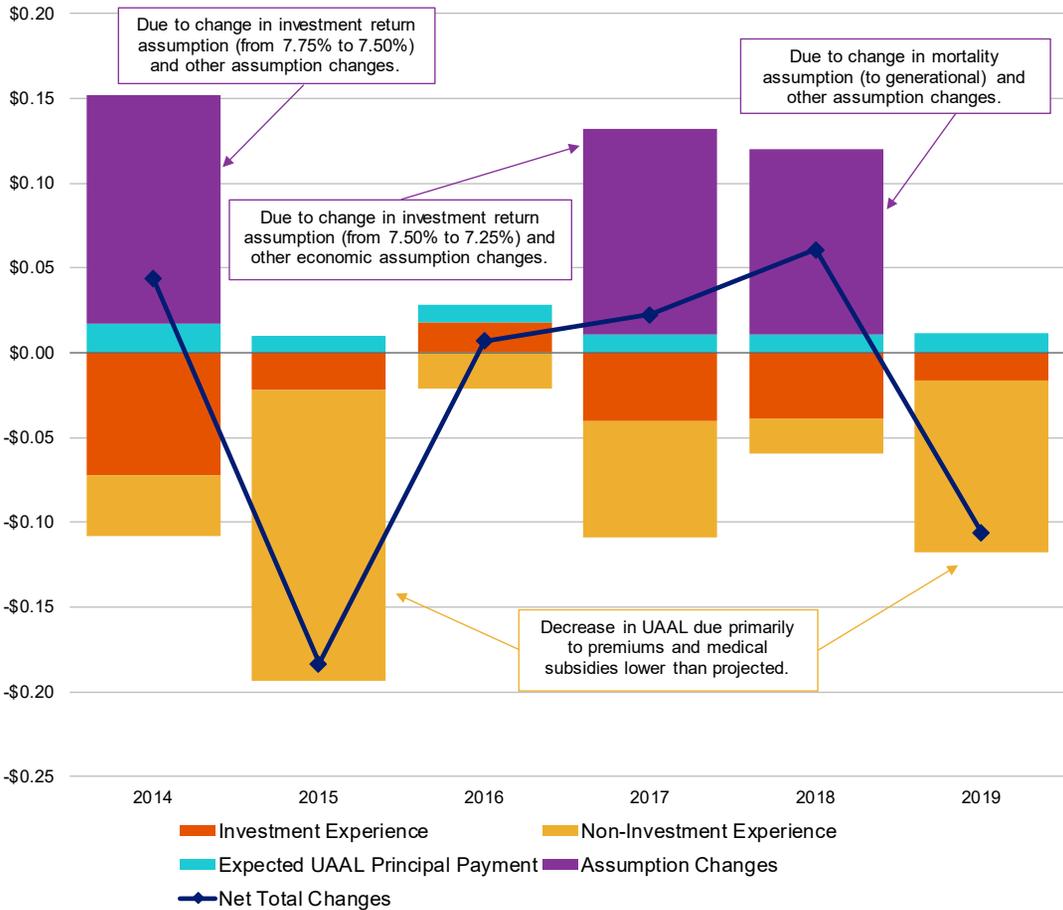
Factors that Changed UAAL in June 30, 2010 to 2019 Valuations (\$ Billions)



Note: The primary source of investment losses starting in the June 30, 2009 valuation is the Great Recession, which was recognized in the valuation value of assets over several years.

HEALTH PLAN

Factors that Changed UAAL in June 30, 2014 to 2019 Valuations (\$ Billions)



Employer Contribution Rates

The total (normal cost¹² plus UAAL payment) employer contribution rates determined in the June 30, 2010 to 2019 valuations for the Retirement and Health Plans are provided in *Charts 3a* and *3b*, respectively, and the factors that caused the changes in the total aggregate employer rates¹³ for the Retirement and Health Plans are provided in *Charts 4a* and *4b*, respectively.

The aggregate employer normal cost rates for the Retirement and Health Plans as shown in *Charts 3a* and *3b* have stayed relatively flat since the June 30, 2010 valuation. For the Retirement Plan, the UAAL rate generally increased between the June 30, 2010 and the June 30, 2019 valuations primarily due to unfavorable investment experience and changes in actuarial assumptions. While there have also been increases in the normal cost rates due to the changes in the actuarial assumptions, those increases were offset to some degree by the plan changes – with the introduction of Tier 3 – as new members have been enrolled in the lower cost benefit tier since February 21, 2016. Furthermore, beginning with the June 30, 2012 valuation, an additional employee contribution (either 2% or 4%, becoming 4% for all affected employees effective January 1, 2013) was implemented by the City for certain bargaining groups and for all non-represented employees.¹⁴ For the Health Plan, the UAAL rate generally decreased between the June 30, 2010 and the June 30, 2019 valuations. A primary source of the decrease was reflected in the June 30, 2011 valuation and was due to a freeze in the medical subsidy for non-retired members who were not contributing, other health related assumption changes, and other actuarial experience (primarily medical premiums and subsidies lower than projected).

For the Retirement Plan, *Chart 4a* shows that the changes in the investment return, mortality tables and other assumptions have had the most impact on increasing the UAAL contribution rates¹⁵ for the City. The next greatest impact was from the investment experience during 2010 to 2019. Favorable non-investment experience and additional required member contributions have partially offset the contribution rate increases.

For the Health Plan, *Chart 4b* shows that the non-investment experience¹⁶ (primarily medical premiums and subsidies lower than projected) has had the most impact on decreasing the UAAL contribution rates¹⁵ for the City, offset somewhat from changes in the investment return, mortality tables and other assumptions.

¹²The 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.

¹³There are separate contribution rates determined in the valuation for Tier 1 and Tier 3 (previously Tier 2, through the June 30, 2015 valuation). 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.

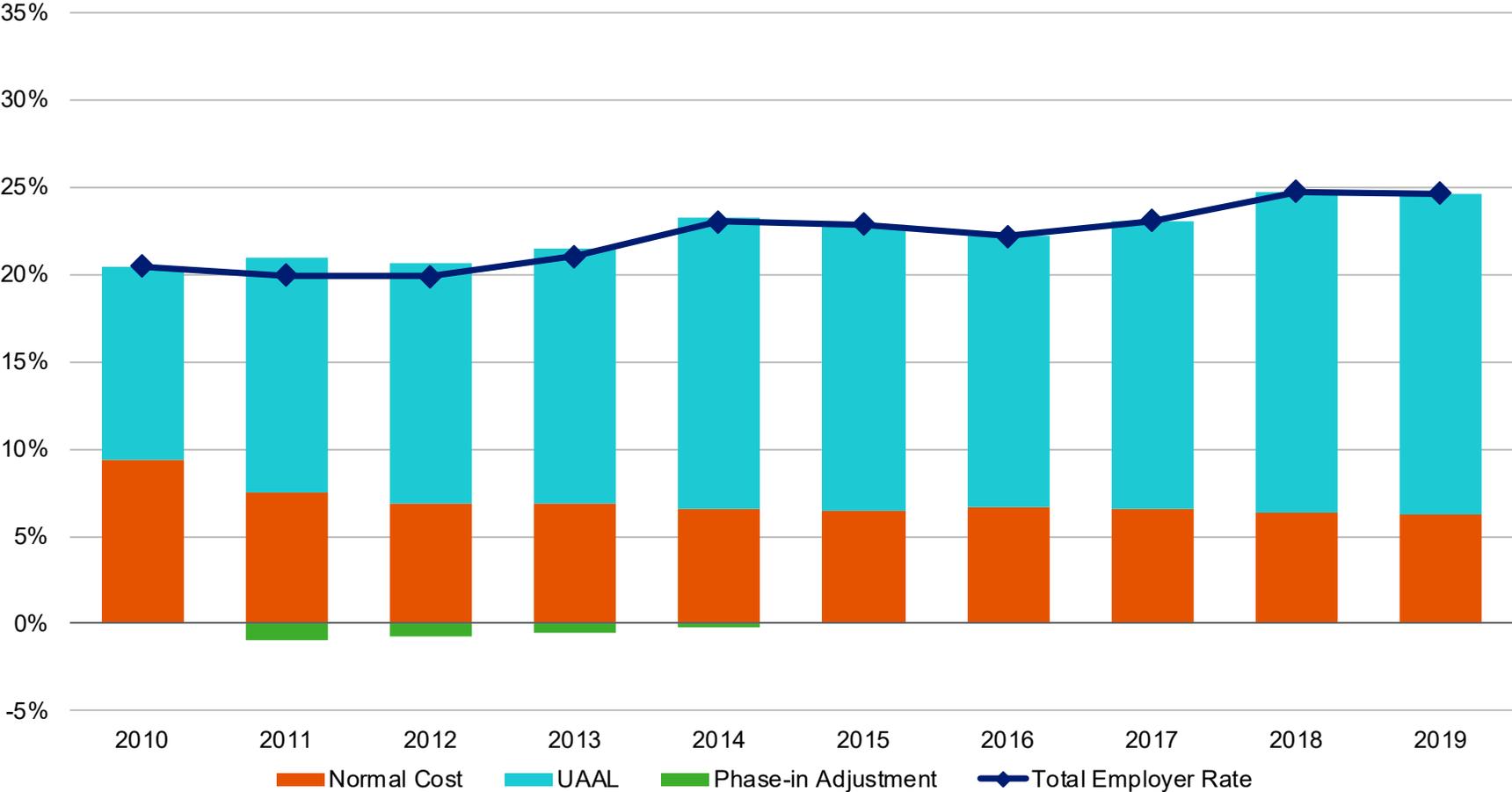
¹⁴As of the June 30, 2012 valuation, roughly 95% of active members were required to pay an additional member contribution rate. By the June 30, 2019 valuation, all active members were paying an additional member contribution rate (which was increased to 4.5% for less than 1% of active members).

¹⁵For example, for the Retirement and Health Plans combined, the increase in the employer's total rate (normal cost plus UAAL) was 1.37% in the June 30, 2011 valuations, 3.20% in the June 30, 2014 valuations, 2.03% in the June 30, 2017 valuations, and 2.09% in the June 30, 2018 valuations (for a total of 8.69%), as a result of the assumptions adopted by the Board following the economic assumptions study and the experience studies over the last ten years.

¹⁶Includes the impact of the annual review and adjustment of the medical trend assumptions.

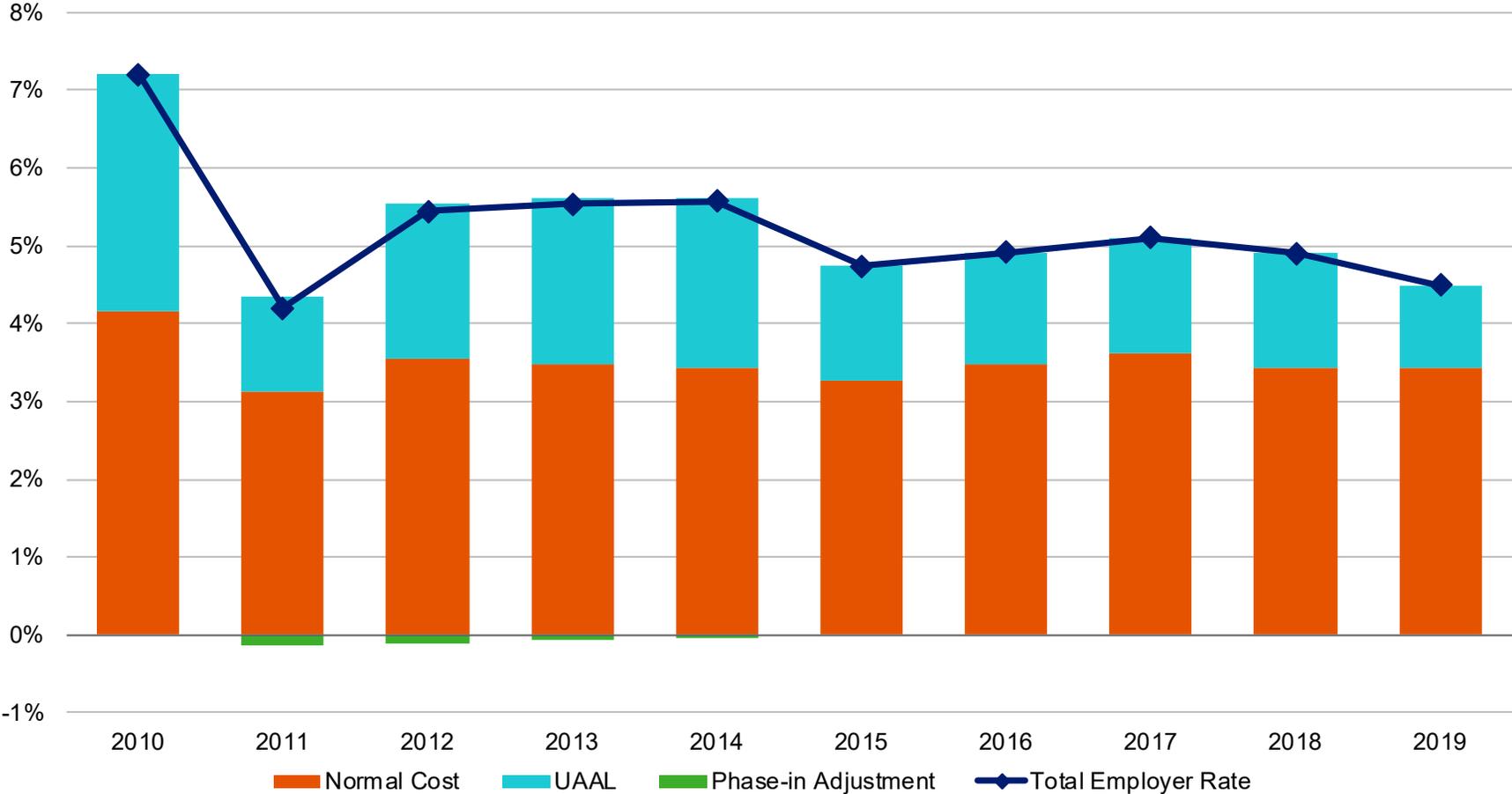
RETIREMENT PLAN

Employer Contribution Rates in June 30, 2010 to 2019 Valuations (% of Payroll – Contributions Received on July 15)



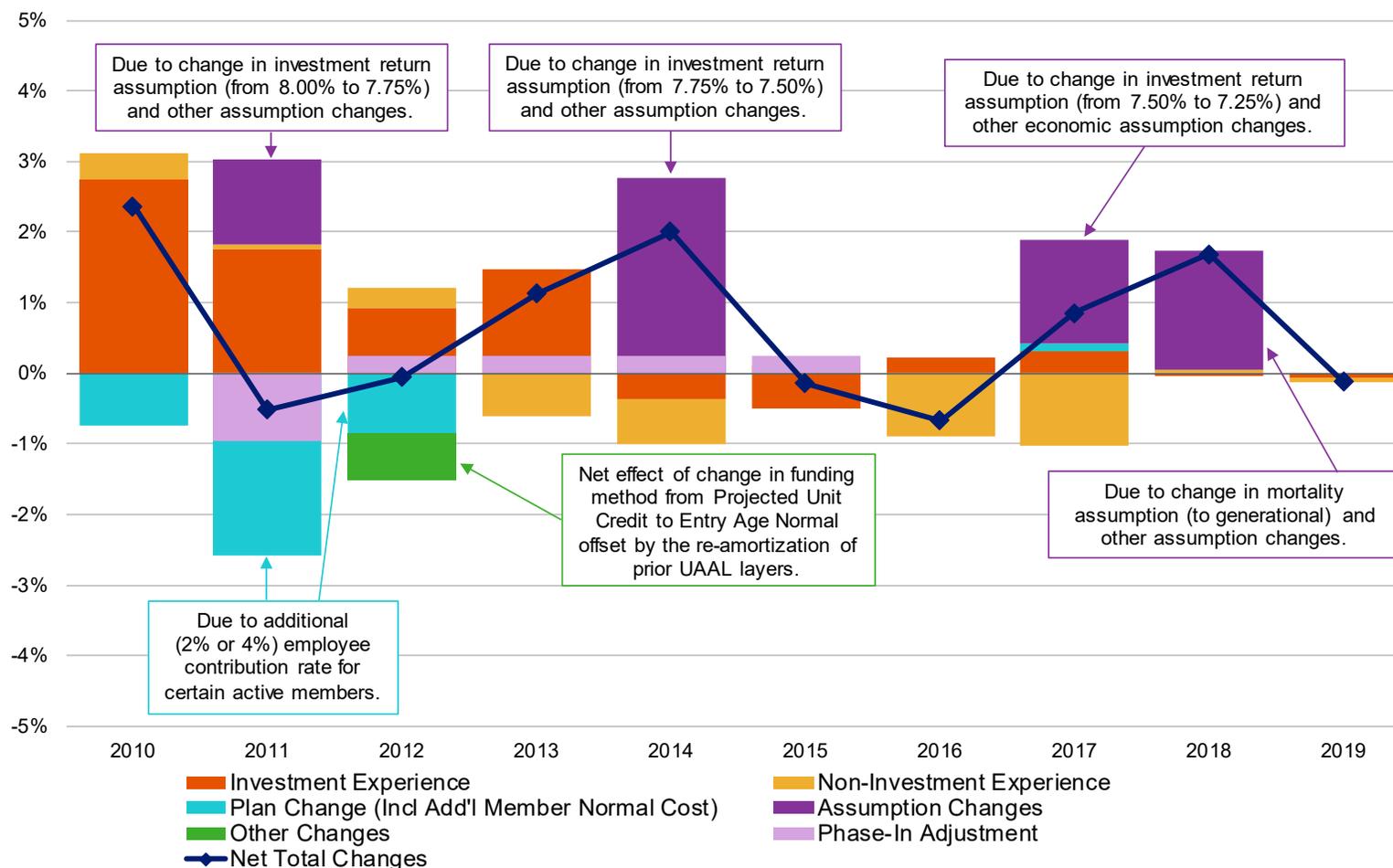
HEALTH PLAN

Employer Contribution Rates in June 30, 2010 to 2019 Valuations
(% of Payroll – Contributions Received on July 15)



RETIREMENT PLAN

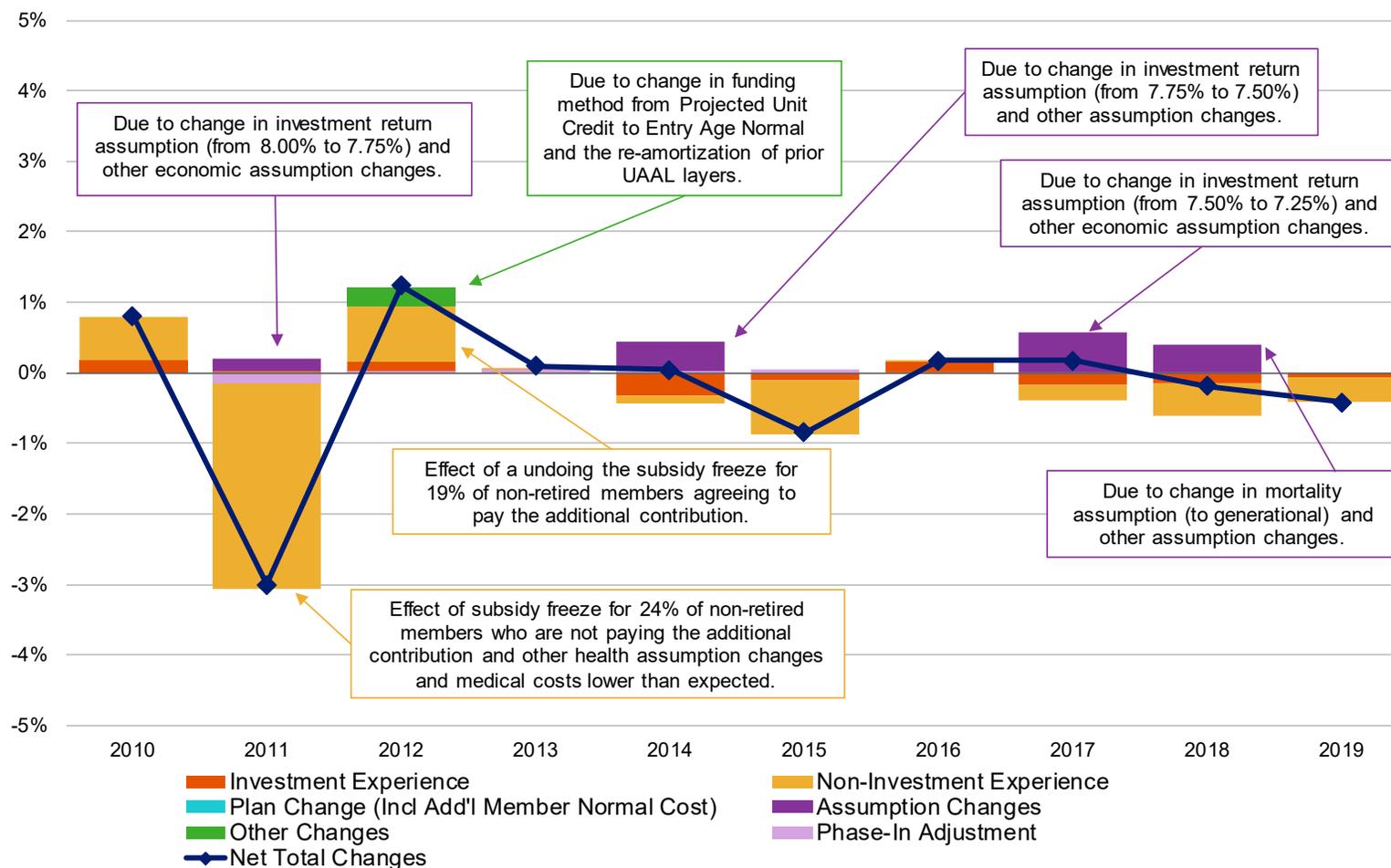
Factors that Affected Employer Contribution Rates
in June 30, 2010 to 2019 Valuations
(% of Payroll – Contributions Received on July 15)



Note: The primary source of investment losses starting in the June 30, 2009 valuation is the Great Recession, which was recognized in the valuation value of assets over several years.

HEALTH PLAN

Factors that Affected Employer Contribution Rates
in June 30, 2010 to 2019 Valuations
(% of Payroll – Contributions Received on July 15)



Assessment of Primary Risk Factors Going Forward

As discussed in the Evaluation of Historical Trends section, in the 2010 to 2019 valuations the funded ratios and the employer contribution rates have changed mainly as a result of changes in actuarial assumptions, investment experience, and non-investment experience.

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 LACERS 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: 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 City the effect of unfavorable or favorable actuarial experience on the assets and the liabilities of LACERS.

- Investment risk – the potential that future market returns will be different from the current expected 7.25% 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 LACERS can better understand the risk associated with earning either more or less than the assumed rate.

Even though the Board has a policy of reviewing the investment return and the other actuarial assumptions generally every three years, the next triennial experience study (recommending assumptions for the June 30, 2020 actuarial valuations) is scheduled to be performed in 2020. This was based on a decision made by the Board when we performed our review of all the assumptions before the June 30, 2018 valuations.

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

The change to using generational,¹⁷ headcount-weighted mortality tables was the most major change to the non-economic assumptions in the last experience study. As can be observed from *Charts 2a, 2b, 4a, and 4b*, there had been relatively small unfavorable impact on the UAAL and employer contribution rates due to non-investment related experience relative to the assumptions used in the last 10 valuations. However, in the last triennial experience study recommending assumptions for the June 30, 2018 valuation, we alerted the Board that it should consider a new benefit-weighted mortality basis¹⁸ when choosing the next mortality table, pending the availability of mortality experience from the Society of Actuaries (SOA) that includes data from public sector retirement plans. In January 2019, the SOA published the public sector mortality tables. While it is premature to estimate the impact of applying those new mortality tables on employer contribution rates until we perform the next triennial experience study recommending assumptions for the June 30, 2020 valuations, the Board should still be aware that there may be some increase in liabilities and contribution rates.

- 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. The City has a well-established practice of making the ADC determined in the annual actuarial valuations, based on the Board of Administration's Actuarial Funding Policy. As a result, in practice LACERS has essentially no contribution risk.

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

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

Note that other events that could affect costs going forward, such as future plan changes, are not included herein.

¹⁷ A generational mortality table provides dynamic projections of mortality experience for each cohort of current and future retirees. For example, the mortality rate for someone who is 65 next year will be slightly less than for someone who is 65 this year. In general, using generational mortality anticipates increases in the cost of the Plan over time as participants' life expectancies are projected to increase. This is in contrast to updating a static mortality assumption with each experience study as we have proposed in prior experience studies.

¹⁸ The Society of Actuaries has published the RP-2014 family of mortality tables and associated mortality improvement scales. Within that family of mortality tables, there are mortality rates developed for annuitants on a "headcount"-weighted basis that weight all retirees at the same age the same way without regard to the level of benefits those annuitants are receiving from a retirement plan. Mortality rates are also developed for annuitants on a "benefit"-weighted basis, with higher credibility assigned to experience from annuitants receiving larger benefits.

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 LACERS associated with earning either higher or lower than the assumed rate of 7.25% 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 LACERS were to earn a market return higher or lower than 7.25% in the next year following the June 30, 2019 valuations. In *Charts 5, 6 and 7*, we show the aggregate employer contribution rates, funded ratios, and UAAL respectively assuming that the System’s portfolio market return in 2019/2020 will be as follows: Scenario 1: 14.50%, Scenario 2: 7.25% (baseline) or Scenario 3: 0.00%. In the past, LACERS allowed us to assist the City in their budgeting process by providing a 6-year illustration of the financial position of LACERS assuming the System was to earn the assumed rate of investment return in all future years. The detailed employer contribution rates, funded ratios and UAAL developed for each of the Retirement and Health Plans, and in total, under the baseline Scenario 2, are provided in *Appendix C* of this report for this reason. However, in preparing the illustration for this risk report, we have included results beyond 6 years to illustrate an aspect of the operation of the current funding policy for the Health Plan. Specifically, we note that for the Health Plan, the UAAL contribution rate is expected to drop in the 2024 to 2028 valuations even though there would still be an increase in the UAAL in those years. This is the result of having experience gains that emerged in prior valuations¹⁹ amortized over shorter periods (i.e., 15 years) than the period used for the combined UAAL base from the 2012 valuation (i.e., 23 years). As we have previously discussed with LACERS’ staff, the Board could make an adjustment to its funding policy so as to smooth out these projected changes in the employer’s rate. Based on a discussion with LACERS’ staff, we will bring that issue back for further discussion with the Board.

The following table summarizes the resulting contribution changes (relative to the June 30, 2019 valuation aggregate employer contribution rate of 29.12%) in the immediately next valuation as well as in June 30, 2026 valuations when all of the investment gains and losses are fully recognized in the (smoothed) actuarial value of assets.

Contribution Rate Change	2019/2020 Single Plan-Year Investment Return		
	14.50%	7.25% (Baseline)	0.00%
June 30, 2020	-1.0% of payroll	-0.3% of payroll	+0.4% of payroll
June 30, 2026	-7.6% of payroll	-3.1% of payroll ²⁰	+2.6% of payroll

¹⁹This anomaly will be exacerbated under Scenario 1 with a 14.50% return for 2019/2020 and we have leveled out the UAAL contribution rates for those years when the UAAL contribution rate would have become negative [credit].

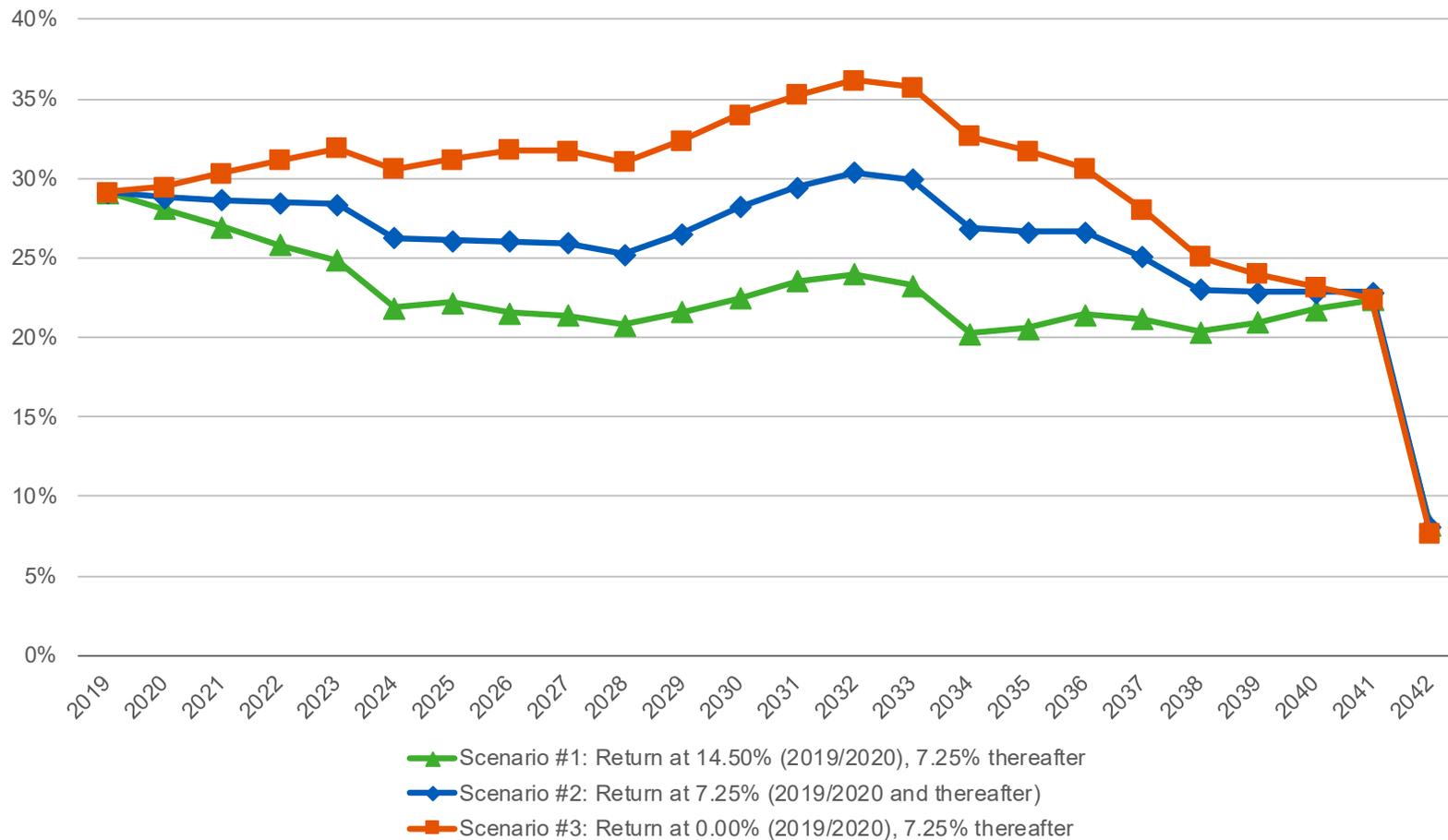
²⁰Primarily due to the June 30, 2009 ERIP amortization layer being fully recognized on June 30, 2024.

As of June 30, 2019, the longest-duration amortization base is 23 years and will be fully amortized on June 30, 2042. While under the unfavorable (0.00%) hypothetical market return scenario for 2019/2020, the last portion of the deferred investment loss under the seven-year asset smoothing method will be recognized in the June 30, 2026 valuations and paid off in 15 years on June 30, 2041, this is one year earlier than when the 23-year base will be fully amortized. This implies that regardless of the hypothetical market return scenario for 2019/2020, the System would be expected to reach full funding at the end of 23 years and the total employer contribution rate would be expected to approach about 8% of payroll on June 30, 2042.²¹

While we have not assigned a probability on the 2019/2020 market return coming in at these rates, the Board and other stakeholders monitoring LACERS would be able to interpolate in order to estimate the funded status and employer contribution rates for the June 30, 2020 and next several valuations as the actual investment experience for the 2019/2020 year becomes available throughout the year. Additionally, comparable experience in upcoming future years are likely to have a similar impact on the System absent any significant plan or assumption changes.

²¹ Assuming no further assumption changes, method changes or experience that differs significantly from assumptions.

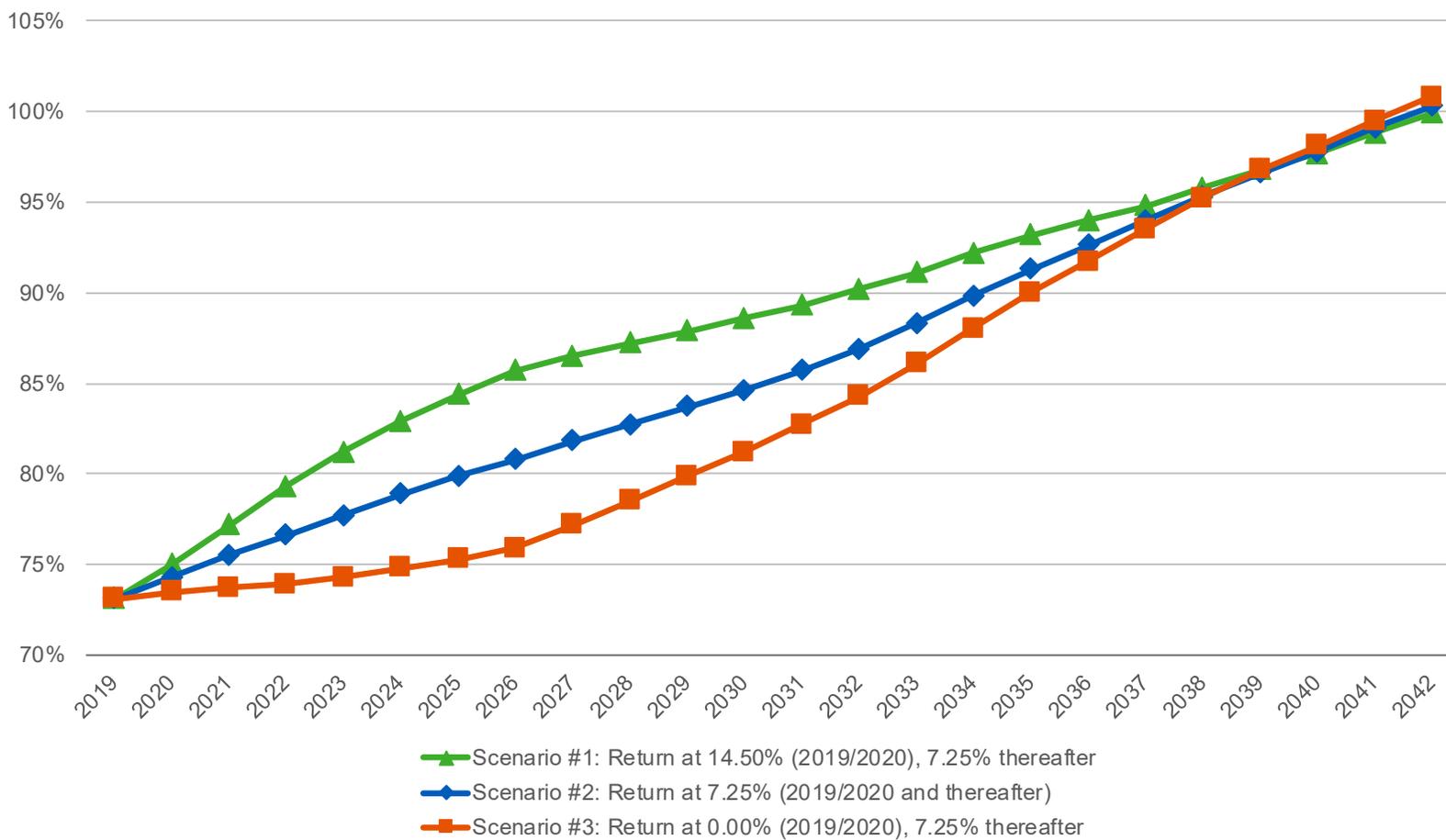
RETIREMENT AND HEALTH PLANS
Projected Employer Contribution Rates
Under Three Hypothetical Market Return Scenarios for 2019/2020
for the June 30, 2019 to 2042 Valuations (% of Payroll – Contributions Received on July 15)



Note: The contribution rates under all scenarios would be expected to approach 8% (the projected aggregate Normal Cost rate) on June 30, 2042 when the final amortization base is fully recognized in 23 years.

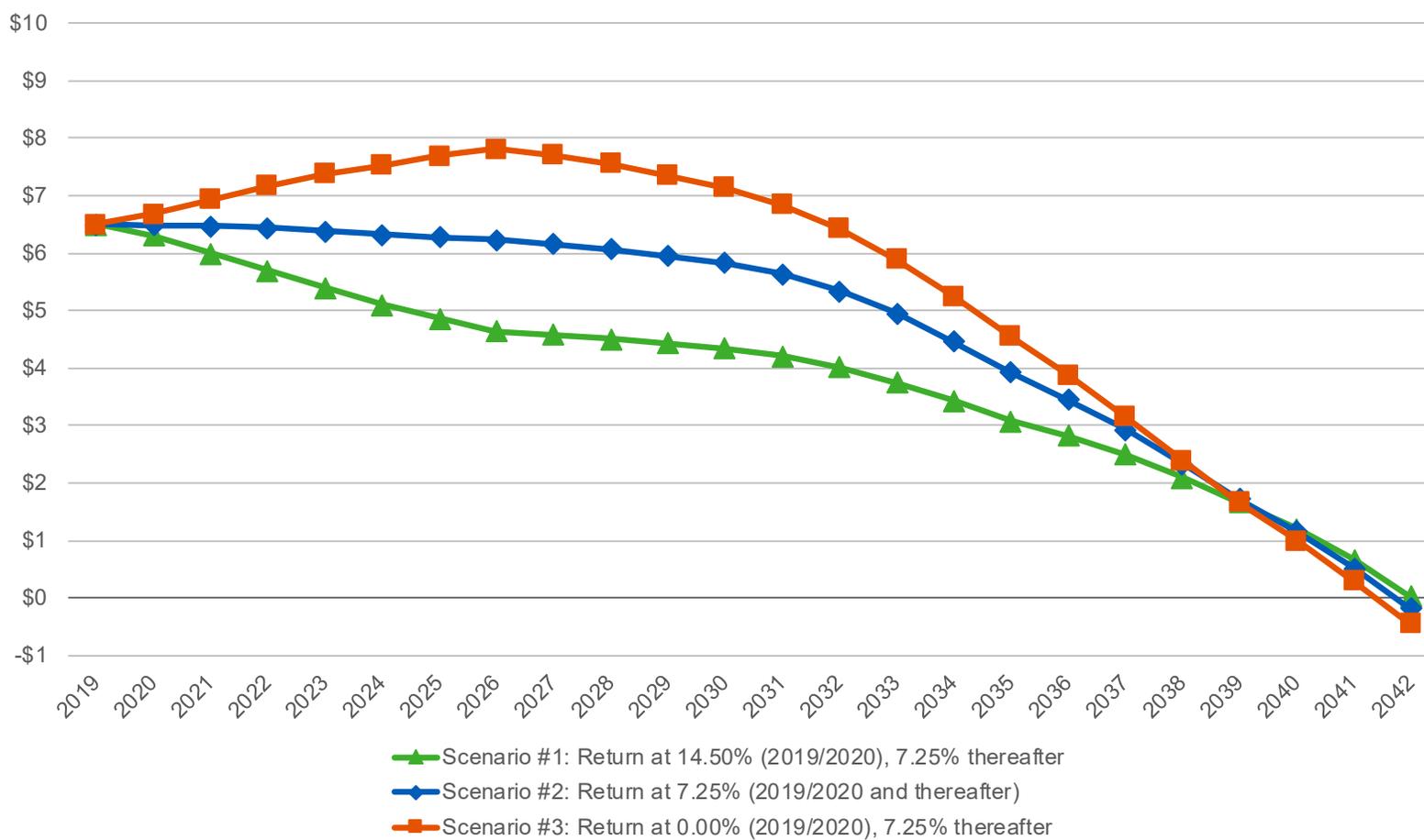
RETIREMENT AND HEALTH PLANS

Projected Funded Ratios (on Valuation Value of Assets)
Under Three Hypothetical Market Return Scenarios for 2019/2020
for the June 30, 2019 to 2042 Valuations



RETIREMENT AND HEALTH PLANS

Projected UAAL (on Valuation Value of Assets)
 Under Three Hypothetical Market Return Scenarios for 2019/2020
 for the June 30, 2019 to 2042 Valuations (\$ Billions)



Plan Maturity Measures that Affect Primary Risks

The annual actuarial valuations consider 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 June 30, 2010 to 2019, LACERS has become more mature, indicated by the continued increase in the ratio of non-active to active members covered by the Retirement and Health Plans as shown in *Charts 8a* and *8b*, respectively. The Charts also show 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 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.

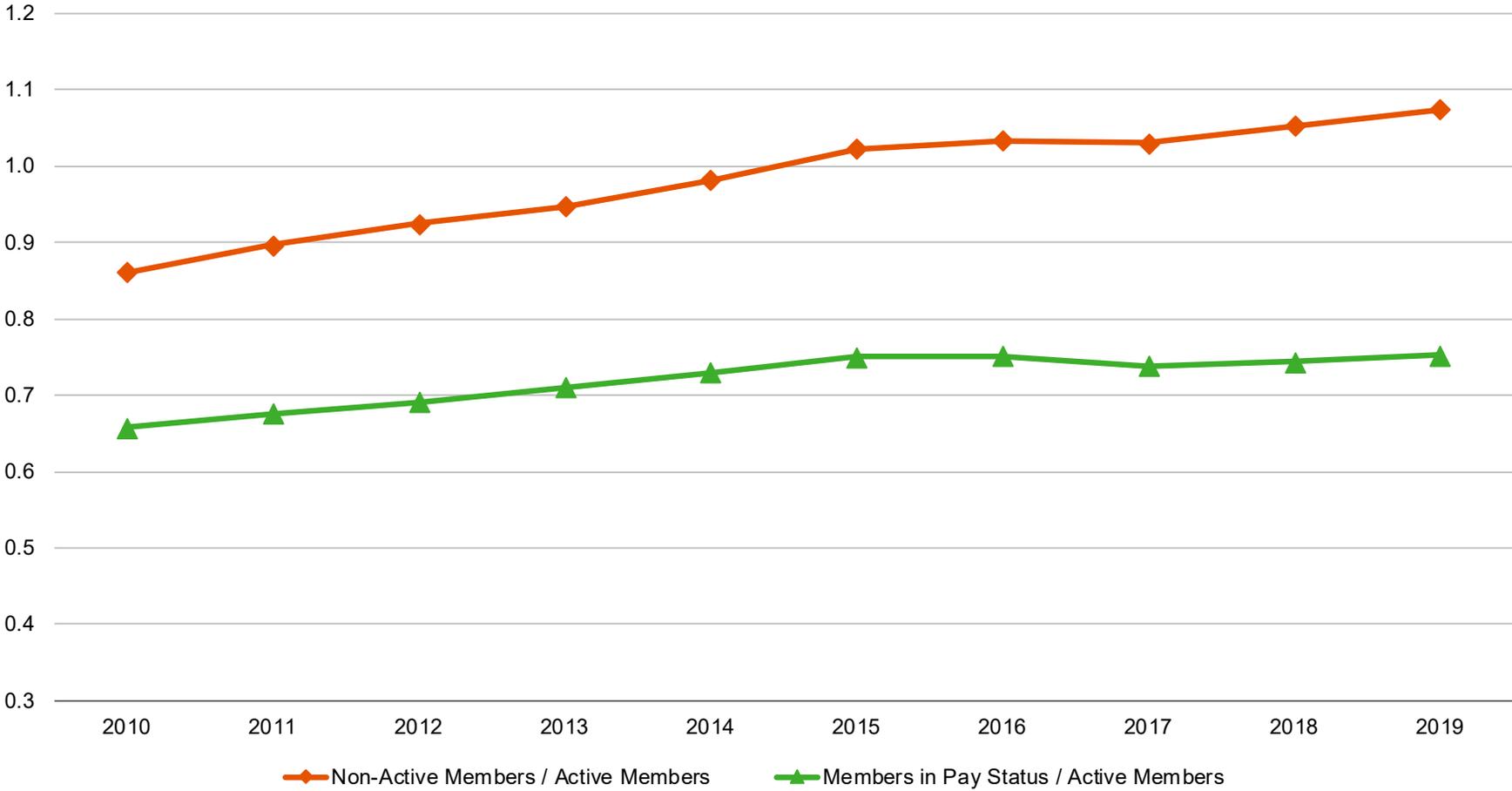
Besides the ratio of members in pay status to active members, another indicator of a more mature plan is relatively large amounts of assets and/or liabilities compared to active member payroll, which leads to increasing volatility in the level of required contributions. The **Asset Volatility Ratio (AVR)**, 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 for the Retirement and Health Plans in *Charts 9a* and *9b*, respectively. 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 also detailed for the Retirement and Health Plans in *Charts 9a* and *9b*, respectively. 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, the Retirement Plan's AVR was 6.7 as of June 30, 2019. This means that a 1% asset gain or loss in 2019/2020 (relative to the assumed investment return) would amount to 6.7% of one year's payroll. Similarly, the Retirement Plan's LVR was 9.3 as of June 30, 2019, so a 1% liability gain or loss in 2019/2020 would amount to 9.3% of one year's payroll.²² Based on LACERS' policy to amortize actuarial experience over a period of 15 years, there would be a 0.6% of payroll decrease or increase in the required contribution rate for each 1% asset gain or loss, respectively, and a 0.8% of payroll decrease or increase in the required contribution rate for each 1% liability gain or loss, respectively, for the Retirement Plan.

²² The AVR and the LVR for the Health Plan as of June 30, 2019 are 1.26 and 1.50, respectively, which are considerably different than those ratios noted above for the Retirement Plan.

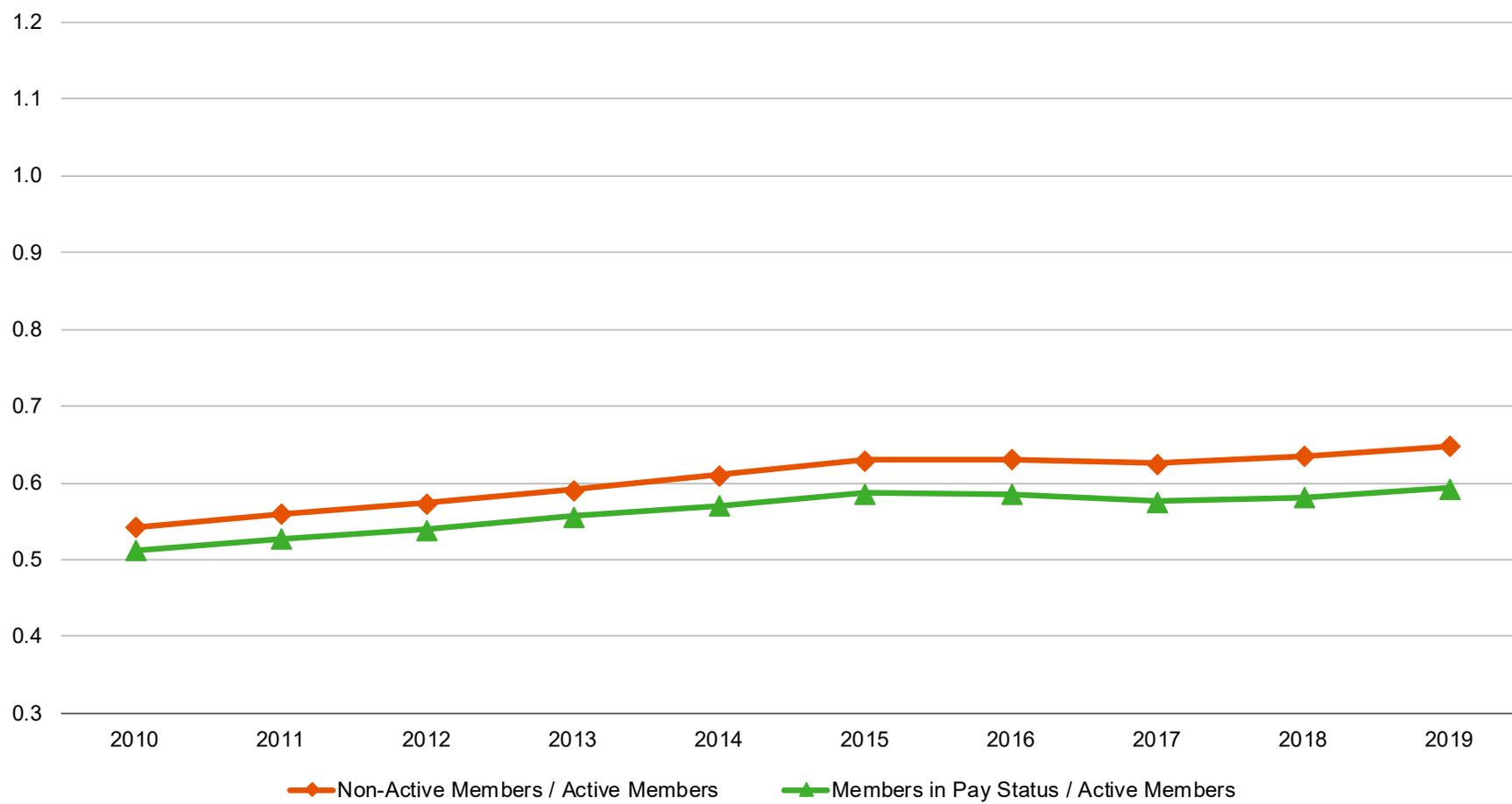
RETIREMENT PLAN

Ratios of Members in Pay-Status (Retirees and Beneficiaries) to Active Members & Non-Active Members (Inactive Vested, Retirees and Beneficiaries) to Active Members in June 30, 2010 to 2019 Valuations



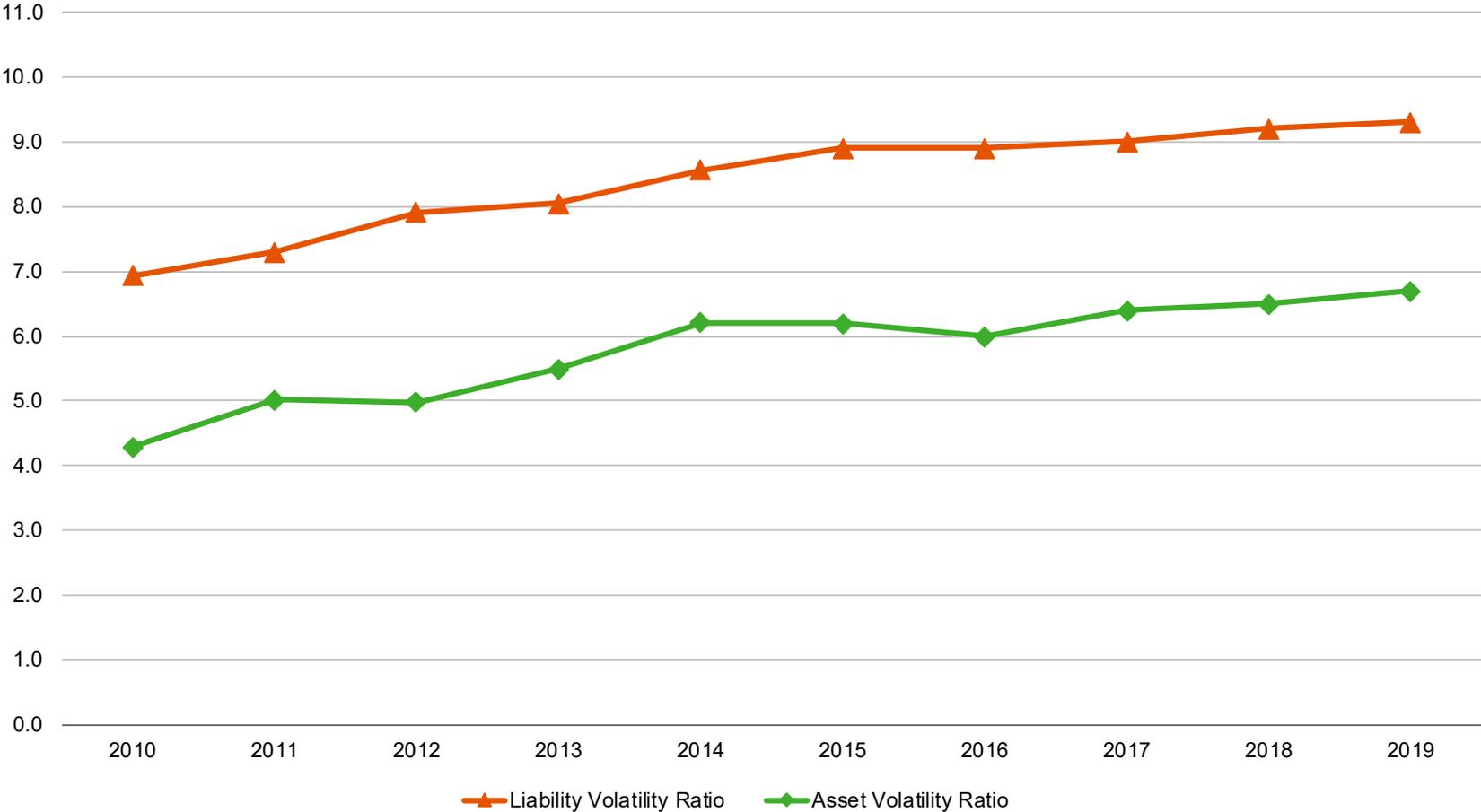
HEALTH PLAN

Ratios of Members in Pay-Status (Retirees and Beneficiaries) to Active Members & Non-Active Members (Inactive Vested, Retirees and Beneficiaries) to Active Members in June 30, 2010 to 2019 Valuations



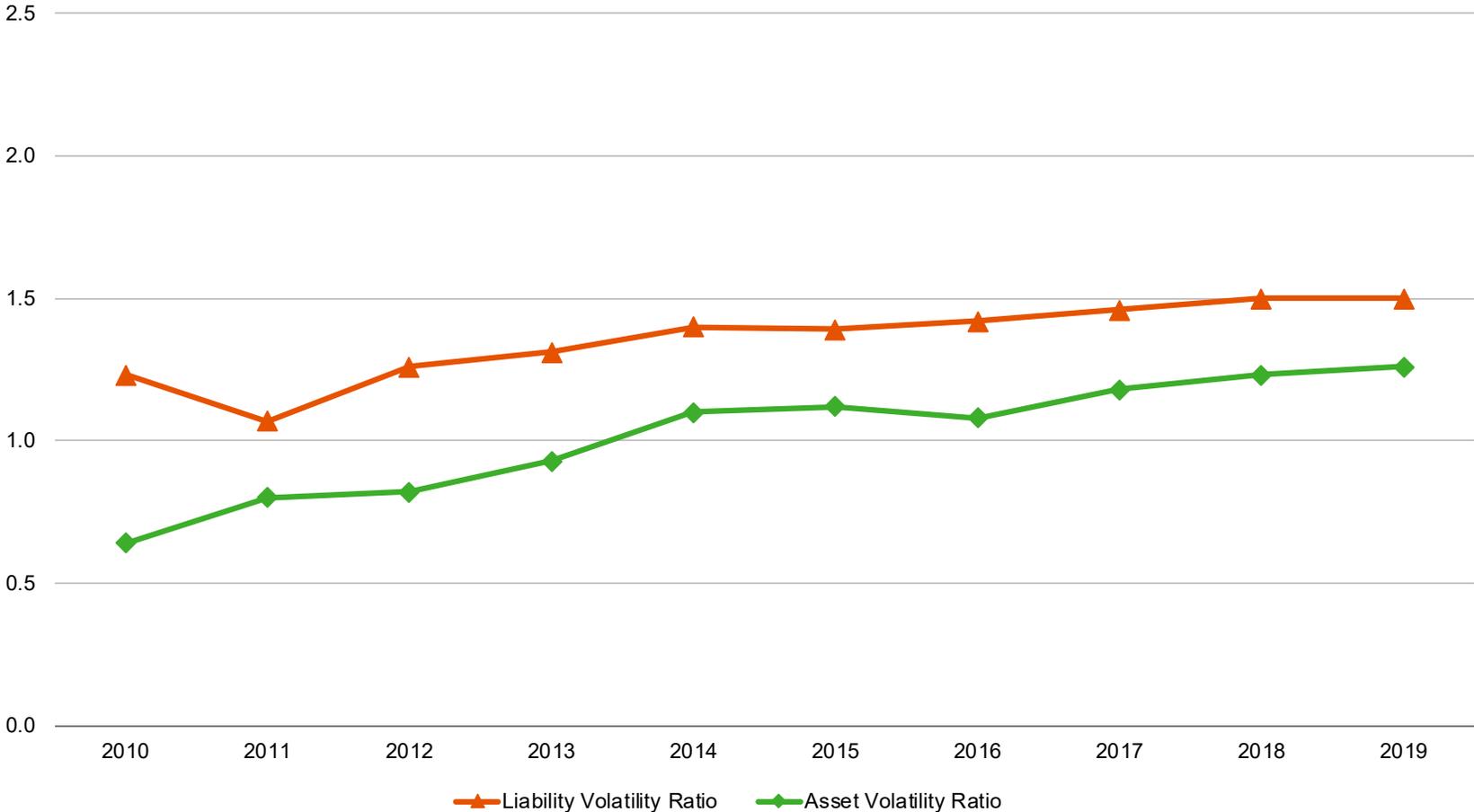
RETIREMENT PLAN

Volatility Ratios in June 30, 2010 to 2019 Valuations



HEALTH PLAN

Volatility Ratios in June 30, 2010 to 2019 Valuations



Appendix: Actuarial Assumptions & Methods, Actuarial Certification, and Detailed Scenario Test Results

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 June 30, 2019 valuations.

Deterministic Projection

In addition, we have prepared the deterministic projection using the following assumptions and methods applied in the June 30, 2019 actuarial valuation:

- Non-economic assumptions will remain unchanged.
- Retirement benefit formulas will remain unchanged.
- Los Angeles Charter and Administrative Code will remain unchanged.
- UAAL amortization method will remain unchanged (i.e., 15-year layers for actuarial gains/losses, 20-year layers for assumption or method changes, 30-year layers for actuarial surplus, and level percent of pay).
- Economic assumptions will remain unchanged, including the annual 7.25% investment earnings and 3.50% active payroll growth assumptions.
- Deferred investment gains and losses will be recognized over a seven-year period.
- In estimating the benefit payments for the open group, we have assumed that the annual payments will increase by 5% and 6% for the Retirement and Health Plans, respectively.
- All other actuarial assumptions used in the June 30, 2019 actuarial valuation will be realized.

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 Andy Yeung, ASA, MAAA, FCA, Enrolled Actuary and Thomas Bergman, ASA, MAAA, Enrolled Actuary.

The actuarial opinions expressed in this report were prepared by Paul Angelo, FSA, MAAA, FCA, Enrolled Actuary, Andy Yeung, ASA, MAAA, FCA, Enrolled Actuary, and Todd Tauzer, FSA, MAAA, FCA, CERA. 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.



Paul Angelo, FSA, MAAA, FCA, EA
Senior Vice President and Actuary



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



Todd Tauzer, FSA, MAAA, FCA, CERA
Vice President and Consulting Actuary

Detailed Scenario Test Results

RETIREMENT PLAN

Projection of UAAL, Funded Ratio and City Contributions
(Contributions Received on July 15)
(\$ In Thousands)

June 30 of Valuation Year			City Contributions (July 15)						
Valuation Year	UAAL	Funded Ratio	Fiscal Year End	Fiscal Year Pay	Normal Cost	UAAL Amortization	Total Rate	Contribution Amount	Incremental Increase
2018	\$ 5,962,144	70.1%	2020	\$ 2,253,906	6.41%	18.34%	24.75%	\$ 557,842	
2019	\$ 5,974,857	71.3%	2021	\$ 2,303,302	6.25%	18.38%	24.63%	\$ 567,303	\$ 9,461
2020	\$ 5,961,290	72.5%	2022	\$ 2,383,918	6.03%	18.25%	24.28%	\$ 578,815	\$ 11,512
2021	\$ 5,929,597	73.8%	2023	\$ 2,467,355	5.87%	18.20%	24.07%	\$ 593,892	\$ 15,077
2022	\$ 5,884,657	75.1%	2024	\$ 2,553,712	5.72%	18.17%	23.89%	\$ 610,082	\$ 16,190
2023	\$ 5,822,093	76.3%	2025	\$ 2,643,092	5.58%	18.13%	23.71%	\$ 626,677	\$ 16,595
2024	\$ 5,739,980	77.6%	2026	\$ 2,735,601	5.43%	16.42%	21.85%	\$ 597,729	\$ (28,948)
2025	\$ 5,677,765	78.7%	2027	\$ 2,831,347	5.31%	16.38%	21.69%	\$ 614,119	\$ 16,390
2026	\$ 5,605,598	79.8%	2028	\$ 2,930,444	5.19%	16.37%	21.56%	\$ 631,804	\$ 17,685
2027	\$ 5,512,176	80.9%	2029	\$ 3,033,009	5.07%	16.35%	21.42%	\$ 649,671	\$ 17,867
2028	\$ 5,395,116	82.0%	2030	\$ 3,139,165	4.97%	15.79%	20.76%	\$ 651,691	\$ 2,020
2029	\$ 5,252,785	83.1%	2031	\$ 3,249,035	4.87%	16.72%	21.59%	\$ 701,467	\$ 49,776
2030	\$ 5,100,318	84.2%	2032	\$ 3,362,752	4.77%	17.60%	22.37%	\$ 752,248	\$ 50,781
2031	\$ 4,885,726	85.4%	2033	\$ 3,480,448	4.69%	18.75%	23.44%	\$ 815,817	\$ 63,569
2032	\$ 4,603,745	86.7%	2034	\$ 3,602,264	4.60%	19.26%	23.86%	\$ 859,500	\$ 43,683
2033	\$ 4,236,500	88.2%	2035	\$ 3,728,343	4.52%	18.60%	23.12%	\$ 861,993	\$ 2,493
2034	\$ 3,798,391	89.7%	2036	\$ 3,858,835	4.45%	15.61%	20.06%	\$ 774,082	\$ (87,911)
2035	\$ 3,329,226	91.3%	2037	\$ 3,993,894	4.38%	15.39%	19.77%	\$ 789,593	\$ 15,511
2036	\$ 2,923,317	92.6%	2038	\$ 4,133,680	4.32%	15.41%	19.73%	\$ 815,575	\$ 25,982
2037	\$ 2,475,177	93.9%	2039	\$ 4,278,359	4.25%	14.32%	18.57%	\$ 794,491	\$ (21,084)
2038	\$ 1,970,557	95.3%	2040	\$ 4,428,102	4.19%	12.70%	16.89%	\$ 747,906	\$ (46,585)
2039	\$ 1,455,426	96.6%	2041	\$ 4,583,085	4.14%	12.59%	16.73%	\$ 766,750	\$ 18,844
2040	\$ 957,328	97.8%	2042	\$ 4,743,493	4.09%	12.62%	16.71%	\$ 792,638	\$ 25,888
2041	\$ 407,398	99.1%	2043	\$ 4,909,515	4.05%	12.63%	16.68%	\$ 818,907	\$ 26,269
2042	\$ (205,095)	100.4%	2044	\$ 5,081,349	4.02%	-0.22%	3.80%	\$ 193,091	\$ (625,816)

Detailed Scenario Test Results

HEALTH PLAN

Projection of UAAL, Funded Ratio and City Contributions
(Contributions Received on July 15)
(\$ In Thousands)

June 30 of Valuation Year				City Contributions (July 15)					
Valuation Year	UAAL	Funded Ratio	Fiscal Year End	Fiscal Year Pay	Normal Cost	UAAL Amortization	Total Rate	Contribution Amount	Incremental Increase
2018	\$ 627,984	80.7%	2020	\$ 2,253,906	3.44%	1.47%	4.91%	\$ 110,667	
2019	\$ 521,637	84.4%	2021	\$ 2,303,302	3.45%	1.04%	4.49%	\$ 103,418	\$ (7,249)
2020	\$ 523,497	85.1%	2022	\$ 2,383,918	3.51%	1.00%	4.51%	\$ 107,515	\$ 4,097
2021	\$ 536,123	85.5%	2023	\$ 2,467,355	3.56%	1.00%	4.56%	\$ 112,511	\$ 4,996
2022	\$ 549,675	85.9%	2024	\$ 2,553,712	3.60%	1.00%	4.60%	\$ 117,471	\$ 4,960
2023	\$ 563,185	86.2%	2025	\$ 2,643,092	3.65%	1.00%	4.65%	\$ 122,904	\$ 5,433
2024	\$ 577,218	86.6%	2026	\$ 2,735,601	3.69%	0.70%	4.39%	\$ 120,093	\$ (2,811)
2025	\$ 599,089	86.8%	2027	\$ 2,831,347	3.73%	0.70%	4.43%	\$ 125,429	\$ 5,336
2026	\$ 623,159	86.9%	2028	\$ 2,930,444	3.77%	0.70%	4.47%	\$ 130,991	\$ 5,562
2027	\$ 648,297	87.0%	2029	\$ 3,033,009	3.80%	0.71%	4.51%	\$ 136,789	\$ 5,798
2028	\$ 674,241	87.1%	2030	\$ 3,139,165	3.84%	0.63%	4.47%	\$ 140,321	\$ 3,532
2029	\$ 701,329	87.2%	2031	\$ 3,249,035	3.87%	1.09%	4.96%	\$ 161,152	\$ 20,831
2030	\$ 731,974	87.3%	2032	\$ 3,362,752	3.90%	1.92%	5.82%	\$ 195,712	\$ 34,560
2031	\$ 748,106	87.6%	2033	\$ 3,480,448	3.93%	2.09%	6.02%	\$ 209,523	\$ 13,811
2032	\$ 734,540	88.4%	2034	\$ 3,602,264	3.95%	2.55%	6.50%	\$ 234,147	\$ 24,624
2033	\$ 710,899	89.3%	2035	\$ 3,728,343	3.98%	2.83%	6.81%	\$ 253,900	\$ 19,753
2034	\$ 665,468	90.4%	2036	\$ 3,858,835	4.00%	2.80%	6.80%	\$ 262,401	\$ 8,501
2035	\$ 601,752	91.7%	2037	\$ 3,993,894	4.02%	2.84%	6.86%	\$ 273,981	\$ 11,580
2036	\$ 530,740	93.0%	2038	\$ 4,133,680	4.04%	2.85%	6.89%	\$ 284,811	\$ 10,830
2037	\$ 448,853	94.3%	2039	\$ 4,278,359	4.06%	2.45%	6.51%	\$ 278,521	\$ (6,290)
2038	\$ 356,374	95.7%	2040	\$ 4,428,102	4.08%	2.06%	6.14%	\$ 271,885	\$ (6,636)
2039	\$ 271,169	96.8%	2041	\$ 4,583,085	4.10%	2.03%	6.13%	\$ 280,943	\$ 9,058
2040	\$ 194,421	97.8%	2042	\$ 4,743,493	4.11%	2.03%	6.14%	\$ 291,250	\$ 10,307
2041	\$ 109,717	98.8%	2043	\$ 4,909,515	4.12%	2.03%	6.15%	\$ 301,935	\$ 10,685
2042	\$ 15,415	99.8%	2044	\$ 5,081,349	4.13%	0.15%	4.28%	\$ 217,482	\$ (84,453)

Detailed Scenario Test Results

RETIREMENT AND HEALTH PLANS

Projection of UAAL, Funded Ratio and City Contributions
(Contributions Received on July 15)
(\$ In Thousands)

June 30 of Valuation Year			City Contributions (July 15)						
Valuation Year	UAAL	Funded Ratio	Fiscal Year End	Fiscal Year Pay	Normal Cost	UAAL Amortization	Total Rate	Contribution Amount	Incremental Increase
2018	\$ 6,590,128	71.6%	2020	\$ 2,253,906	9.85%	19.81%	29.66%	\$ 668,509	
2019	\$ 6,496,494	73.1%	2021	\$ 2,303,302	9.70%	19.42%	29.12%	\$ 670,721	\$ 2,212
2020	\$ 6,484,787	74.3%	2022	\$ 2,383,918	9.54%	19.25%	28.79%	\$ 686,330	\$ 15,609
2021	\$ 6,465,720	75.5%	2023	\$ 2,467,355	9.43%	19.20%	28.63%	\$ 706,403	\$ 20,073
2022	\$ 6,434,332	76.6%	2024	\$ 2,553,712	9.32%	19.17%	28.49%	\$ 727,553	\$ 21,150
2023	\$ 6,385,278	77.7%	2025	\$ 2,643,092	9.23%	19.13%	28.36%	\$ 749,581	\$ 22,028
2024	\$ 6,317,198	78.9%	2026	\$ 2,735,601	9.12%	17.12%	26.24%	\$ 717,822	\$ (31,759)
2025	\$ 6,276,854	79.9%	2027	\$ 2,831,347	9.04%	17.08%	26.12%	\$ 739,548	\$ 21,726
2026	\$ 6,228,757	80.8%	2028	\$ 2,930,444	8.96%	17.07%	26.03%	\$ 762,795	\$ 23,247
2027	\$ 6,160,473	81.8%	2029	\$ 3,033,009	8.87%	17.06%	25.93%	\$ 786,460	\$ 23,665
2028	\$ 6,069,357	82.7%	2030	\$ 3,139,165	8.81%	16.42%	25.23%	\$ 792,012	\$ 5,552
2029	\$ 5,954,114	83.7%	2031	\$ 3,249,035	8.74%	17.81%	26.55%	\$ 862,619	\$ 70,607
2030	\$ 5,832,292	84.6%	2032	\$ 3,362,752	8.67%	19.52%	28.19%	\$ 947,960	\$ 85,341
2031	\$ 5,633,832	85.7%	2033	\$ 3,480,448	8.62%	20.84%	29.46%	\$ 1,025,340	\$ 77,380
2032	\$ 5,338,285	86.9%	2034	\$ 3,602,264	8.55%	21.81%	30.36%	\$ 1,093,647	\$ 68,307
2033	\$ 4,947,399	88.3%	2035	\$ 3,728,343	8.50%	21.43%	29.93%	\$ 1,115,893	\$ 22,246
2034	\$ 4,463,859	89.8%	2036	\$ 3,858,835	8.45%	18.41%	26.86%	\$ 1,036,483	\$ (79,410)
2035	\$ 3,930,978	91.3%	2037	\$ 3,993,894	8.40%	18.23%	26.63%	\$ 1,063,574	\$ 27,091
2036	\$ 3,454,057	92.6%	2038	\$ 4,133,680	8.36%	18.26%	26.62%	\$ 1,100,386	\$ 36,812
2037	\$ 2,924,030	94.0%	2039	\$ 4,278,359	8.31%	16.77%	25.08%	\$ 1,073,012	\$ (27,374)
2038	\$ 2,326,931	95.3%	2040	\$ 4,428,102	8.27%	14.76%	23.03%	\$ 1,019,791	\$ (53,221)
2039	\$ 1,726,595	96.6%	2041	\$ 4,583,085	8.24%	14.62%	22.86%	\$ 1,047,693	\$ 27,902
2040	\$ 1,151,749	97.8%	2042	\$ 4,743,493	8.20%	14.65%	22.85%	\$ 1,083,888	\$ 36,195
2041	\$ 517,115	99.1%	2043	\$ 4,909,515	8.17%	14.66%	22.83%	\$ 1,120,842	\$ 36,954
2042	\$ (189,680)	100.3%	2044	\$ 5,081,349	8.15%	-0.07%	8.08%	\$ 410,573	\$ (710,269)

Historical Funded Status, UAAL, and Employer Contribution Rates

RETIREMENT AND HEALTH PLANS

Valuation Date	Market Value Basis		Valuation Value Basis		Total (Aggregate) Employer Contribution Rate (% of Payroll – Contributions Received on July 15) ⁽¹⁾
	Funded Status	UAAL	Funded Status	UAAL	
June 30, 2010	60.5%	\$5.9B	74.0%	\$3.8B	27.66%
June 30, 2011	69.4%	\$4.7B	73.2%	\$4.1B	24.14%
June 30, 2012	63.3%	\$6.1B	69.4%	\$5.1B	25.33%
June 30, 2013	68.7%	\$5.4B	69.1%	\$5.3B	26.56%
June 30, 2014	73.4%	\$5.0B	68.1%	\$6.0B	28.60%
June 30, 2015	71.9%	\$5.5B	70.7%	\$5.7B	27.62%
June 30, 2016	69.0%	\$6.3B	72.6%	\$5.5B	27.13%
June 30, 2017	72.8%	\$5.8B	72.8%	\$5.8B	28.16%
June 30, 2018	72.9%	\$6.3B	71.6%	\$6.6B	29.66%
June 30, 2019	73.1%	\$6.5B	73.1%	\$6.5B	29.12%

⁽¹⁾ For the June 30, 2011 – 2014 valuation dates, the rates shown are with adjustment for the five-year phase-in of the increase in the employer contribution rates due to assumption changes from the 2011 experience study. The rates without adjustment for those years were 25.25%, 26.17%, 27.11%, and 28.88%, respectively.