

California Public Employees' Retirement System

2023 Annual Review of Funding Levels and Risks

November 2023



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Introduction

This report is intended to assist the CalPERS Board of Administration (board), participating employers and other stakeholders in assessing the soundness and sustainability of the Public Employees' Retirement System for ongoing pension plans. It does not address the Terminated Agency Pool or the 1959 Survivor Benefit Program, nor does it address the other systems (Judges' Retirement Systems, Legislators' Retirement System or the non-pension programs) administered by CalPERS.

The results presented in this report are based on the June 30, 2022 annual valuations, which have been projected forward to June 30, 2023 based on investment performance of 6.1% for the year ending June 30, 2023. Unless stated otherwise, current and projected results in the report are based on a long-term discount rate of 6.80% and the demographic assumptions reflecting the 2021 Experience Study.

The actual results based on the June 30, 2022 valuations are summarized in Appendix A.

This report focuses on:

- Reporting the current funded status of the system
- Reviewing prior and expected future funding progress.
- Identifying and quantifying investment risks
- Examining other system risks, such as high inflation and mortality
- Discussing risk mitigating activities for the system and employers

The report is organized into the following sections:

- **Funding Levels:** this section discusses the relationship between assets and liabilities for the Public Employees' Retirement System (PERS) and various sub-groups of the system. Current, historic and potential future funding levels are shown.
- **Identifying and Quantifying Investment Risks:** this section outlines the impact future investment performance could have on funding and contribution levels. This is of particular importance because investment performance has a large impact on pension funding and costs.
- **Key Non-Investment Risks:** this section addresses the potential impact of key non-investment risks (e.g., mortality, inflation, etc.) on the pension system. The topics in this session may change over time to reflect current and expected trends.
- **Managing Risks:** this section describes areas where risks may be managed. These include assumptions (e.g., expected investment return and inflation), amortization of costs as well as employers making additional payments to fund their pension plans.

Pension and investment beliefs adopted by the board that inform our work on risks and funding include the following:

Pension Belief 5: Funding policies should be applied in a fair, consistent manner, accommodate investment return fluctuations and support rate stability.

Pension Belief 9: Sound understanding, and deployment of enterprise-wide risk management is essential to the ongoing success of a retirement system.

Investment Belief 1: Liabilities must influence the asset structure. More specifically, ensuring the ability to pay promised benefits by maintaining an adequate funding status is the primary measure of success for CalPERS.

Investment Belief 9: Risk to CalPERS is multi-faceted and not fully captured through measures such as volatility or tracking error.

Executive Summary

With the slightly lower-than-expected investment returns for fiscal year (FY) 2022-23, the funded status of the system has increased modestly from 70.9% as of June 30, 2022 to an estimated 72% as of June 30, 2023 as a result of employers making their unfunded accrued liability (UAL) payments. Funded ratios vary somewhat among the different plans, with the plans for miscellaneous members generally having higher funded ratios than plans for safety members.

The recent decrease in funded status over the past couple of years has increased the risk that plans will fall to low funding levels. However, other factors including Additional Discretionary Payments (ADPs) have reduced this risk. Employer contribution levels are increasing primarily in response to the investment loss for fiscal year 2021-22. With the added economic stress due to inflation, and the possibility of a near-term recession, the ability of employers to continue making required contributions is an area of concern for the system and its members. However, with few exceptions, employers are currently up to date with their contribution requirements, and many are considering ADPs to improve their funded status and lower their overall costs.

The termination policies and processes currently in place should mitigate risk to the system. However, if an employer is under severe financial stress, the termination policies do not fully protect the benefits of members that have served that employer. Ultimately, the members' benefits are only secure if the employer continues to make the required contributions.

All actuarial assumptions and methods are based on the latest Asset Liability Management (ALM) process and associated Experience Study. These include a discount rate of 6.8%, an inflation assumption to 2.3% and a payroll growth assumption to 2.8%.

Recent and current increases in the Consumer Price Index (CPI) are expected to have an impact on the pension liabilities in future actuarial valuation reports for both retirees (due to cost of living increases) and the active members (due to future salary increases).

This report illustrates the impact of recent events on the retirement system and projects the possible impacts of various factors that are possible in the future. While there is no immediate concern regarding the system's ability to pay required benefits, the possibility of unfavorable events in the near future, such as continued high inflation, and the possibility of an economic recession, lead to concerns that required employer contributions could rise to levels that would be challenging for employers. Understanding these risks and opportunities to manage them is the main focus of this report.

Funding Levels

CalPERS is a conglomeration of multiple plans and several risk sharing pools. While it is informative to review actuarial results of the system as a whole, it is also important to understand that individual “plans” within CalPERS have unique funded status and required contribution results. In general, the assets of one plan are not shared with any other plan.

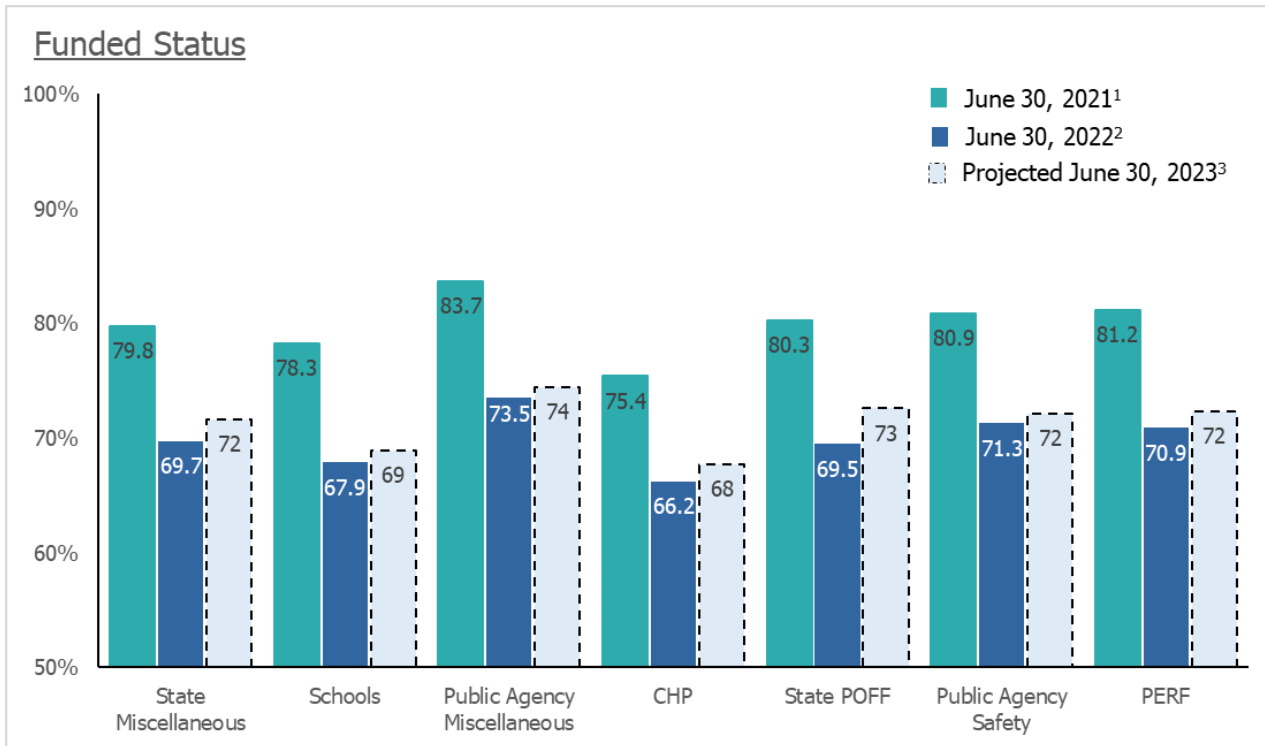
In this section we will discuss current valuation results for the system as a whole, as well as results for various member sub-groups of the system. In addition, a summary and analysis of funding results over the last 10-years as well as results expected during the next 10-years is also provided. This information helps illustrate the effectiveness of the current funding methods as well as the impact of unexpected experience on the funding levels of the system.

More detailed funding results can be found in the appendices as well as on the CalPERS website at <https://www.calpers.ca.gov/page/employers/actuarial-resources/summary-valuation-results-overview>.

Current Funding Levels

The overall level of funding of the system has been quite volatile over the last 2-3 years. Strong investment performance during the fiscal year ending June 30, 2021 significantly improved asset values. However, the following fiscal year ending June 30, 2022 saw decreases in asset values due to the FY 2021-22 poor investment return. The investment performance for the year ending June 30, 2023 was just under the expected return of 6.8%. The preliminary return was communicated as 5.8% for the previous fiscal year. However, the return reflecting the 4th quarter results for private and real assets was later determined to be 6.1%.

The chart below shows the funding levels of the various components of the Public Employees’ Retirement Fund (PERF) as of June 30, 2021, June 30, 2022, and estimated results as of June 30, 2023. Estimates as of June 30, 2023 were based on asset values as of June 30, 2023 and liabilities rolled forward from the most recent valuation date of June 30, 2022 to June 30, 2023.



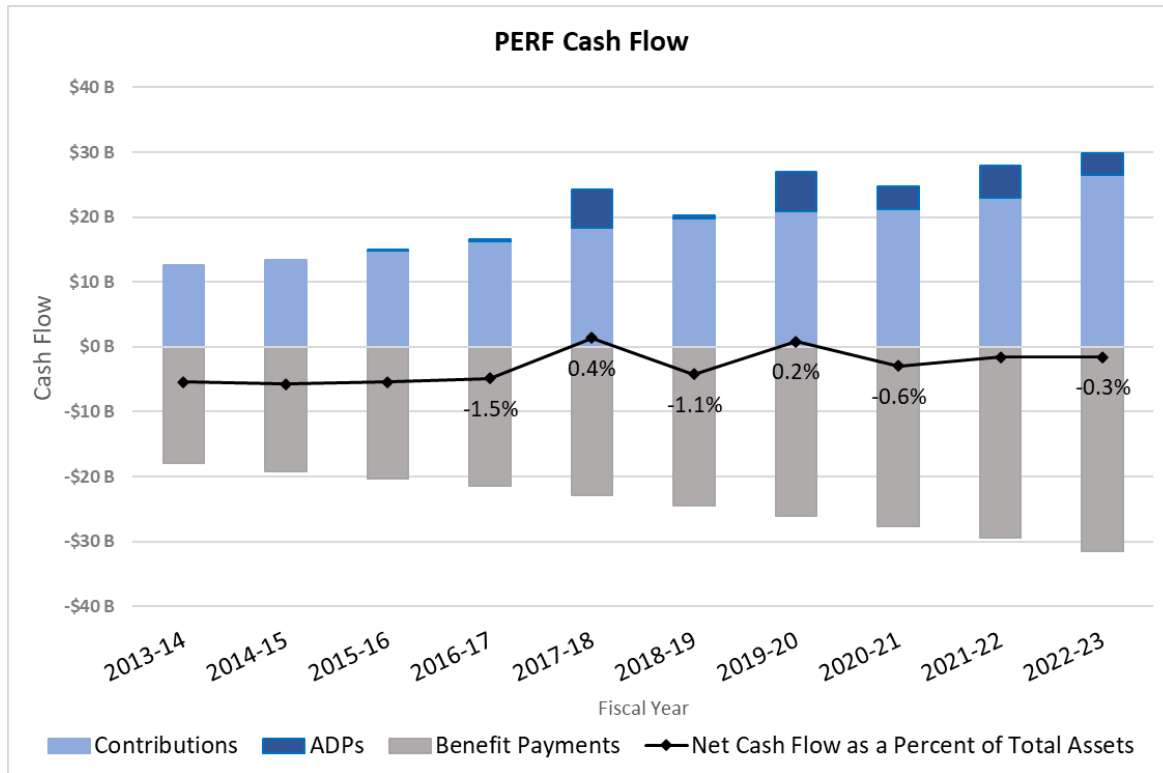
¹June 30, 2023 projected funded status based on an investment return of 6.1% for FY 2022-23.

The chart above shows that the funded status decreased significantly between June 30, 2021 and June 30, 2022. This was due to an investment return during that year of -7.5%. Based on the results of the funding valuations as of June 30, 2022, the overall funded ratio of the PERF was about 71% and the estimated PERF funded ratio as of June 30, 2023 is 72%.

10-Year Funding History

A review of funded status and cash flow results during the prior ten years provides valuable information regarding the operation of the system. The charts below provide a 10-year history of results for the system as a whole. As mentioned previously, all results shown are the aggregation of individual plan results.

The chart below provides a 10-year history of contributions including ADPs into the system and benefit payments out of the system.



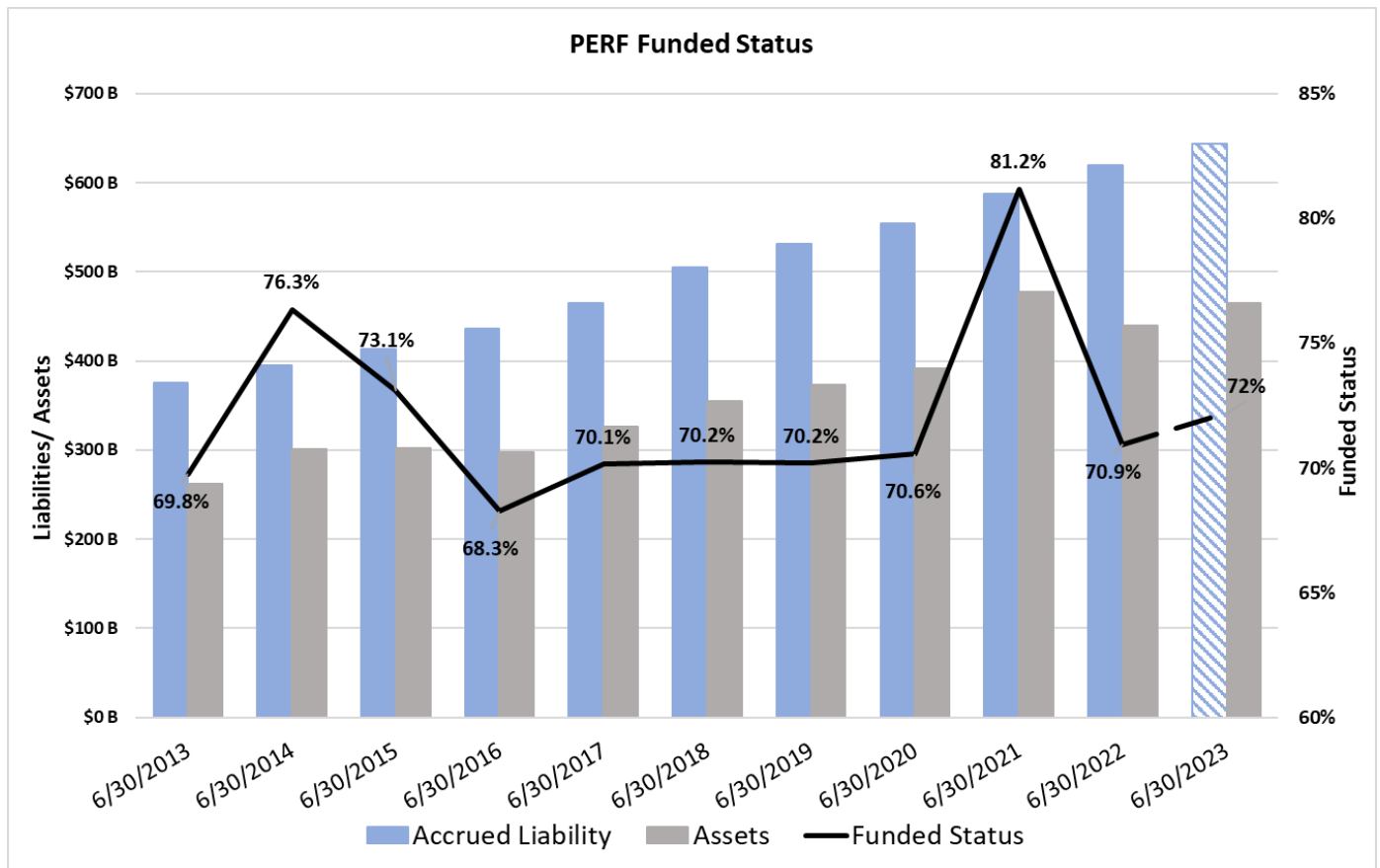
As shown in the chart above, benefit payments consistently increased during this period. This is expected to continue into the future. However, as more PEPRAs members retire, these increases will be somewhat muted.

Actual contributions made over this period also generally increased from one year to the next. While contribution dollars are expected to increase somewhat each year due to payroll increases, contributions during this period also increased due to investment losses and changes to actuarial assumptions. Significant ADPs were made in some years as shown above in the dark blue boxes. These ADPs also increased the net cash flow in those years. The two years during which net cash was positive were the result of ADPs.

In a prefunded public retirement system, net cash flow generally starts out positive in the early years of the system but becomes negative at some point as the system matures. This is an expected outcome of

prefunding and generally not a result to attempt to correct. However, projected levels of negative cash flow should be understood so that invested assets can be managed to maintain the necessary level of liquidity to pay benefits without harming the overall performance of the fund.

The chart below shows that the funded status of the system has varied from year to year, increasing in some years and decreasing in others. Year-to-year changes are primarily the result of investment gains/losses. However, other factors include changes to actuarial assumptions, non-investment gains/losses, and payments made by employers to pay-down existing UAL. While employers have required minimum payments toward UAL as set by the CalPERS amortization policy, ADPs can also be made.



The ending funded status of 72% as of June 30, 2023 is not considerably higher than the funded status at the beginning of the period of 69.8%. Factors that can result in slower improvement in the funded status include, unfavorable investment or non-investment experience, lack of sufficient contributions to pay down UAL, or changes in actuarial assumptions. During this period, investment and non-investment experience was reasonably close to expectations (on average), and employers made all actuarially determined contributions including required payments toward UAL.

The factor having the greatest impact on the funded during this period was changes to actuarial assumptions, especially the lowering of the discount rate from 7.5% to 6.8%. In addition, even though the average investment return for the prior 10-years was 7.1%, there was a larger amount of investment losses than investment gains during this period. This is primarily due to two factors, 1) the expected return at the beginning of this period was 7.5% and was gradually reduced to the current 6.8%, and 2) the timing of individual gains and losses, for example the largest of the investment losses occurred late in this period on a relatively high amount of assets. So, while it was not the predominant factor, investment losses over this 10-year period also led to overall reductions in funded status and increases in employer contribution rates.

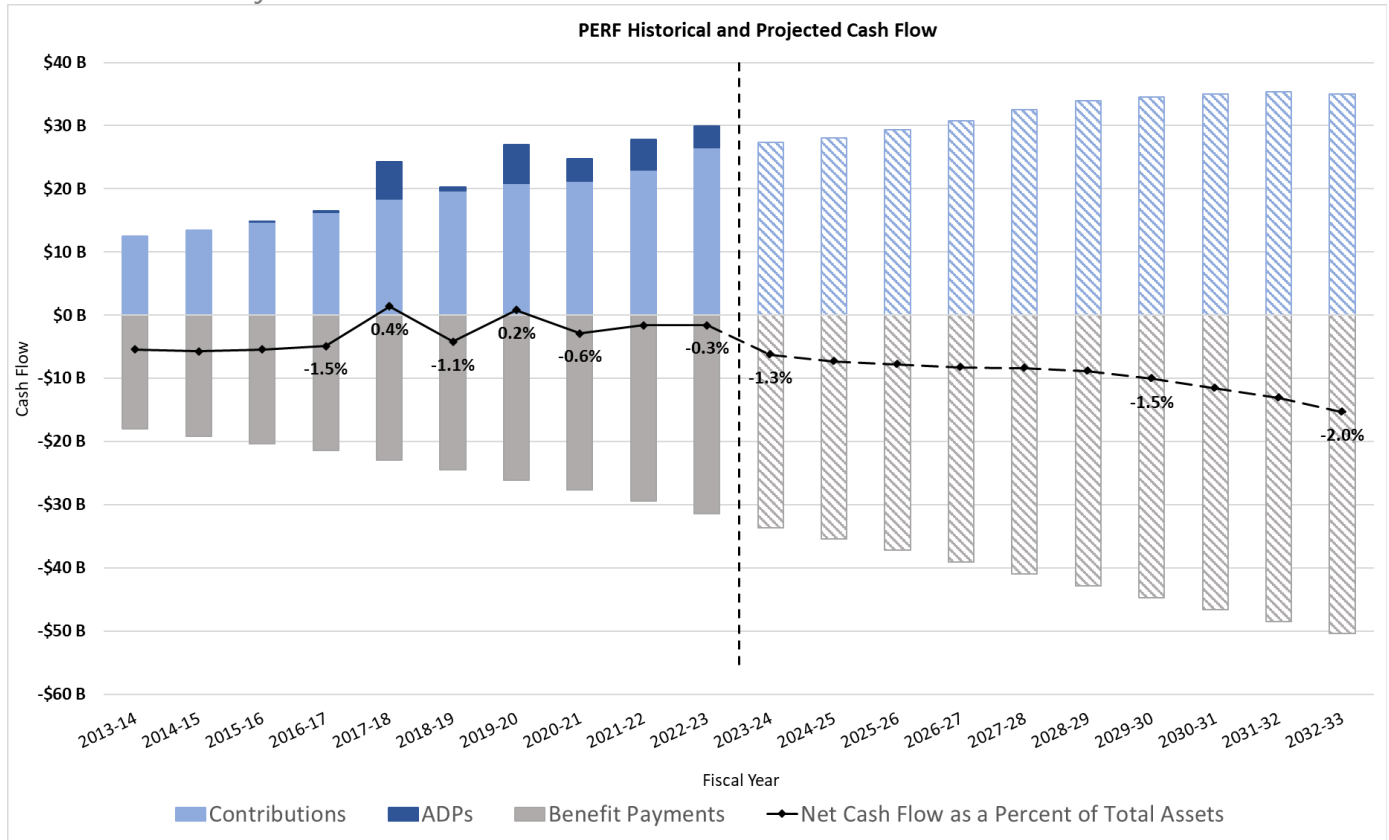
While a change to the discount rate impacts neither the current level of assets nor the amounts of future benefits expected to be paid, it resets the funding target and therefore immediately changes the funded status.

Knowing what we know today regarding the actual investment experience over the past 10-years and the current projection of returns going forward of 6.8%, this period's starting funded status (measured with a 7.5% discount rate) would be remeasured today as being much lower than 69.8%. Therefore, the actual improvement in funded status due to employer contributions over this period is obscured by funding level decreases caused by assumption changes.

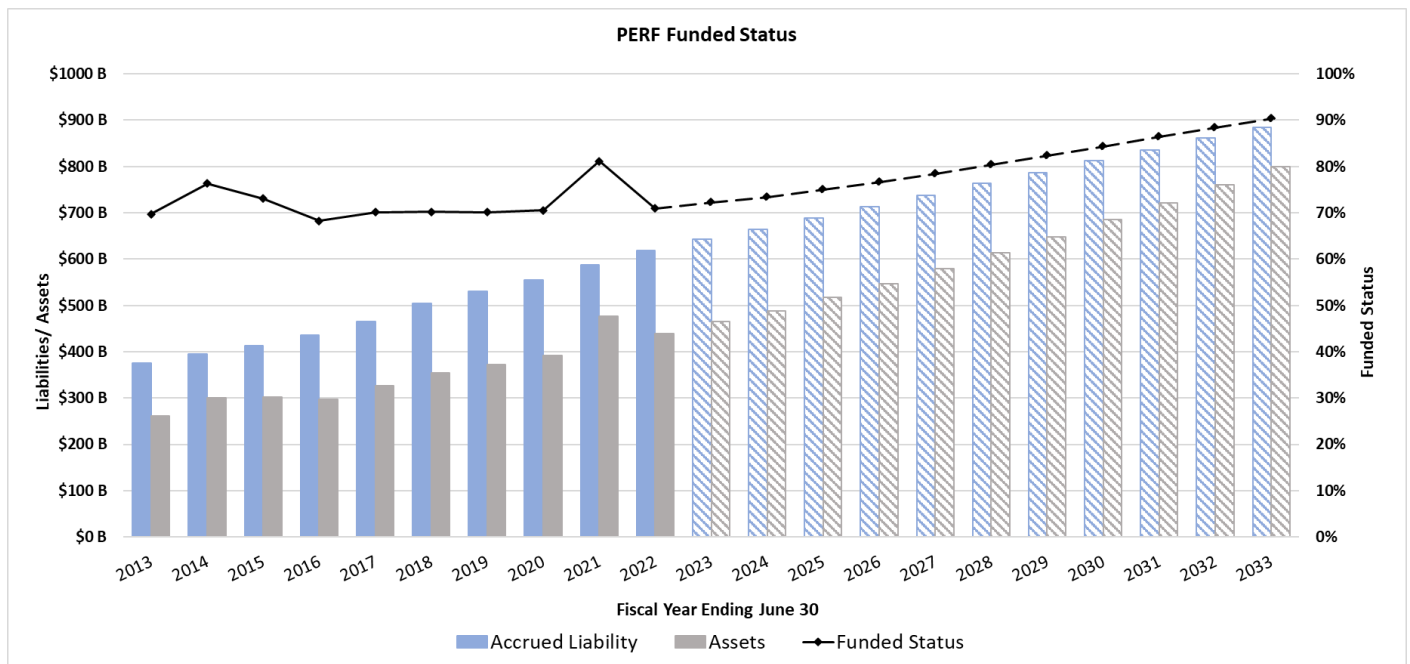
Funding Projections

Assuming all future experience exactly matches the current actuarial assumptions, cash flows and funded status projections for the next 10-years are provided in the charts below.

Historical and Projected Cash Flow



Historical and Projected PERF Funded Status



While benefit payments are expected to continue to increase in a relatively consistent fashion, contribution increases are expected to moderate over the next ten years with decreases expected toward the end of this period. This is due to decreasing projected payments toward UAL as plans become better funded. Lower future contributions are expected to increase negative cash flow as shown above. However, as stated previously, this is an expected result.

Projected results assume no ADPs by employers over the next 10-years. Any such payments would result in faster improvement in the funded status and reduce negative cash flow in those years.

During the previous 10-years, there was only modest improvement in the funded status of the system primarily because of necessary changes to actuarial assumptions and investment losses. While there is no evidence to suggest the need for material changes to any non-investment assumptions in the next 10-years, it is possible the system could experience decreases to the expected investment return and discount rate.

Absent any changes to actuarial assumptions, provided future experience matches the current assumptions and employers continue to make required annual contributions, it is expected the funded status will improve by 15-20% over the next 10-years. An additional reason for potentially faster improvement during this period is the continued phase-in of the current amortization policy which somewhat accelerates the pay down of UAL.

Funded Status - Termination Basis

The term "funded status" as used in the previous charts, is the funded portion of the funding target determined annually for each plan in the actuarial valuation process, reflecting all the actuarial assumptions and methods adopted by the Board of Administration for funding purposes. Alternate funding methods and assumptions yield different funding targets and therefore different funded status results.

If an agency elects to terminate its contract with CalPERS, the employer is required to contribute the amount necessary to fully fund the plan. However, for this purpose, the funded status of the plan is determined using different actuarial assumptions and methods. Since the employer will no longer be obligated to make up any shortfalls in investment return (or due to other economic or demographic events), CalPERS funds the terminated agency pool on a much more conservative basis to ensure that the affected members' benefits are secure. With the funding of terminated plans based on fixed income assets, the termination discount rate depends on actual market rates of return for such assets on the date of termination. Such rates are lower than the ongoing 6.8% discount rate used for funding purposes (currently around 4.50%) and result in a lower funded status for CalPERS plans. A typical CalPERS plan that is currently 70% funded based on a 6.8% discount rate, would be around 50-55% funded based on current termination rates. This indicates some additional risk to public agency members, in the form of potential benefit reductions, if their employer were to terminate their plan and be unable to make the required final contribution to fully fund the plan.

PEPRA Impacts on Funding

The California Public Employees' Pension Reform Act (PEPRA), which took effect in January 2013, changed CalPERS retirement benefits, and placed compensation limits on new members.

In general, as defined by PEPRA, a new member includes:

- A new hire who joins CalPERS for the first time on or after January 1, 2013, and **who has no prior membership** in another California public retirement system.
- A new hire who joins CalPERS for the first time on or after January 1, 2013, and who was a member of another California public retirement system prior to that date, but **who is not subject to reciprocity** upon joining CalPERS.

All members who don't fall into the definitions above are considered classic members. Classic members will retain the existing benefit enrollment levels for future service with the same employer.

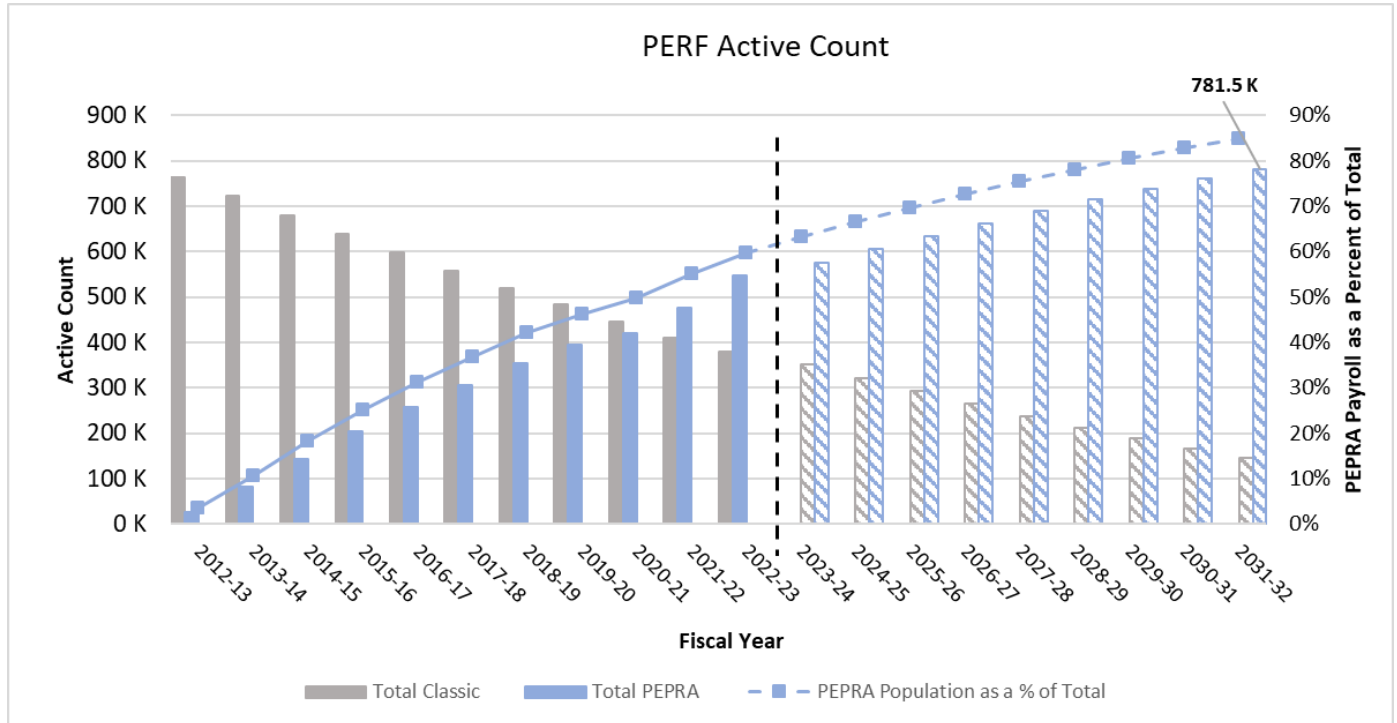
Changes to pension benefit provisions include:

- Generally later retirement eligibility provisions
- Lower benefit multipliers in some cases
- A cap on the compensation used to determine pension benefits
- Member contributions equal to roughly half of the estimated cost of benefits

One of the objectives of PEPRA was to improve the ability of employers to manage the costs of retirement benefits for their members. Due to legal limitations that make it difficult or impossible to change benefit provisions for existing active or retired CalPERS members, if benefit reductions are necessary to align benefit costs with employers' ability to fund them, such changes can only be made for future members of the system. While such changes can reduce future benefit costs in a meaningful way, the full impact on employer contributions can take decades to materialize.

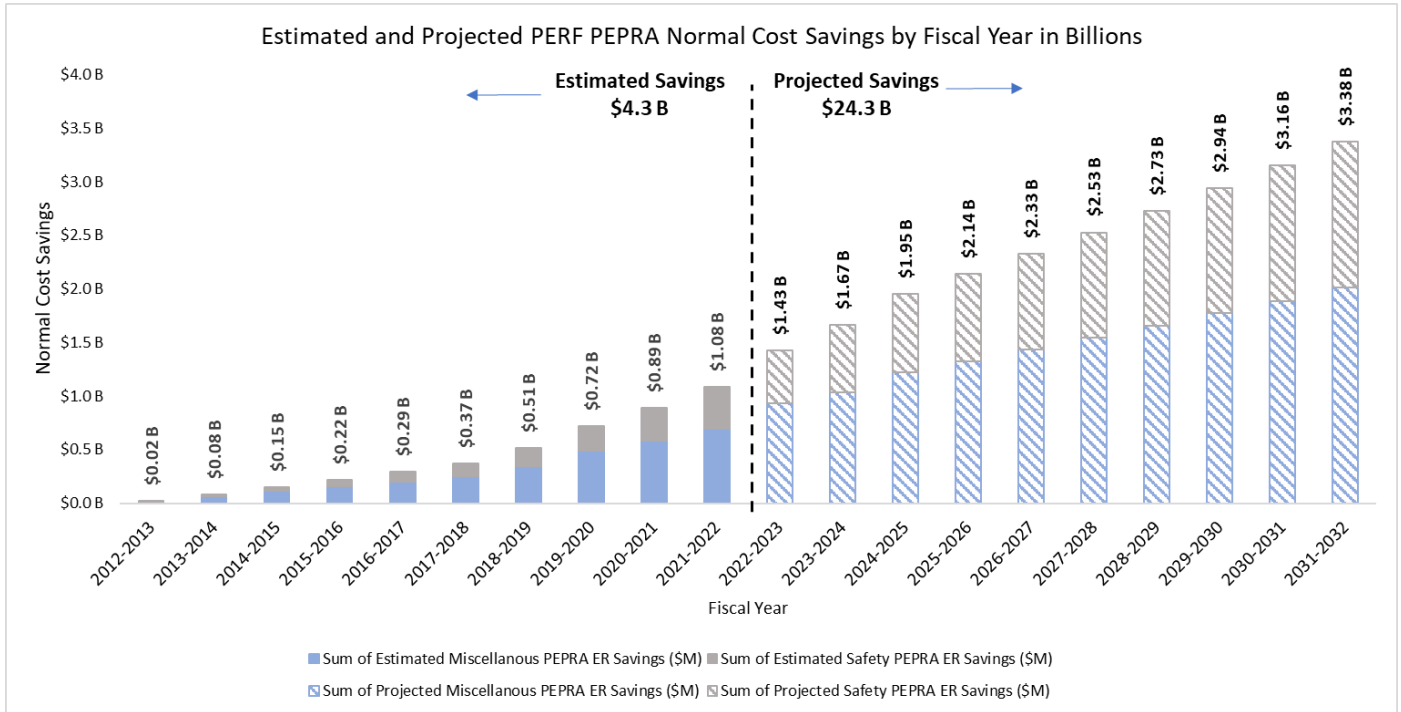
PEPRA has been in effect for roughly 10-years. The progression of PEPRA members within CalPERS over the last 10-years, as well as the corresponding impact on employer costs are explored in this section.

As Classic members terminate or retire, they are generally replaced by PEPRA members. Over the last 10-years, the percentage of PEPRA members out of the entire active member population has continued to grow. This is expected to continue until all active members are subject to the rules and provisions of PEPRA. The chart below illustrates this progression.



Since the pension benefit changes applied only to new hires, there was no immediate impact on the funded status of the system upon adoption. However, reductions to employer contributions did begin immediately after adoption. As members were hired that were subject to the provisions of PEPRA, required employer contributions for pre-funding the retirement benefits of these members were adjusted downward to reflect the lower cost of these benefits. In addition, new member contribution rates for these PEPRA members also took effect immediately. Over the last 10-years, as more and more PEPRA members were hired, employer cost savings continued to grow.

The chart below provides the estimated annual reduction in employer normal costs since the effective date of PEPRA through today, as well as projected savings for the next 10-years. The accumulation of these annual normal cost reductions can be thought of as the employer cost savings attributable to PEPRA.



It is impossible to know the exact financial impact of PEPPRA on employers, as the cost of the system if PEPPRA had not been implemented can never be known. Estimates provided here represent the decrease in employer normal costs due to lower cost benefits and increased member contributions.

While total contributions into the system began to decrease immediately with PEPPRA, the impact on actual benefits paid to retirees developed more slowly. Even today, the portion of annual benefits paid from the system attributable to PEPPRA members is very low. As shown previously, negative cash flow for the system is expected to grow over the next . This is partially due to a larger decrease in contributions than benefit payments due to the phase-in of PEPPRA. Eventually all active and retired members will be PEPPRA members, and contributions and benefit payments will stabilize at "PEPPRA" levels, as opposed to "Classic" levels. However, even at that point, it is expected that total benefit payments will exceed contributions, such that negative cash flow will continue to exist.

Over the last 10-years since PEPPRA's effective date, employer costs have been reduced by \$4-5 billion. However, as illustrated above, expected cost savings over the next 10-years are expected to be roughly 5 times the savings in the previous 10-years.

Identifying and Quantifying Investment Risks

This section looks at risks to the retirement system and members due to future investment performance by focusing on three key risk considerations:

1. The funded status and probability that it will fall to very low levels.
2. The risk of increasing contributions due to lower-than-expected average investment returns.
3. The possibility of high contribution increases in a single year due to investment “shocks”.

These risks were evaluated in connection with alternate investment scenarios. Other factors can impact the risks of the system but generally not to the same extent as investment returns. However, longevity and high near-term inflation are potentially material risks. Longevity refers to the potential of an individual to live longer than anticipated. This could be due to medical advancements, lifestyle choices and genetics, all of which have an impact on one’s lifespan and increase the cost of projected benefits. These risks are discussed separately in later sections of the report.

Shared Risk

Member benefits are paid through the combination of CalPERS investment returns, required employer contributions, and member contributions. While there is a legal requirement for the employer to make the full contribution needed to fund the plan, in extreme circumstances the employer may be unable to do so. In these situations, the employer’s financial hardship can become a direct risk to the members and their benefits.

The risks borne by the employers (primarily investment risk) can impact their ability to make required CalPERS contributions. Investment and actuarial policies adopted by the board are always adopted with the purpose of maintaining benefit security for members.

By focusing on the risks to the soundness and sustainability to the overall system, CalPERS can take steps to mitigate risks to both members and employers. Ultimately, pensions are a shared responsibility between members and employers.

Risk of Low Funding Levels

When the funded status of a plan is low, the required employer contributions can become quite high. If required contributions exceed the amount that an employer is able to pay, there is a possibility the employer’s CalPERS contract will be terminated, which can lead to benefit reductions for members of that plan. Many CalPERS plans are less than 100% funded as of June 30, 2023. This is not a significant cause for concern provided employers continue to make the actuarially determined required contributions. While there is no specific funded status that indicates a retirement plan and its members are in jeopardy, plans

that fall below 50% would likely have short-term required contributions that would strain the employer’s budget.

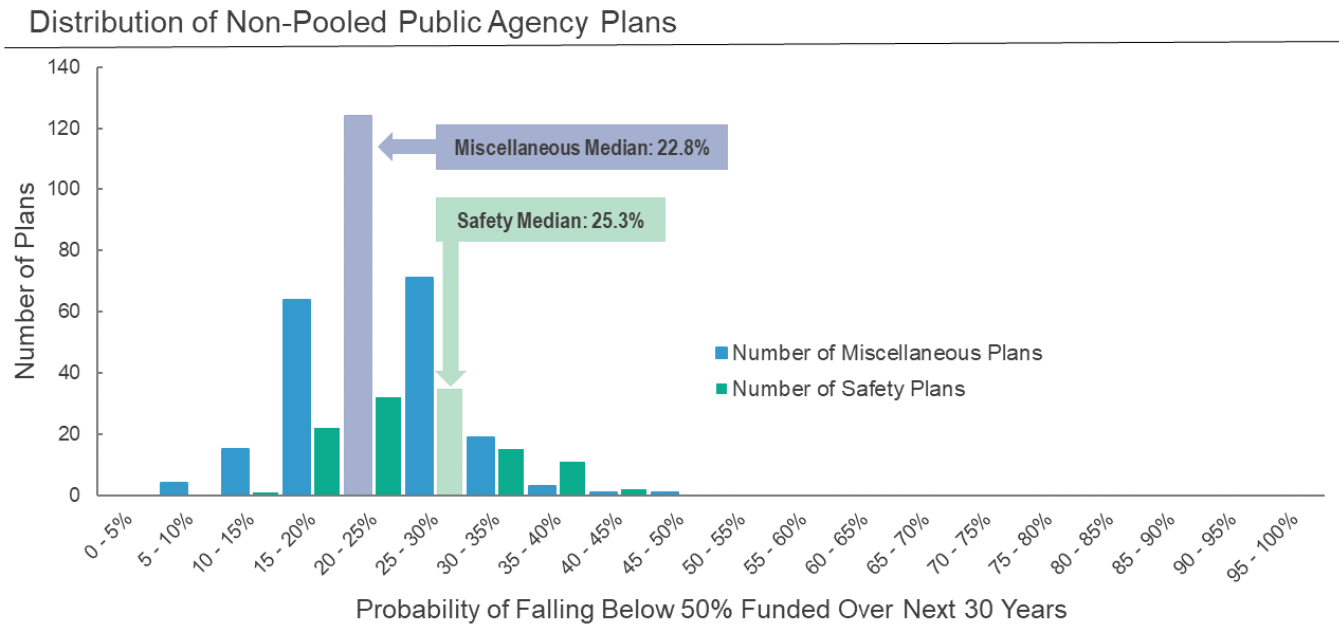
The likelihood that a plan falls below 50% funded in the future can be estimated with “Stochastic Modeling”. With this type of modeling, alternate future investment scenarios are used to create projected future funded ratios. The results provided in this section are based on the outcomes of 5,000 alternate investment scenarios for all future years provided by the investment office.

Alternate investment return scenarios were developed based on the expected returns and standard deviations of each of the asset classes in the PERF. Assumed correlations along with a covariance matrix between asset classes are also reflected.

Based on stochastic modeling, the State Miscellaneous Plan has a 20.0% probability of falling below 50% funded at some point over the next 30 years. For the School's Pool, the probability is 20.3%. While many factors contribute to these results, the recent investment loss during the fiscal year ending June 30, 2022 was a primary factor in increases to these percentages. Notably, additional contributions by the state reduced the probability for the State Miscellaneous Plan.

The probability of falling below 50% funded status for CalPERS public agency plans is illustrated in the chart below. The chart shows the numbers of non-pooled plans within various probability ranges of falling below 50% funded. (Pooled plans are expected to have similar results.) For example, 124 miscellaneous plans have a 20%-25% probability of falling below 50% funded over the next 30 years.

Probability of Falling Below 50% Funded (at any point in next 30 years)



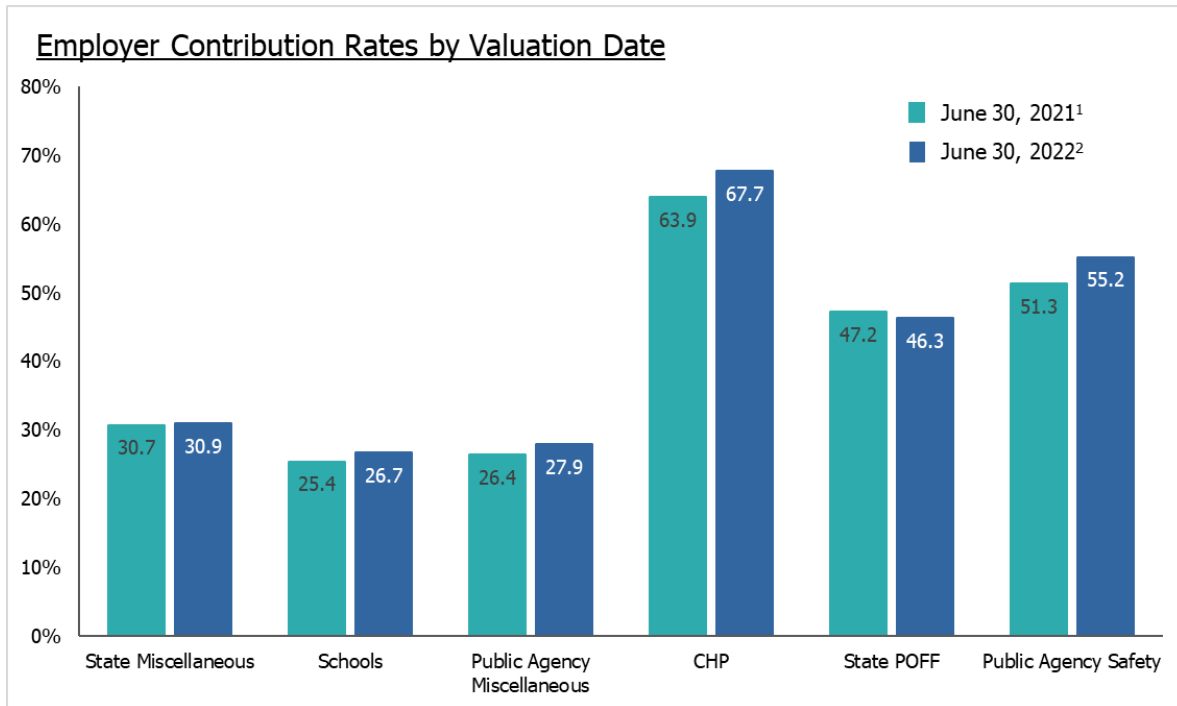
Lower Than Expected Average Investment Returns

While it is believed that the current investment policy and asset allocation will result in average long-term geometric returns of approximately 6.8%, future average returns may be higher or lower. It is also believed that there is an equal likelihood that long-term average returns will be either greater than or lower than 6.8%. Average future returns of greater than 6.8% pose little risk to the system. However, since required contributions for PEPRA members reflect the current 6.8% assumption, it could be considered that PEPRA members overcontributed if the fund earns greater than 6.8% on a long-term basis.

Returns in any year that are lower than the assumed 6.8% result in increases to employer contributions. High employer contribution rates impose significant financial stress and may increase the risk that employers will default and be unable to make their required contributions. Since future employer contributions are one of the funding sources for the benefit payments, a default by the employer would result in increased risk to the members' benefits. The level of financial stress associated with any particular level of contributions will differ by employer.

Current State

Current contribution levels or average contribution levels for public agency plans are shown in the table below. As shown below, employer contribution levels are relatively high, especially for safety plans. Actions to reduce the probability of low funded status or contribution volatility generally result in increases in the contribution levels. It is difficult to assess just how much strain current contribution levels are putting on employers. However, evidence such as collections activities, inquiries regarding extensions to amortization schedules and information regarding termination procedures indicate that some public agencies are under significant strain.



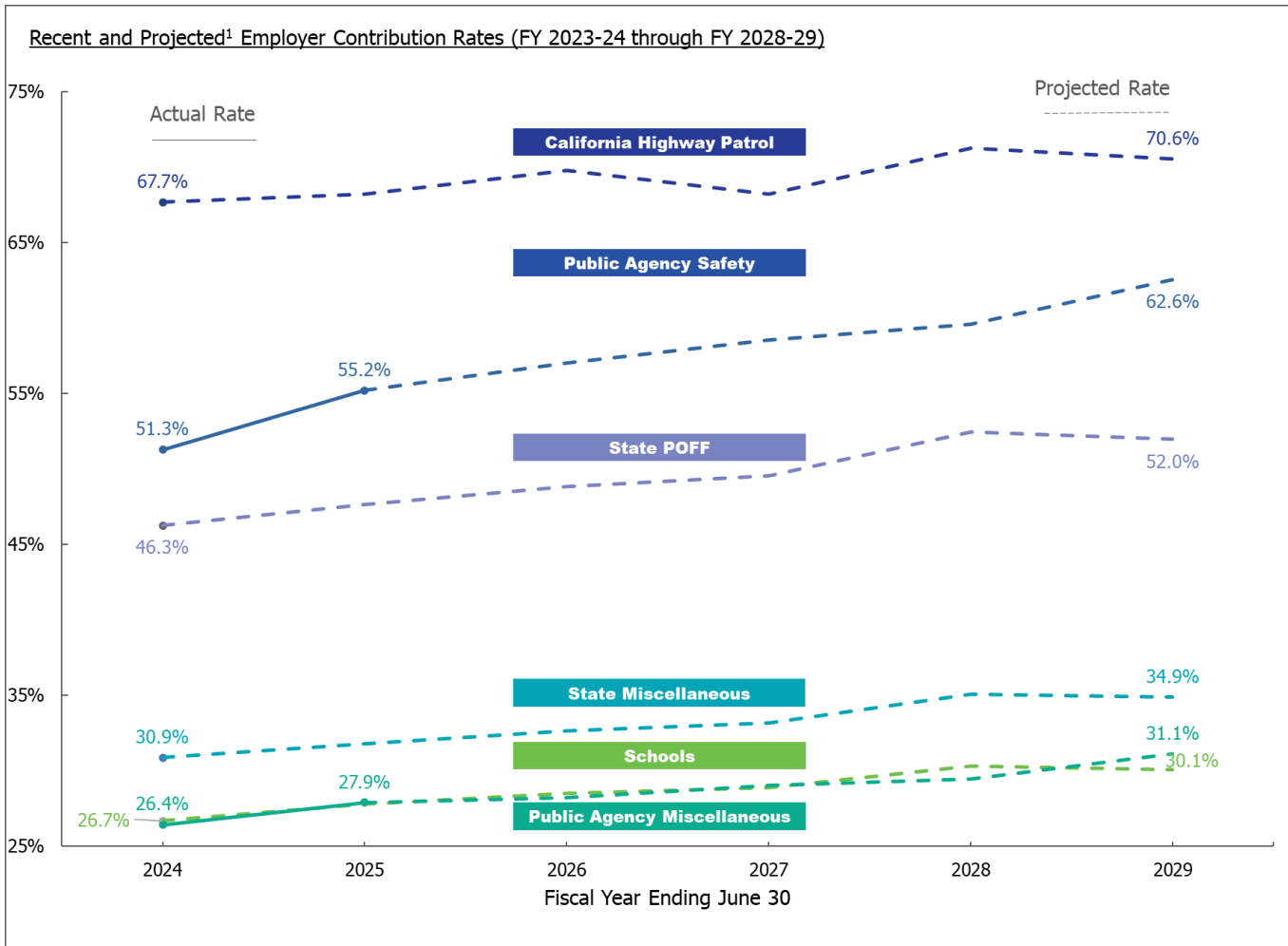
¹June 30, 2021 valuations for state plans and the schools pool set FY 2022-23 rates and set FY 2023-24 rates for public agencies.

²June 30, 2022 valuations for state plans and the schools pool set FY 2023-24 rates and set FY 2024-25 rates for public agencies.

Note, for the above chart the results for Public Agency plans were determined by summing the required dollar contributions for each plan and then dividing by total payroll for all plans.

Expected Future State

Below are projected employer contribution requirements (expressed as percentage of payroll) based on the June 30, 2022 actuarial valuation results projected forward with an investment return of 6.1% for FY 2022-23 and assumed annual investment returns thereafter of 6.8%.



¹FY 2023-24 state plan and schools pool rates are actual. FY 2023-24 and 2024-25 public agency rates are actual.

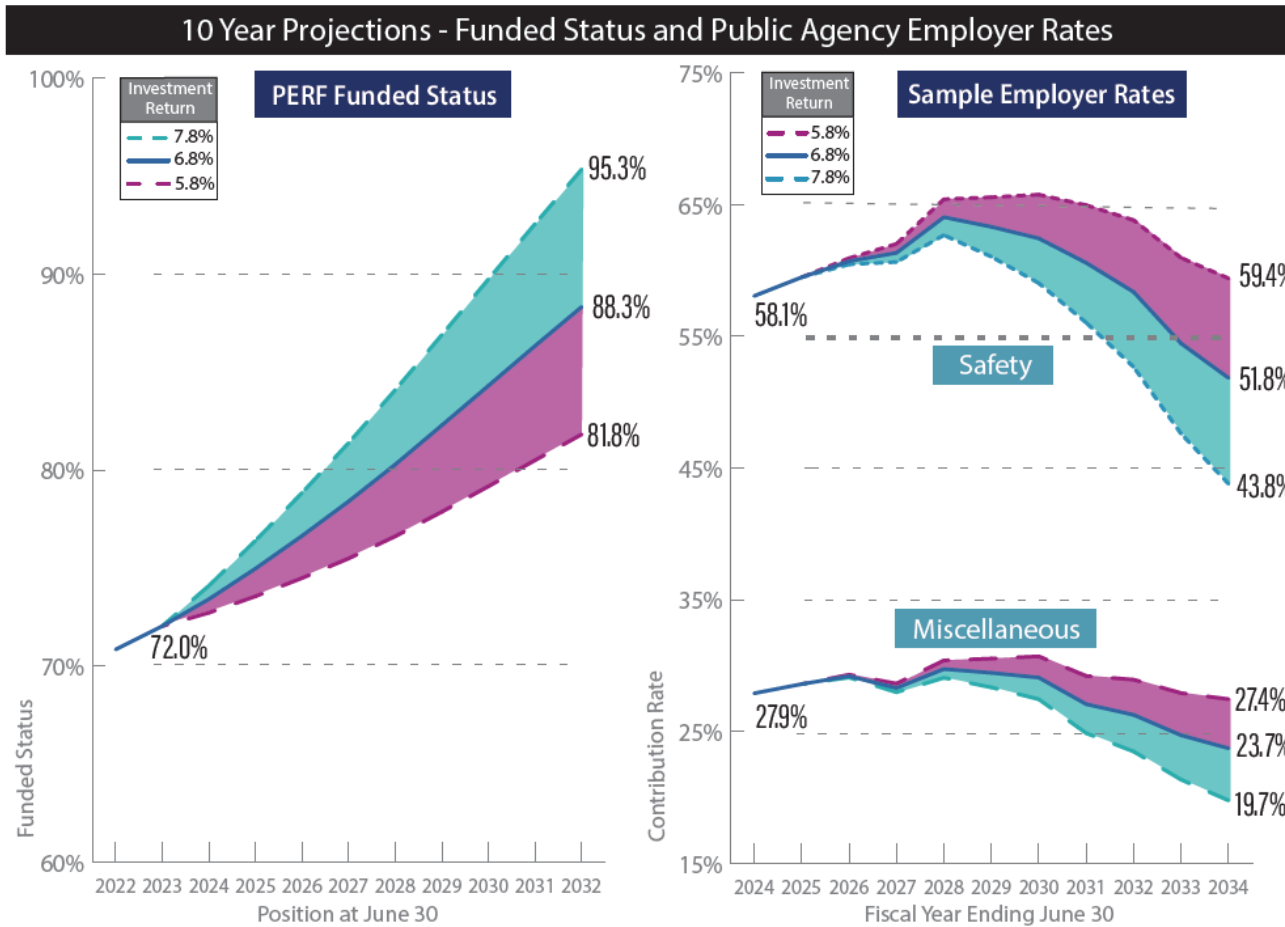
Alternate Investment Scenarios

To the extent future experience deviates from the actuarial assumptions, adjustments are made to the UAL position which result in required contribution increases or decreases from present levels. The factor that is likely to have the largest impact on future contribution requirements is the investment return of the PERF. While actual plan experience in other areas such as mortality, inflation, rates of retirement, pay changes, etc., also impact required contributions, these factors are typically not as volatile as investment return.

The expected long-term investment return of the PERF is 6.8%. If the actual returns every year in the future were 6.8%, the following are expected to occur:

- Required employer contributions would continue to increase over the next few years while the full costs of recent investment losses are being phased in.
- In approximately five years, required employer contributions are expected to decrease. This is due to two separate factors:
 1. the continual decrease in normal cost as Classic members retire or terminate and are replaced by PEPRA members, and
 2. current required payments toward existing unfunded accrued liability bases will be gradually eliminated as individual UAL bases are fully paid-off.
- In the long-term, required employer contributions will trend toward the employer portion of the normal cost.
- The funded status of all plans would gradually increase to around 100% over the next 20 to 25 years.

The charts below provide the projected funded status of the PERF and sample employer contribution rates for a public agency safety and miscellaneous plan over the next ten years reflecting the assumed 6.8% annual investment return, with alternative annual investment returns of 5.8% and 7.8% to demonstrate the sensitivity of the PERF and the plans to future investment returns.



Over longer periods of 20 years or more, chances are greater the average return will be closer to the expected geometric average of 6.8%. However, based on the current allocation of assets and the expected volatility of the various asset classes, there is a significant possibility that the average return over the next 10-years will fall outside of the range illustrated above of 5.8% to 7.8%.

Investment Shocks

Over periods shorter than 20 years or single year periods, the likelihood of varying from the 6.8% expected return is even greater. For example, there is roughly a 16% chance that in a single year, the investment return will be lower than -4.4% and a 16% chance that it will be greater than 18.0%. These returns are one standard deviation lower and higher than the expected return of 6.8%. So, while it is more likely that any

single year return will be between -4.4% and 18.0% (68% probability), the chance of falling outside this range for one year is not insignificant.

A two standard deviation higher or lower return is much less likely but does have roughly a 5% chance of occurring. The two standard deviation range is -15.6% to 29.2%. Or said another way, a return between -15.6% and 29.2% in any given year has a probability of around 95%.

While such "shock" returns are possible and do occur, history has shown that market corrections in the opposite direction typically occur over the next few years. However, such corrections are certainly not guaranteed.

The chart below provides the impact of various "shock" returns in the year ending June 30, 2024 with no assumed future correction. The purpose of the chart is to illustrate the potential impact of a single very good year or very bad year of investment return.

As demonstrated in the chart, funded status is impacted immediately and significantly while changes to required contributions happen more gradually due to the 5-year phase-in of the impact of investment gains and losses. The 5-year phase-in would allow time for a possible correction to occur which would then begin to have the opposite effect on future contributions.

Hypothetical Investment Return Scenarios - Funded Status and Public Agency Employer Rates



Key Non-Investment Risks

Mortality

The ultimate cost of a CalPERS members benefit depends on many factors including how long the member lives after retirement. For centuries, life expectancy has been consistently increasing. CalPERS actuaries study the mortality rates of its members, as well as national rates and use this information to project mortality rates into the future. If on average, members live longer than what is projected by the mortality rates used in the actuarial valuations, the cost of benefits increases. This results in downward pressure on funded status results and upward pressure on contribution rates.

As of the publication of this document, there have been more than 100,000 COVID-19 related deaths in California. While many of these deaths have been among older individuals, deaths have occurred at younger ages as well. The impacts of the pandemic in California began early in the 2020 calendar year. During this relatively short period of time, impacts of the pandemic on the economy, public health and workplace norms have been significant but there remain unknowns regarding the potential long-term impacts to CalPERS.

COVID-19 Impacts

The pandemic altered the experience of the retirement system in several different areas. These include, investment returns, inflation, deaths, retirements, terminations, disability retirements, pay increases, etc. Material impacts on the demographic results of the system are as follows:

- More deaths than expected over the last few years (roughly 10-15%)
- More retirements occurred than expected in the school's pool and within public agency plans.

While there were a significant number of additional deaths over the last few years, presumably due primarily to COVID 19, the impact on the liabilities of CalPERS plans has been less. Many of these "additional" deaths were among older retirees and therefore liability gains measured in recent valuations were less material than if deaths occurred among younger retirees. We expect to see similar results in the June 30, 2023 valuations.

During the pandemic several employers utilized budget management tools such as golden handshakes, furloughs, pay decreases and staff reductions to reduce short-term spending. There are risks to these tools and it remains of utmost importance that employers use appropriate due diligence.

Long-term COVID-19 Questions

- Will viruses like COVID-19 be more common in the future?
- Will COVID-19 survivors and those that experience Long Covid have a higher likelihood of earlier death or disability?
- Will increased handwashing, masks, and social distancing practices lower the risk of existing diseases and therefore improve future mortality?
- Will changes in work patterns (e.g., increased teleworking) change the frequency of job changes?
- Will high interest rates and forecasts of slower economic growth persist and reduce the long-term expected return on plan assets?

These questions will be examined in the November 2025 experience study which will also analyze their impact to the pension system and provide us with enough credible experience to determine if changes are needed to the demographic assumptions. However, the demographic impacts of COVID-19 over the last few years will add complexity and uncertainty to the selection of assumptions in the next Experience Study.

Inflation

Over the last few years, inflation has been significantly higher than the CalPERS long-term assumption of 2.3%. As a result, the most recent actuarial valuation of CalPERS plans as of June 30, 2022, showed most of our plans experienced actuarial losses attributable to inflation. These losses were directly related to higher-than-expected Cost of Living Adjustments to retiree benefits and in some cases, higher than expected pay increases to active members. Losses varied somewhat from plan to plan, but in aggregate amounted to roughly 2% or less of existing CalPERS benefit liabilities. Losses attributable to higher inflation or any other factor, result in increases to required employer contributions, but not increases to PEPRAs member contributions.

The determination of member benefits can be impacted by other factors that are tied to inflation. One such factor is the compensation limit that applies to most PEPRAs members. Increases to this pay limit due to higher inflation can increase both employer and PEPRAs member contributions. In addition, certain federal limits that apply to qualified retirement plans are also impacted by inflation. These include limits on monthly benefit amounts. However, the impact of the IRS monthly benefit limits is to cap benefits paid from the PERF with the difference in benefits being paid by the Replacement Benefit Fund (RBF). Therefore, higher increases to this federal limit due to higher near-term inflation will generally simply result in a different allocation of costs between the PERF and RBF.

While recent inflation has been higher than anticipated, long-term estimates continue to be in-line with CalPERS long-term assumption of 2.3%. However, inflation for the year ending June 30, 2023 continued to be higher than the 2.3% assumption. The impacts of this will be quantified in the June 30, 2023 actuarial valuations scheduled for completion in August 2024.

Salary increases due to high inflation can be difficult to predict due to other factors such as budgeting constraints of the employer and the bargaining cycle. Individual employers are in a better position than CalPERS to estimate the impact of future salary increases.

Retiree COLAs, on the other hand, are calculated by CalPERS, and we can say that in the June 30, 2022 actuarial valuation, the April 2022 COLA caused the accrued liability to increase about 1% more than expected. Due to the amortization policy, a liability loss of 1% or less can be absorbed by most ongoing agencies without impacting services. The April 2023 COLA, which was based on 8% annual inflation the prior year, will have a similar impact in the June 30, 2023 actuarial valuation, but the impact will vary based on the COLA provision and whether the agency participates in a risk pool. The following table shows the estimated actuarial loss, as a percent of retiree accrued liability, for the various employers.

Plan Type	Estimated Increase in Retiree Accrued Liability as of June 30, 2023 due to 2023 COLA
Non-pooled Public Agencies	
2% COLA Provision	< 0.5%
3% COLA Provision	4.1%
4% COLA Provision	4.8%
5% COLA Provision	5.3%
Pooled Public Agencies	
Miscellaneous	0.7%
Safety	< 0.5%
State	< 0.5%
Schools Pool	< 0.5%

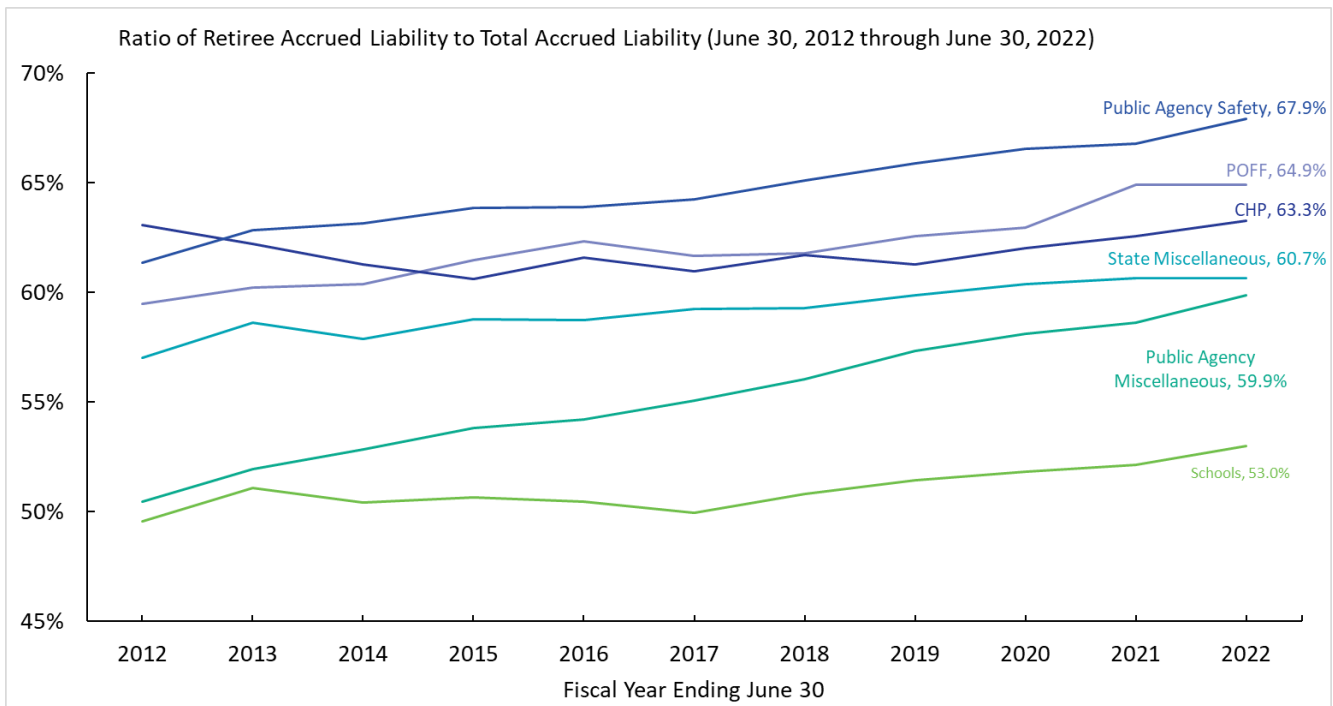
The largest actuarial losses resulting from the 2023 COLAs will be for the non-pooled public agencies that have adopted an enhanced COLA provision. For more information about the impact on a particular rate plan, contact a CalPERS actuary.

Plan Maturity

The maturity of a pension plan can provide useful information regarding its sensitivity to various risks in the future. A variety of risk measures based on plan maturity, can be calculated, and tracked over time for this purpose.

One simple way to look at the maturity level of CalPERS and its plans is to look at the ratio of active members to retirees. A more relevant ratio is a plan’s retiree liability to its total liability. A pension plan in its infancy will have a very low ratio of retiree liability to total liability. As the plan matures, the ratio increases. A mature plan will often have a ratio above 60%-65%. For CalPERS and other retirement systems in the United States, these ratios have been steadily increasing in recent years. However, this measure has flattened out somewhat in the last few years. Certain individual plans may have a significantly lower ratio, particularly if the plan has not been in existence as long.

In general, plans with higher retiree liability ratios have a shorter “duration” over which current accrued benefits will be paid. In some cases, particularly when a plan has only retiree liability, the actuary may determine that a shorter amortization period for UAL is appropriate to avoid the depletion of plan assets.

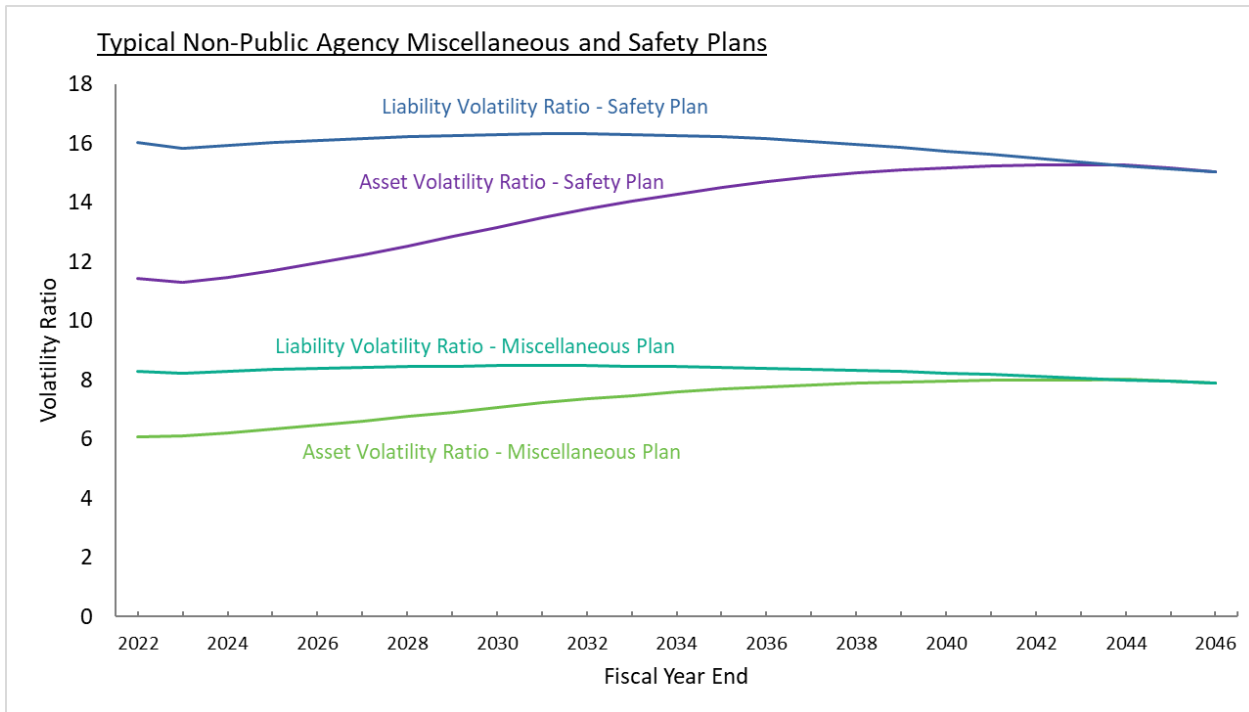


Other measures of plan maturity are the Asset Volatility Ratio (AVR) and the Liability Volatility Ratio (LVR). The AVR is the ratio of assets to payroll, and the LVR is the ratio of liability to payroll. As with the ratio of retiree liability to total liability, these ratios start out low given the low levels of assets and accrued liabilities, then increase over time as service is earned and contributions are made. Plans that have higher asset-to-payroll or liability-to-payroll ratios generally experience more volatile employer contributions (as a percentage of payroll) due to unexpected experience such as investment returns or mortality experience. For example, if the investment return in any given year is 1% less than expected a plan with an AVR of 10 experiences an investment loss equal to 10% of annual payroll, whereas a plan with an AVR of 5 only suffers an investment loss equal to 5% of annual payroll.

While many of the individual plans within CalPERS have comparable AVRs and LVRs, there can be significant differences from plan to plan based on several factors such as:

- The age of the plan
- The funded ratio of the plan
- The level of benefits provided by the plan
- Changes to the membership of the plan, for example if fire services are moved from a city to a county, etc.

Projections of these ratios indicates that Liability Volatility Ratios are projected to grow minimally (or decrease) for many CalPERS plans which have already been in existence for a long period of time. However, some public agency plans that were established more recently have lower current LVRs that are projected to grow more significantly in the future. Overall, the results indicate that contribution risks due to factors that impact plan liabilities, such as mortality, salary increases, retirements, etc., are not expected to increase significantly for most plans due to further maturation. However, current LVRs are relatively high which indicates most CalPERS plans already face high contribution volatility.



The projected increases in the AVR are primarily due to fact that the assets are projected to grow to equal the accrued liability as the funded ratio grows toward 100%. The funding policy alone will cause the AVRs to increase above current levels. As the AVR increases, each investment loss will have a higher impact than the last from the perspective of the employer.

As illustrated in the chart above, there will be downward pressure on volatility ratios in the future as liabilities for benefits earned by PEPRA members become a larger portion of total liabilities.

The maturing of a defined benefit retirement system is expected and is not a sign of mismanagement or that corrective action needs to necessarily take place. In fact, it is difficult to reduce plan maturity measures without lowering benefits or settling benefit obligations with retirees through lump sums or annuity purchases. However, it is important to recognize that increasing plan maturity typically leads to increased contribution volatility.

Volatility measures can vary significantly from plan to plan. Each plan’s annual actuarial valuation includes these measures along with a recent history and discussion of their significance. Employers with higher AVRs and MVRs, or those who may be more sensitive to contribution volatility, may wish to create or increase funding toward a stabilization or rainy-day fund such as the California Employers’ Pension Prefunding Trust (CEPPT).

Managing Risk

Trend Toward Lower Expected Returns and Discount Rates

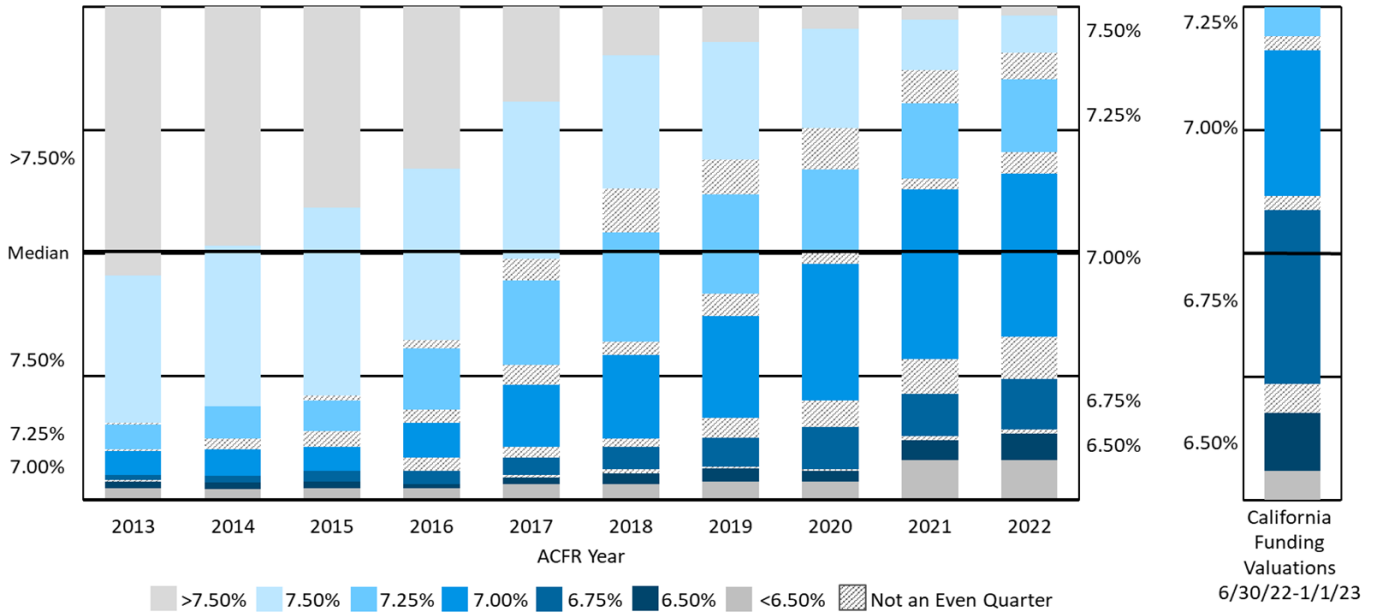
Despite recent increases in interest rates and more favorable capital market forecasts, concerns about lower returns over the next 10 to 20 years persist. The trend nationally for public pension plans in recent years has been a reduction in the rate of return assumption.

Over the last 10-15 years bond yields were below historical averages, and forecasts of economic growth and inflation were also lower than they were prior to 2009. This meant that plans needed to change their asset allocations to accept a higher level of investment risk (to achieve the same level of expected return) or to accept a lower expected return on investments, or a combination of both.

Over the prior two years, price inflation has increased, and the Federal Reserve has responded by increasing interest rates. Up to this point, this does not appear to be significantly impacting long-term assumptions.

CalPERS is not alone in facing the changed expectations of what can be achieved in the capital markets. The chart below left shows the change in distribution of public pension investment return assumptions from 2013 through 2022. The survey shows that based on the available 2022 Annual Comprehensive Financial Report (ACFR) data, discount rates ranged from 5.25% to 8.25% with a median of 7.00%

Distribution of Public Pension Plan Investment Return Assumptions



Data sources: Left - Center for Retirement Research at Boston College Public Plans Data (left), downloaded August 23, 2023
Right - Actuarial Funding Valuations for each system

Each year from 2013 through 2022 between 14% and 35% of the systems included in the survey reduced their discount rates including 16% in the most recent year.

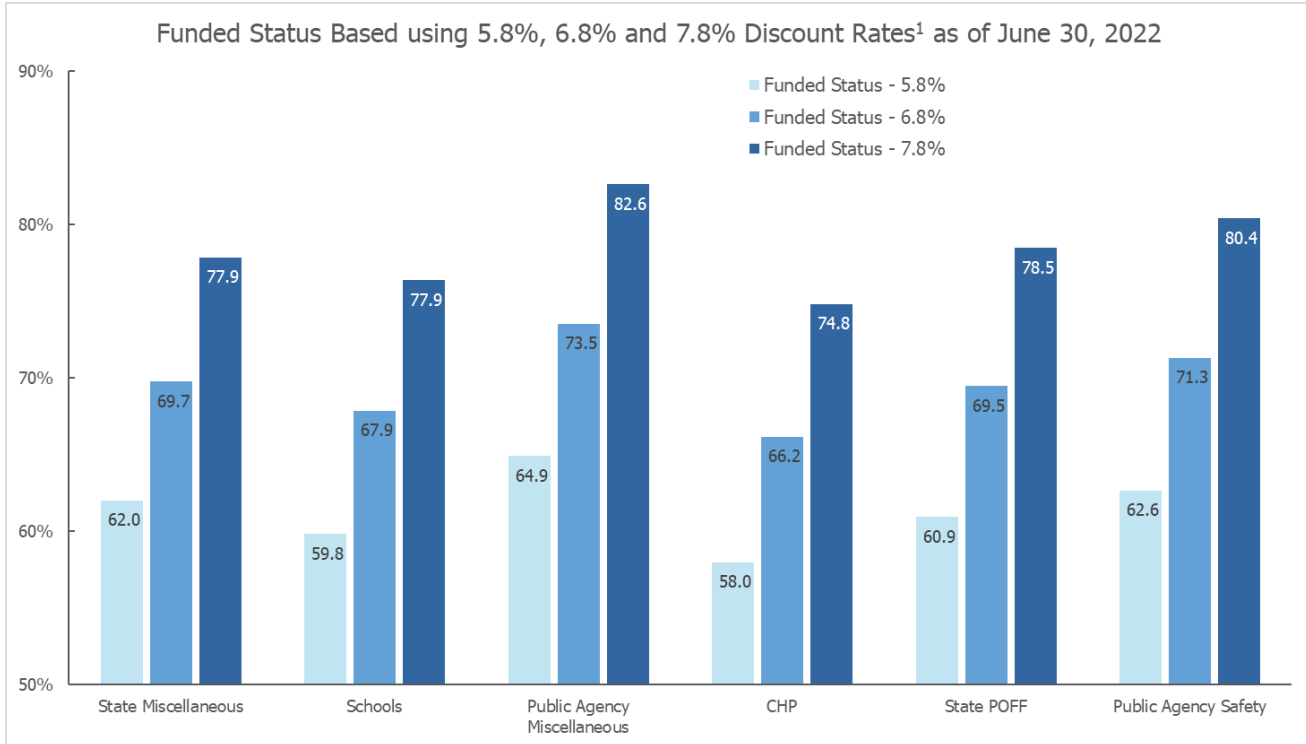
Since the Public Plans Data was compiled from available 2022 ACFR information, which typically reports information from 2021 funding valuations, it is somewhat out of date compared to current funding practices.

The Actuarial Office performs a more up to date, albeit smaller, survey of public retirement systems in California. The discount rates for 34 state, county and city retirement systems within California were compiled. The chart shown to the right of the Public Plans Data is based on funding valuations with valuation dates ranging from June 30, 2022 through January 1, 2023. The survey found that discount rates ranged from 6.00% to 7.25% with a median of 6.75%. Four systems reduced the discount rate since last year’s survey, two to 6.75% and two to 6.50%.

It is likely that the reductions in investment return assumptions are the result of the same factors that have influenced changes at CalPERS. As interest rates fell starting in the early 1990s, discount rates only partially followed as investment risk was added to portfolios. With interest rates today higher than they have been in a decade, it will be interesting to observe whether retirement systems will consider reducing investment risk in the future.

Given the recent changes in capital market assumptions, and the uncertainty regarding what the actual CalPERS long-term rate of investment return will be, it is informative to consider the current funded status under alternate discount rate assumptions. The chart below provides such results assuming 5.8%, 6.8%, and 7.8% discount rates with no change to the current inflation assumption of 2.3%.

Funded Status based upon 5.8%, 6.8% and 7.8% Discount Rates



¹Inflation assumption is kept at 2.3% for all scenarios listed. The inflation assumption may increase or decrease along with the discount rate assumption.

Discount rate changes are primarily due to 1) revised expectations of the future returns of utilized asset classes, or 2) decision to raise/lower investment risk by shifting investment allocations toward lower/higher risk return investments. The decision regarding the level of investment risk to target is among the most important decisions made by the system and its board. Excessive risk can lead to significant swings in funded status and contribution requirements as illustrated throughout this report. In addition, if discount rates are set higher than the reasonably expected average return, required contributions will be understated with the differences needing to be made up by future generations. Under that scenario, future contributions can rise to levels higher than if the discount rate had been set appropriately.

Amortization Policy

The goals of a retirement system's amortization policy should be to pay down existing UAL over a reasonable amount of time in order to:

- Provide benefit security for plan members
- Maintain intergenerational equity
- Limit contribution volatility to the extent possible

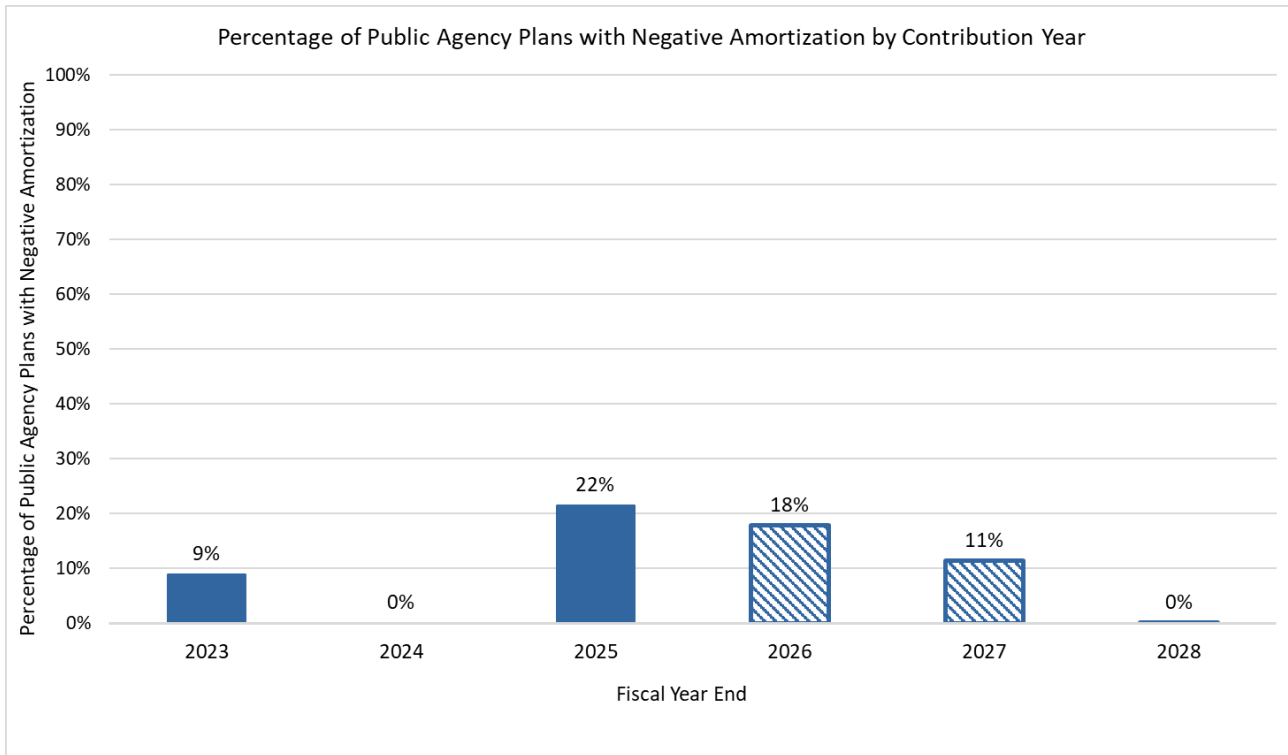
CalPERS current amortization policy adopted by the Board (effective with the June 30, 2019 Actuarial Valuation Reports), improved the overall expected outlook for these objectives relative to the previous policy. In particular, the current policy greatly reduces the possibility of "negative amortization" which occurs when required amortization payments are lower than the interest on a plan's existing UAL.

Negative amortization can be the result of various factors such as:

- UAL bases being paid off over a long period of time (e.g., 25 years or more) using a payment schedule with increasing amounts.
- The interaction of positive and negative UAL bases with different amortization periods which combine to result in a low total payment toward total UAL.
- A large portion of the UAL attributable to recent investment losses that are within the 5-year phase-in period.

The current CalPERS amortization policy precludes the first scenario from occurring. For CalPERS plans, the third bullet item above is likely to be the cause of negative amortization if negative amortization exists. However, in such situations the funded position of the plan is typically higher than the average plan and the period over which the negative amortization is expected to occur is typically short (<5 years).

Given the large investment losses for the year ending 6/30/22, it was expected that a significant number of well-funded CalPERS plans would have required UAL payments for FY 2024-25 that would be less than interest on the UAL. As shown in the chart below, the number of rate plans subject to negative amortization increased from 0% to 22% this year.



While the number of plans with negative amortization for this year is higher than usual, the dollar amount of UAL associated with these plans is a relatively low percentage of CalPERS total UAL. In addition, as illustrated in the chart above, negative amortization for these plans is not expected to continue beyond a few years.

We do not consider the high number of plans with negative amortization this year a result of any issue with the CalPERS amortization policy. In addition, CalPERS agencies are notified within the annual valuation report if the required UAL payment is less than interest on the UAL. The report also provides the amount of ADPs that would be necessary to eliminate the negative amortization.

Note: The Actuarial Amortization Policy addresses situations where an employer has requested an extension of the amortization of the UAL due to a financial necessity. While these policies can temporarily moderate employer contribution requirements, such employers are required to contribute at least interest on the UAL.

Employers Making Supplemental Payments

Many employers have elected to make additional contributions over and above the minimum required contributions. Education efforts over the last few years have increased employers' awareness of the ability to make such payments and the many advantages of doing so. As part of the education efforts, CalPERS Actuarial Office has been providing the Managing Employer Contribution (MEC) spreadsheet upon employer request and access to the [Pension Outlook](#) tool on the CalPERS website. These tools help employers determine the possible impact of additional contributions to their plans.

The primary advantages of additional contributions are:

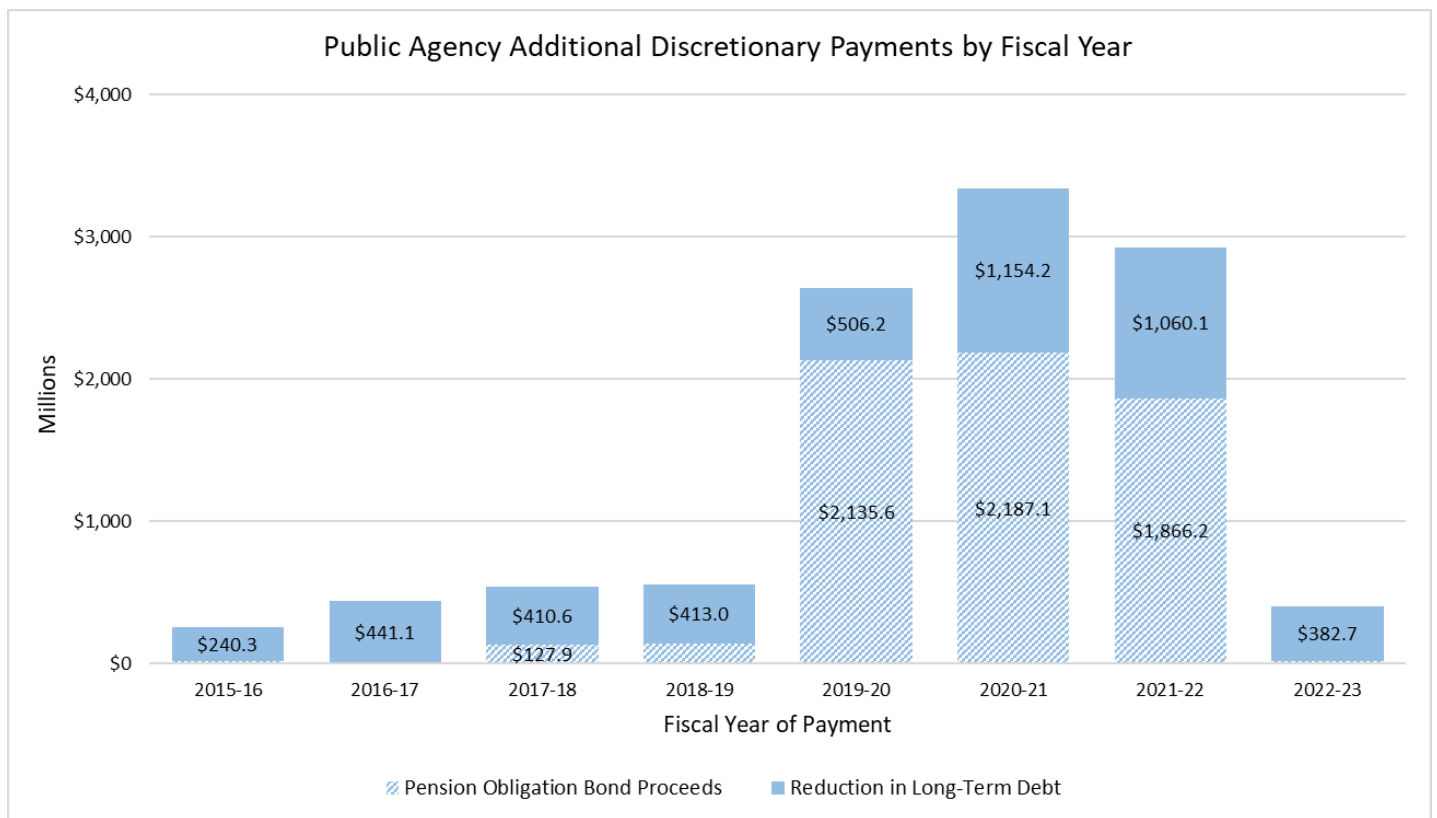
- Expected savings in interest paid and lowering the overall cost of the pension program
- Lower risk of low funded status in the future
- Lower risk of high contributions in the future
- A reduction to net pension liability for financial reporting purposes
- A reduction in pension expense for financial reporting purposes

The form of these ADPs varies between employers. Some employers make occasional ADPs on an ad hoc basis, for example, if they have a budgetary surplus towards the end of a fiscal year. Other employers have made more regular ADPs on a monthly or quarterly basis, and some even have a formal plan in place to pay off their unfunded liabilities by a specific target date.

The State of California also makes contributions in excess of the actuarially required contributions in order to reduce UAL. Some additional contributions have been collectively bargained, some are due to a provision in the California Constitution that requires certain surplus funds be used to reduce State pension debt, and some are discretionary and serve to reduce long-term costs and stabilize contribution rates. In FY 2023-24, the State is expected to contribute over \$2 billion more than the actuarially required contributions.

In addition to ADPs, public agencies have also been issuing Pension Obligation Bonds (POBs) with increased frequency since FY 2019-20. A POB is a taxable bond that some agencies issue to fund the unfunded portion of their pension liabilities by creating a debt to bondholders. The low interest environment likely contributed to the recent trend of public agencies issuing POBs. Now that interest rates are beginning to rise, the frequency of new POB issues has all but ceased. We are not aware of any POBs being issued by CalPERS public agencies since August 2022.

The chart below reflects the total ADPs made by public agencies including the POBs that were issued in order to make those ADPs. The ADPs reduce long-term public agency debt only to the extent they exceed new POB issues. Although much of the increase in ADPs over the last few years has been driven by an increased use of POBs, agencies continue to pay off pension debt. The total public agency ADPs that were not paid for with POB proceeds has increased to over \$1 billion per year for two straight years before sharply declining in 2022-23.



ADP information was provided by the CalPERS Financial Office. POB issuance data was downloaded from the [California Debt and Investment Advisory Commission](#) on the California State Treasurer website.

California Employers' Pension Prefunding Trust Program

Many public employers set aside additional pension assets in a trust separate from pension fund. These trusts, known as "Section 115 Trusts" (after Internal Revenue Code Section 115), allow employers to prefund future required defined benefit pension system normal costs and UAL payments. This also includes both lump sum annual UAL payments and voluntary ADPs. Section 115 pension trust assets can be used by the employer at any time to reimburse the employer's general fund from which they have made these pension contributions. Employers may also make pension contributions directly from a Section 115 pension trust.

The purposes of Section 115 pension trusts include the following:

- Save overall pension costs due to additional prefunding which generates investment income.
- Likely earn higher long-term returns than the State Treasurer's Local Agency Investment Fund or a county treasurer's office.
- Invest with different time horizons and risk levels than the pension fund.
- Retain liquidity on assets dedicated to pension costs.
- Stabilize and subsidize future budgets.
- Create a contingency reserve for difficult times ahead.
- Pay down pension liabilities in a predictable and prudent manner.

One of the most attractive of these Section 115 pension trust purposes from an employer's point of view is the ability to build up a contingency reserve that can be used to satisfy CalPERS contribution requirements during years the employer's budget is strained. This can be an effective way to deal with CalPERS contribution volatility due to fluctuating investment markets.

The unfunded pension liabilities and future pension contribution volatility summarized in the previous sections of this report do not reflect the fact that hundreds of public employers already have Section 115 pension trust funds. Because Section 115 pension trusts can be expensive to set up and administer, CalPERS launched the California Employers' Pension Prefunding Trust (CEPPT) in 2019. The CEPPT was established by Senate Bill 1413 which provides public agencies additional low cost and not-for-profit investment vehicles to help manage pension costs. Participation in the CEPPT is voluntary and provides employers with the flexibility to determine the amount of their contributions, reimbursements, and overall funding strategy. The CEPPT offers two broadly diversified portfolio options with low to moderate risk profiles that are expected to have a net rate of investment return of 3.5% and 4.5%, respectively. As of October 2023, a total of 94 employers have established CEPPT accounts with assets under management totaling approximately \$175 million.

Conclusion

Over the last few years various external factors have had material impacts on the experience of the retirement system. These include extreme investment experience (both favorable and unfavorable), a global pandemic and historically high levels of inflation.

In addition, over the last 10-years the system has had to recognize investment losses and significantly lower levels of future expected investment return due primarily to lower capital market assumptions across most asset classes. Also, during this 10-year period however, employer costs were somewhat reduced due to the impact of PEPRAs.

The combined impact of the above factors has resulted in increased required employer contributions and only modest improvements in the funded status of the system over the last 10-years. However, necessary changes to actuarial assumptions over the last decade have positioned the system to see greater improvements in funded status over the next 10-years.

Employer contributions are currently at relatively high levels due to large amounts of UAL and are projected to increase somewhat over the next 5 years. In addition, uncertainty within the economy suggests a near-term economic recession is a possibility. The ability of employers to continue making required contributions to the system is the area of greatest concern.

For employers facing financial difficulties, financial necessity policies within the CalPERS amortization policy can be used in some cases to spread amortization payments over a longer period and hence reduce near-term contributions. However, these policies require minimum contributions that may still pose challenges for some agencies. In addition, these policies do not reduce costs but merely delay and increase them.

Various strategies and actions by CalPERS, its Board of Administration, and its employers have improved the sustainability of the system and mitigated certain risks. Among these are:

- The adoption of the current amortization policies that mitigate the risk of the system dropping to dangerously low funding levels.
- The increased level of additional contributions made by CalPERS agencies.
- The use of a separate 115 trust by many CalPERS agencies for minimizing the risk of required contribution spikes and volatility
- The continued improvements in investment policies which maintains favorable investment return expectations and associated volatility.
- Improved modeling tools that allow CalPERS and its participating employers to forecast future required contributions and funded status under a variety of possible future scenarios.

In addition to the actions listed above, we believe the following items should receive a high level of focus going forward.

- Continual focus on the acceptable level of investment risk versus the desire for higher investment returns.
- Monitor the effectiveness of the current investment policy to ensure desired returns relative to the chosen level of risk.
- Continue the focus on educating participating employers on the risks facing the system and providing tools that enhance their ability to manage these risks.
- Stakeholder outreach regarding employers' ability to make required contributions.

CalPERS and its participating employers have taken many positive steps to manage the risks of the system. Increased focus on these risks and opportunities to minimize and manage them, as discussed in this report, will be of utmost importance going forward.

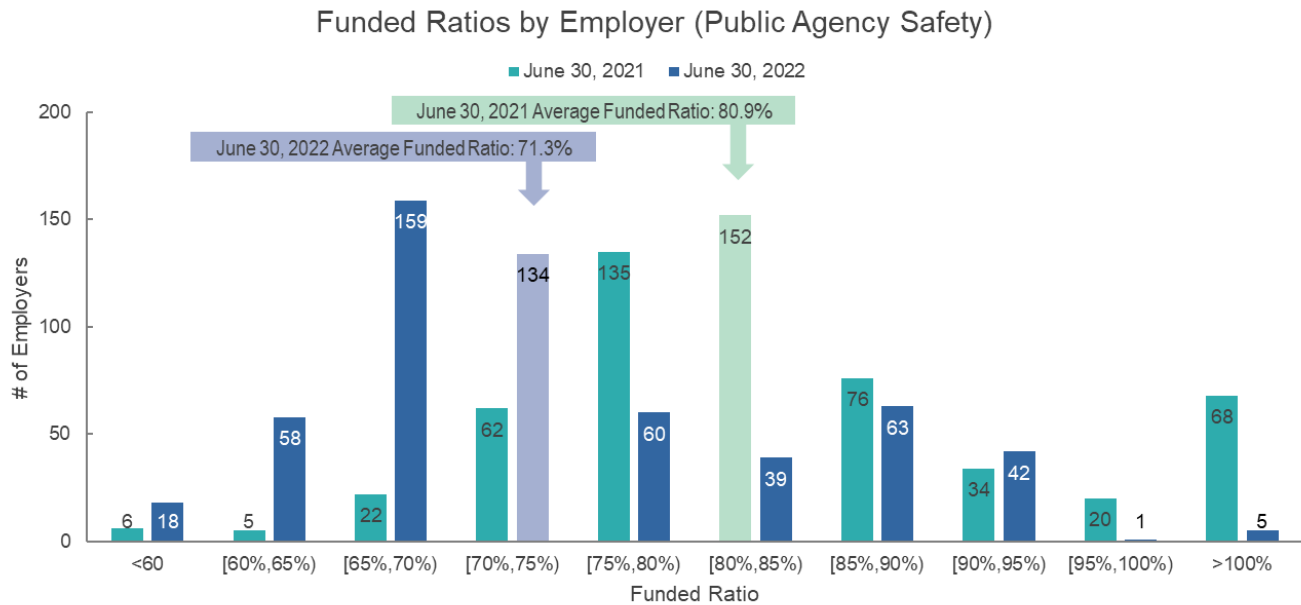
Appendix A – Public Employees’ Retirement System (PERS) Summary Statistics

	June 30, 2021	June 30, 2022
Number of Actives ¹	844,905	867,844
Number of Transferred ¹	166,686	167,329
Number of Separated ¹	458,012	496,715
Number of Receiving ¹	897,640	922,678
Payroll	\$58.7 billion	\$62.3 billion
Entry Age Accrued Liability	\$587.3 billion	\$618.8 billion
Market Value of Assets	\$476.2 billion	\$438.4 billion
Unfunded Liability	\$111.1 billion	\$180.4 billion
Funded Status	81.1%	70.8%
Prior Year Benefit Payments	\$27.7 billion	\$29.4 billion
Prior Year Employer Contributions	\$20.0 billion	\$22.7 billion
Prior Year Employee Contributions	\$4.8 billion	\$5.2 billion

¹These counts are from the CalPERS actuarial valuation system, which may not match the statistics provided in CalPERS Annual Comprehensive Financial Report (ACFR). For example, the number of receiving displayed in this report is not the count of unique benefit recipients; rather, it is the count of data records in CalPERS actuarial valuations for benefits in pay status. Some individual retirees have multiple records in our data due to having worked at multiple CalPERS agencies. Numbers shown in the ACFR for retirees receiving benefits include individuals just once in the count even if they are receiving benefits from multiple CalPERS agencies.

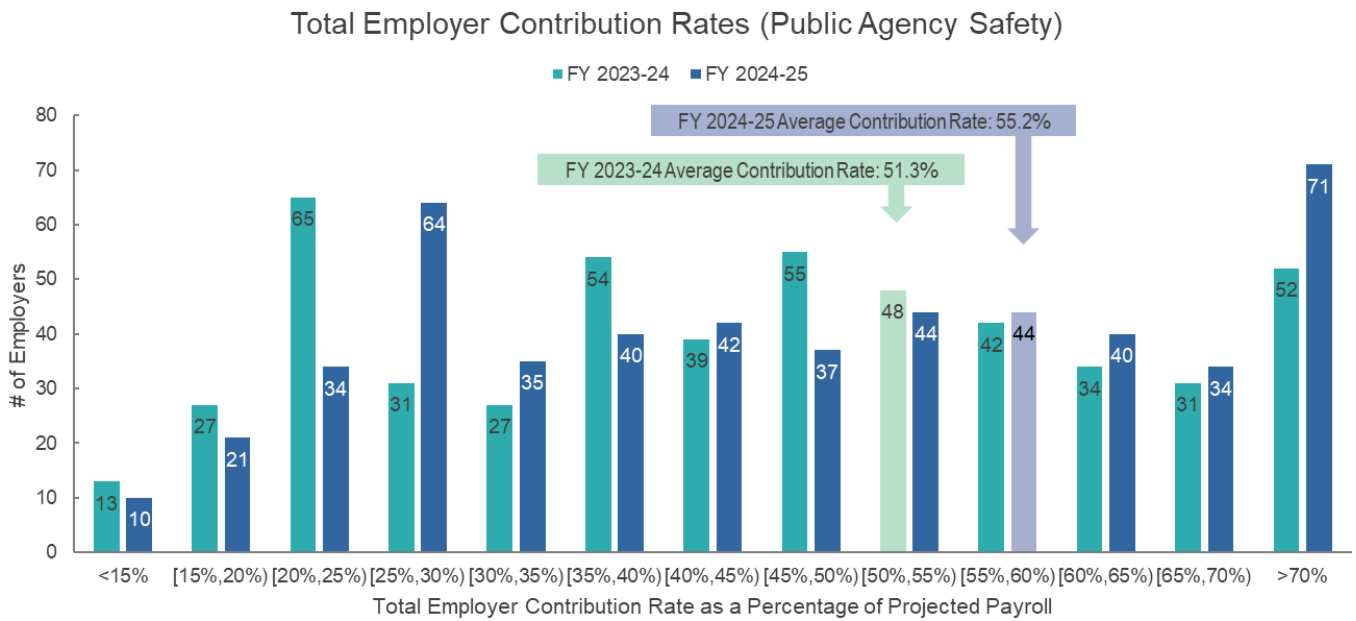
Appendix B – Results of June 30, 2022 Public Agency Valuations for Safety Plans

Public Agency Funded Ratios for Safety Plans



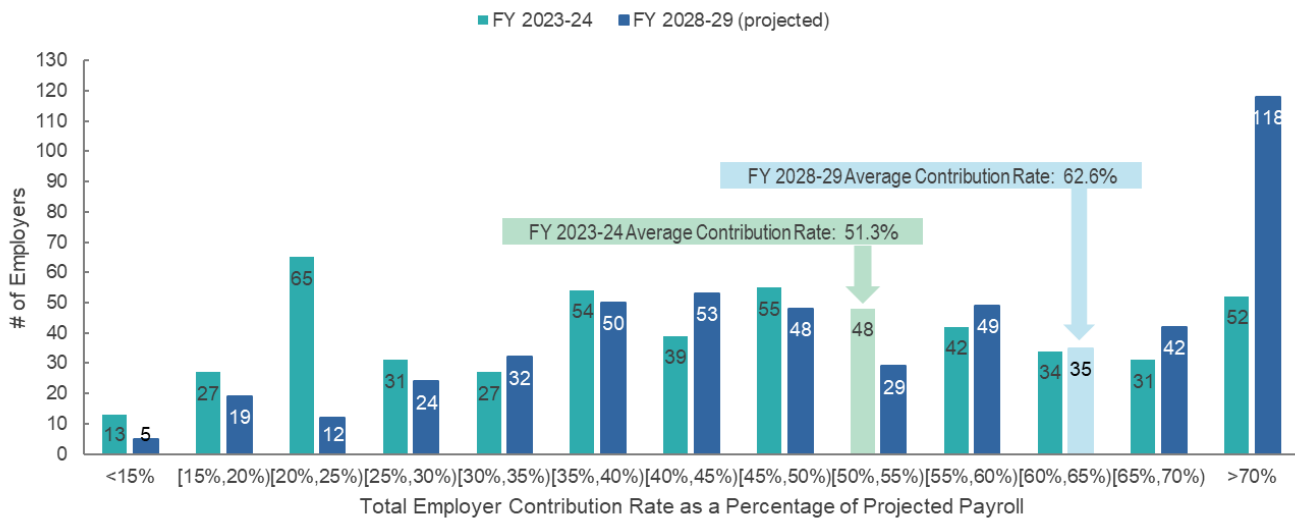
Public Agency Contribution Rates for Safety Plans

The following table displays the total employer contribution rates for public agency safety plans that contract with CalPERS for benefits. These contribution percentages reflect both the required normal cost contribution percentage and the required payment toward any UAL (converted to a percent of payroll).



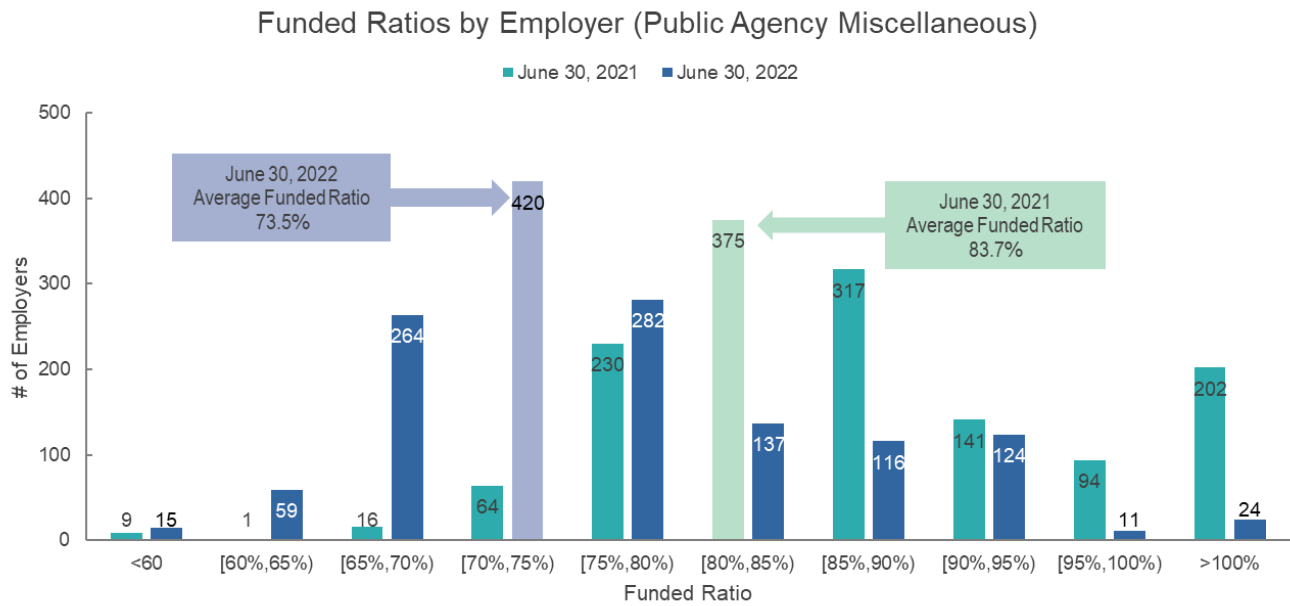
The following table displays the actual and projected total employer contribution rates for public agency safety plans that contract with CalPERS for benefits. These contribution percentages reflect both the required normal cost contribution percentage and the required payment toward any UAL (converted to a percent of payroll). FY 2028-29 rates are based on a projected payroll. For plans with a decreasing number of active members (and therefore decreasing payroll), these contribution percentages can become quite large when the required payment toward UAL becomes a large percentage of the decreasing payroll. In addition, the projected contributions are based on experience through June 30, 2022. There will be additional investment, economic and demographic experience that will impact the projected rates before they become actual rates in the future.

Total Employer Contribution Rates (Public Agency Safety)



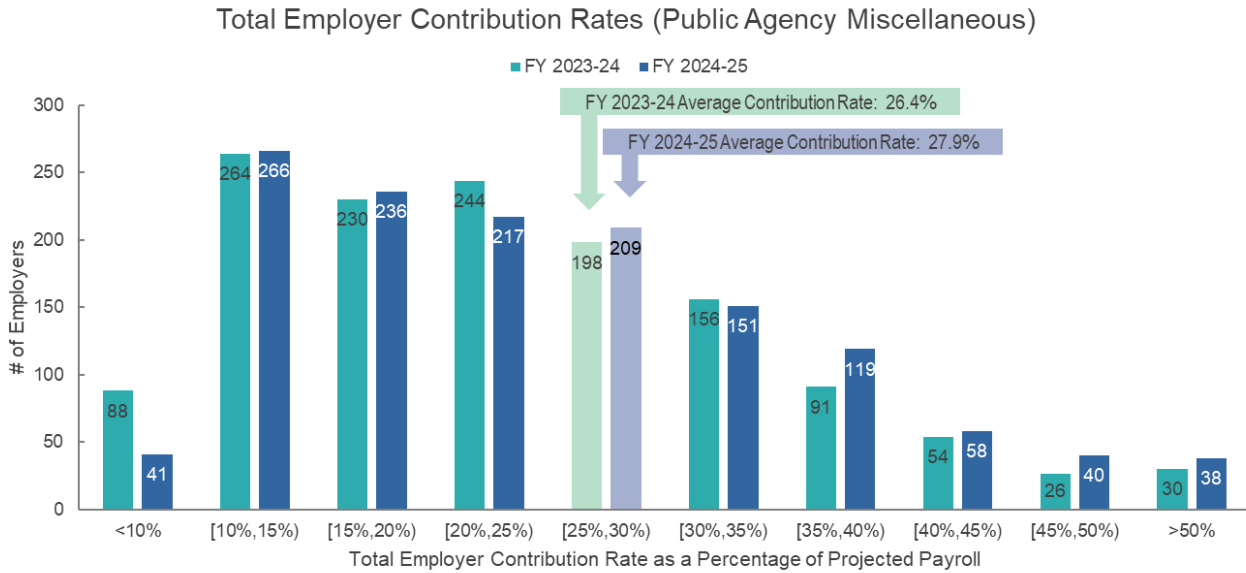
Appendix C – Results of June 30, 2022 Public Agency Valuations for Miscellaneous Plans

Public Agency Funded Ratios for Miscellaneous Plans



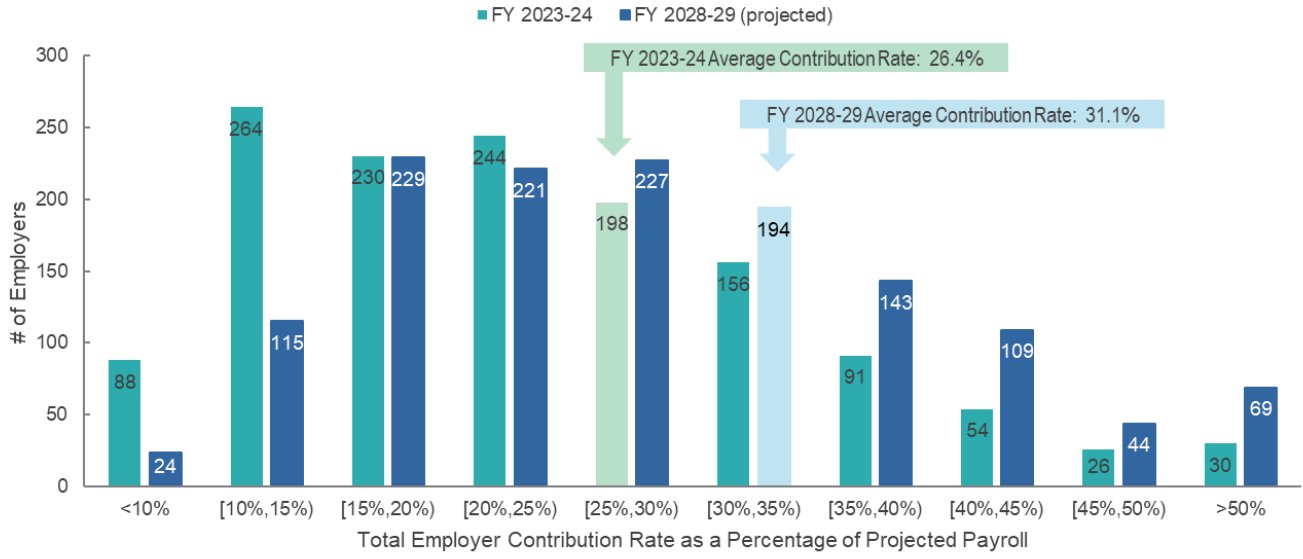
Public Agency Contribution Rates for Miscellaneous Plans

The following table displays the total employer contribution rates for public agency miscellaneous plans that contract with CalPERS for benefits. These contribution percentages reflect both the required normal cost contribution percentage and the required payment toward any UAL (converted to a percent of payroll).



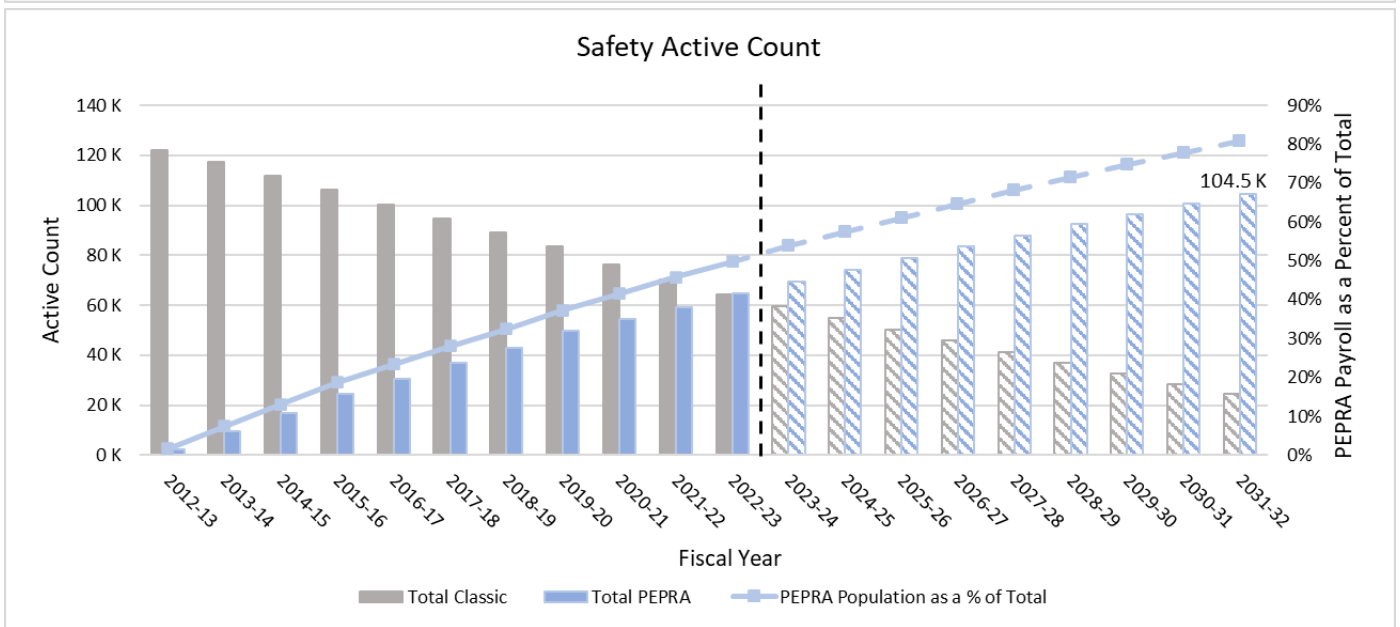
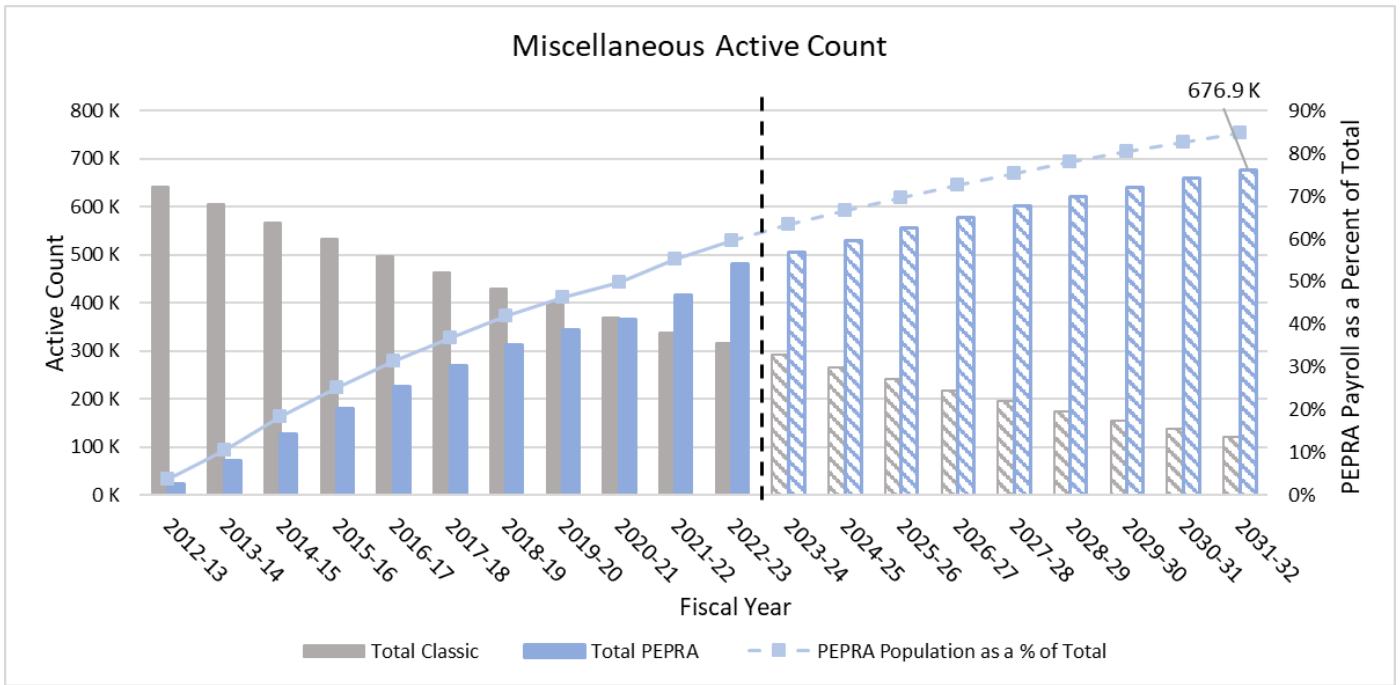
The following table displays the actual and projected total employer contribution rates for public agency miscellaneous plans that contract with CalPERS for benefits. These contribution percentages reflect both the required normal cost contribution percentage and the required payment toward any UAL (converted to a percent of payroll). FY 2028-29 rates are based on a projected payroll. For plans with a decreasing number of active members (and therefore decreasing payroll), these contribution percentages can become quite large when the required payment toward UAL becomes a large percentage of the decreasing payroll. In addition, the projected contributions are based on experience through June 30, 2022. There will be additional investment, economic and demographic experience that will impact the projected rates before they become actual rates in the future.

Total Employer Contribution Rates (Public Agency Miscellaneous)



Appendix D – Additional Information on PEPRA Impacts

Plan Type	% PEPRA Members 6/30/2023	% PEPRA Payroll 6/30/2023	Cost savings Last 10-Years	Cost Savings Next 10-Years
State	50%	43%	\$1.3 B	\$7.6 B
Schools	57%	49%	\$0.8 B	\$3.7 B
Public Agencies	68%	50%	\$2.3 B	\$13.0 B



2023 Annual Review of Funding Levels and Risks

November 2023

