California Public Employees' Retirement System

2022 Annual Review of Funding Levels and Risks

November 2022

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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, 2021 annual valuations, which have been projected forward to June 30, 2022 based on preliminary investment performance for the year ending June 30, 2022. 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 reflect all changes recommended in the 2021 Experience Study.

The actual results based on the June 30, 2021 valuations are summarized in Appendix A.

This report focuses on:

- Reporting the current funded status of the system
- Identifying and quantifying investment risks
- Examining other system risks, such near-term high inflation and the COVID pandemic
- Discussing risk mitigating activities for the system and employers

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 lower-than-expected investment returns for fiscal year (FY) 2021-22, the funded status of the system has decreased from 81.2% as of June 30, 2021 to an estimated 72% as of June 30, 2022. 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 has increased the risk that plans will fall to low funding levels. In addition, employer contribution levels are expected to increase in response to the investment loss for fiscal year 2021-22. With the added economic stress due to the Coronavirus pandemic, increased inflation, and the possibility of a 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 making additional discretionary payments 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.

CalPERS completed an Asset Liability Management (ALM) process in November 2021 that reviewed the capital market assumptions and adopted a revised strategic asset allocation. In addition, the discount rate was reduced to 6.8% along with a reduction in the inflation assumption to 2.3% and an increase in the payroll growth assumption to 2.8%. At the same time the Actuarial Office completed its Experience Study to review the demographic experience within the pension system and made minor changes to modify future assumptions where necessary. The most significant change was implementing fully generational mortality assumptions with mortality rates weighted by benefits. This weighting reflects the observed trend of lower mortality rates for wealthier members.

Recent and current increases in the Consumer Price Index (CPI) are expected to have a material 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). We have determined that required contributions may increase 5%-12% of payroll over the next several years depending on how long the high inflation period lasts and how quickly it returns to Federal Reserve targets.

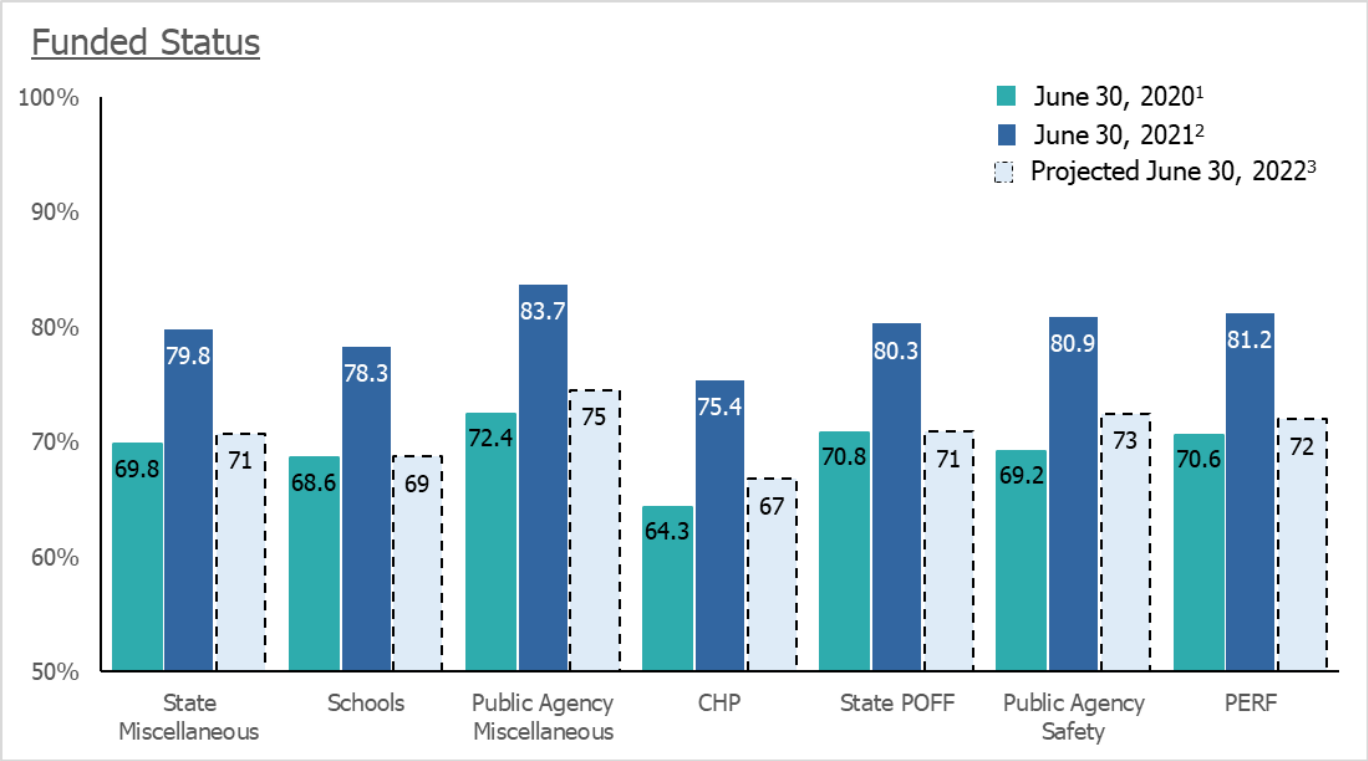
This report illustrates the impact of recent events on the retirement system and projects the possible impacts of various factors that are possible in the future. While there is no immediate concern regarding the system's ability to pay required benefits, the possibility of unfavorable events in the near future, such as high inflation, continued impacts from the Coronavirus pandemic 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

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 system is a conglomeration of multiple plans and several risk sharing pools. Each of these pools and the non-pooled plans are funded separately. Over the last two years, many of these individual plans received additional discretionary payments (ADPs) from the sponsoring agencies. As a result, funded statuses for these plans are higher than they would otherwise be.

The chart below shows the funding levels of the various components of the Public Employees' Retirement Fund (PERF) as of June 30, 2020, June 30, 2021, and estimated results as of June 30, 2022. Estimates as of June 30, 2022 were based on preliminary asset values as of June 30, 2022 and liabilities rolled forward from the most recent valuation date of June 30, 2021 to June 30, 2022.



[1]June 30, 2020 valuations based on a 7.00% discount rate.

[2]June 30, 2021 valuations based on a 6.80% discount rate.

[3]June 30, 2022 projected funded status based on a preliminary investment return of -7.4% for FY 2021-22.

The previous chart shows that the funded status increased significantly between June 30, 2020 and June 30, 2021, and then decreased significantly as of June 30, 2022. Based on the results of the funding valuations as of June 30, 2021, the overall funded ratio of the PERF was about 81% and the estimated PERF funded ratios of June 30, 2022 is 72%. While the favorable and unfavorable returns during these two years both deviated significantly from the expected returns of 7.0% and 6.8% respectively, the returns for both years were within two standard deviations of the expected return. Based on the current allocation of assets, returns that deviate from the expected return by two standard deviations or more are expected to occur about once every 20 years. Therefore, such investment volatility is expected to occur sporadically but not regularly.

The term "funded status" as used in the chart, is the funded portion of the funding target determined annually for each plan in the actuarial valuation process. This funding target reflects all the actuarial assumptions and methods adopted by the Board of Administration. Alternate funding methods and assumptions would yield different funding targets and therefore different funded status results. For example, reflection of a lower assumption for future investment return would lower the current funded status for each CalPERS plan. The Trend Toward Lower Discount Rates section of this report provides funded status results by employee group under alternate assumptions for future investment return (i.e., discount rate).

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 discount rate (currently around 4%) 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 40%-45% 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.

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, COVID and high near-term inflation are potentially material risks and are analyzed 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 system, 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, 2022. 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.

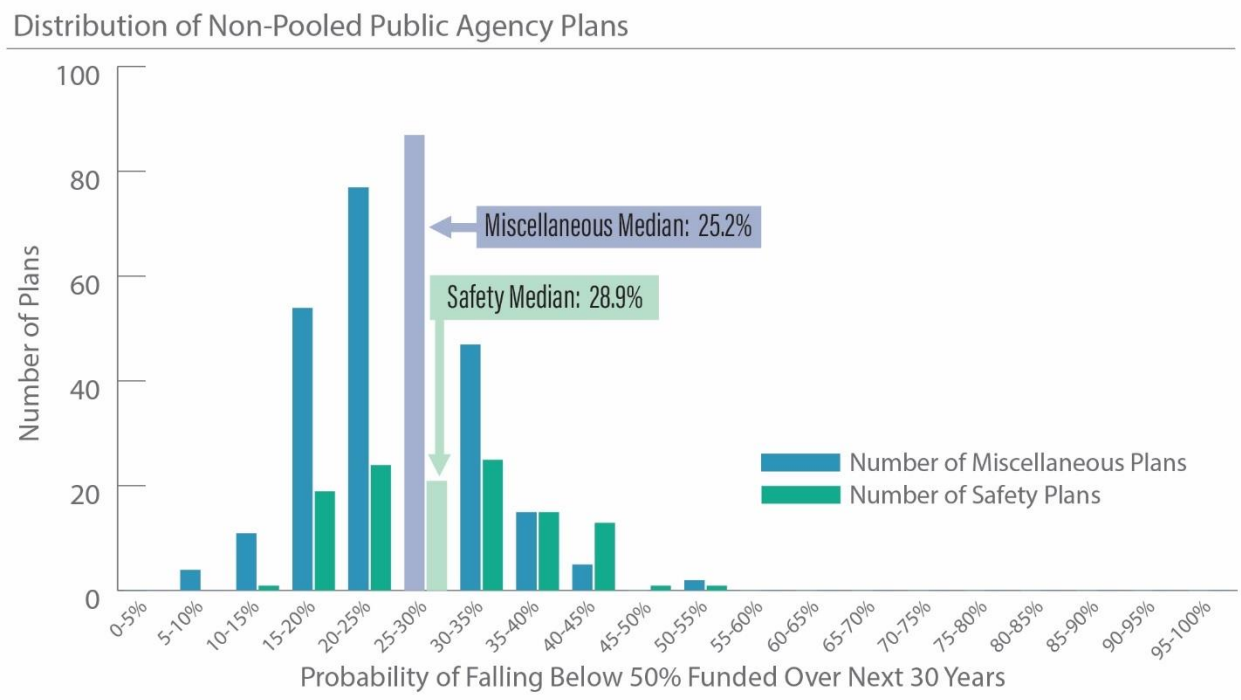
The likelihood that a plan falls below 50% funded in the future can be estimated with "Stochastic Modeling". With this type of modeling, alternate future investment scenarios are used to create projected future funded ratios. The results provided in this section are based on the outcomes of 5,000 alternate 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 23.4% probability of falling below 50% funded at some point over the next 30 years. For the School's Pool, the probability is 24.9%. 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, 87 miscellaneous plans have a 25%-30% probability of falling below 50% funded over the next 30 years.

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



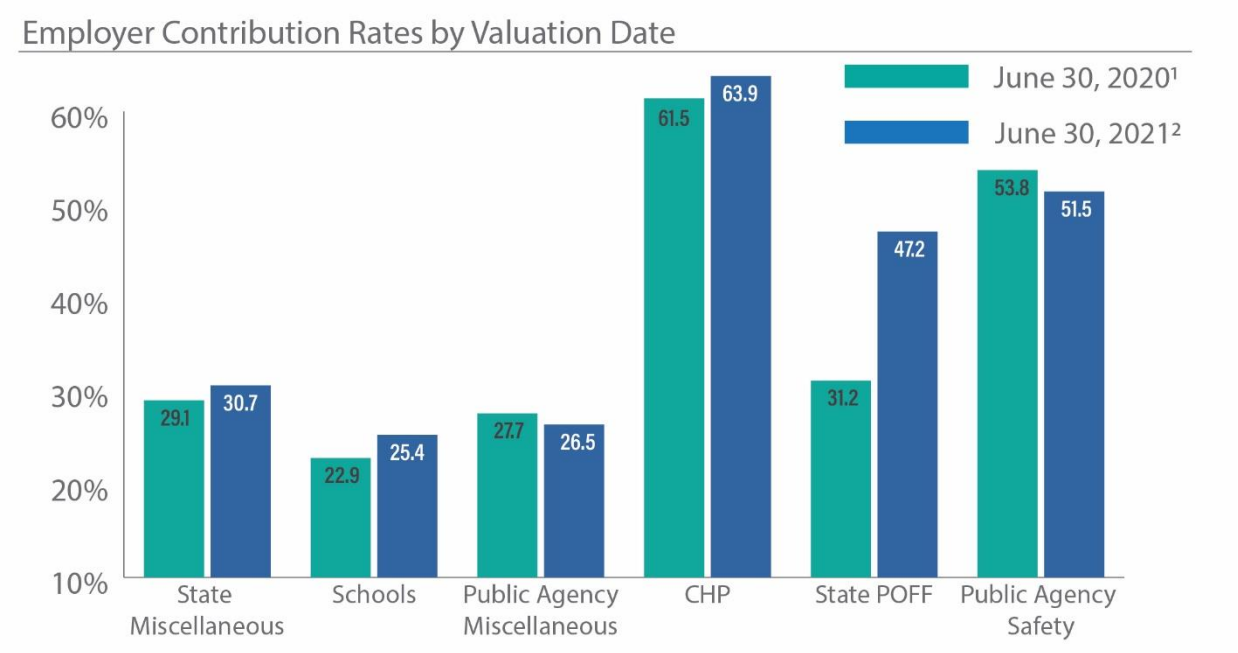
Lower Than Expected Average Investment Returns

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 may be under significant strain.

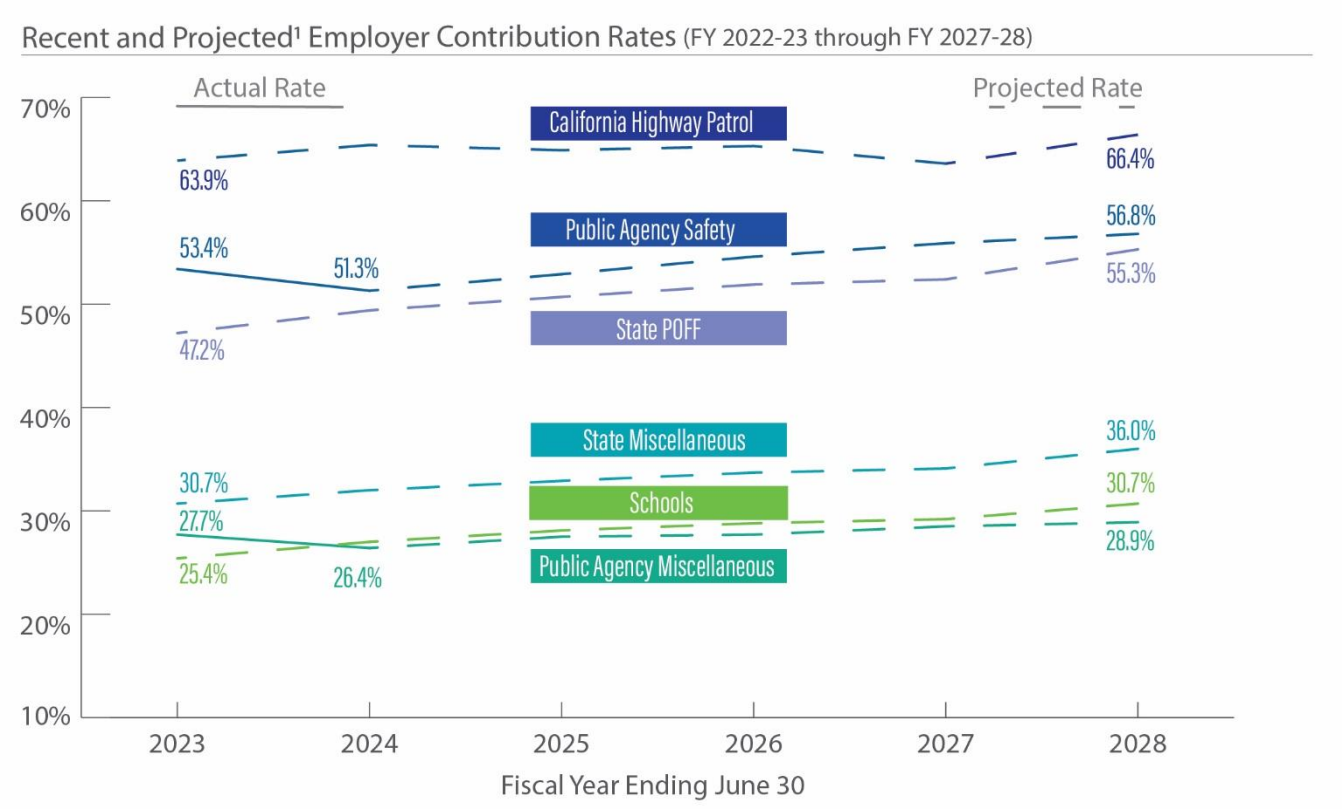


1June 30, 2020 valuations for state plans and the schools pool set FY 2021-22 rates and set FY 2022-23 rates for public agencies.
2June 30, 2021 valuations for state plans and the schools pool set FY 2022-23 rates and set FY 2023-24 rates for public agencies.

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, 2021 actuarial valuation results projected forward with a preliminary investment return of –7.4% for FY 2021-22 and assumed annual investment returns thereafter of 6.8%.



[1]FY 2022-23 state plan and schools pool rates are actual. FY 2022-23 and 2023-24 public agency rates are actual.

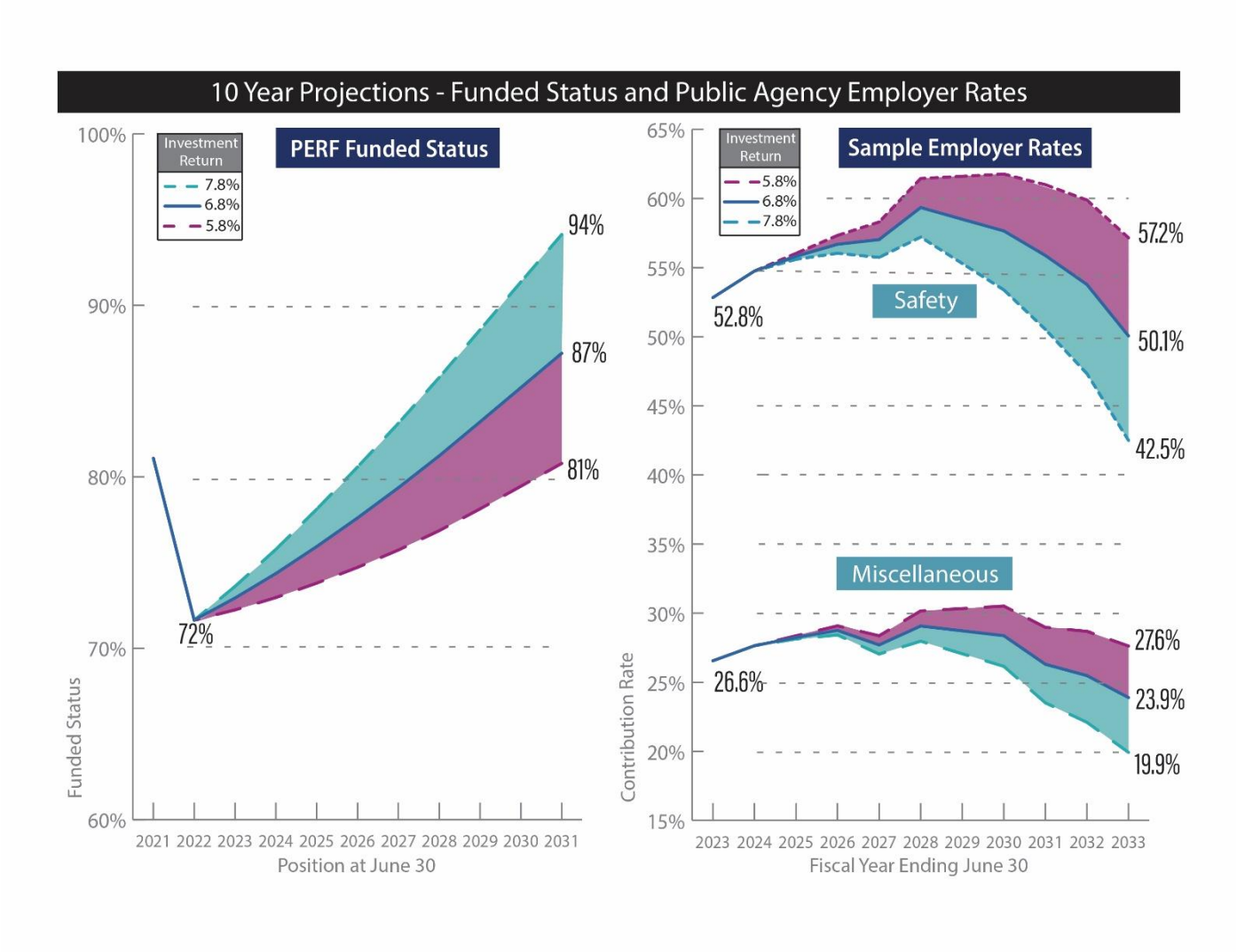
Alternate Investment Scenarios

To the extent future experience deviates from the actuarial assumptions, adjustments are made to the unfunded liability 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 30 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, the possibility exists that the average return over the next 30 years will fall outside of the range illustrated above of 5.8% to 7.8%.

Investment Shocks

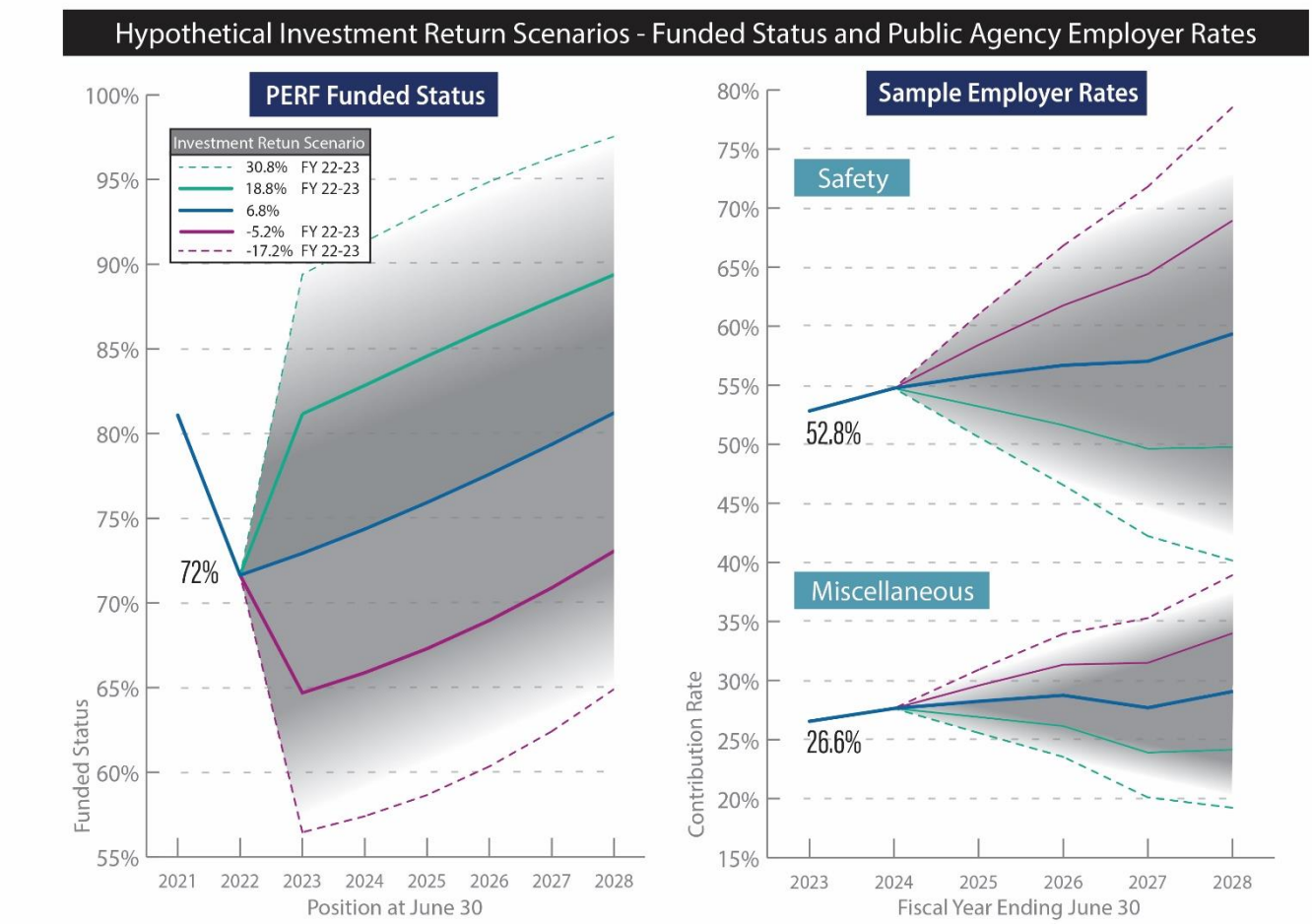
Over periods shorter than 30 years or single year periods, the likelihood of varying from the 6.8% expected return is even greater. For example, there is roughly a 16% chance that in a single year, the investment return will be lower than -5.2% and a 16% chance that it will be greater than 18.8%. These 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 -5.2% and 18.8% (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 -17.2% to 30.8%. Or said another way, a return between -17.2% and 30.8% 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, 2023 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
PERF Funded Status
Investment Retun Scenario
30.8% FY 22-23
18.8% FY 22-23
6.8%
-5.2% FY 22-23
-17.2% FY 22-23
72%
Funded Status
Position at June 30
Sample Employer Rates
Safety
52.8%
Miscellaneous
26.6%
Contribution Rate
Fiscal Year Ending June 30

Other Risks

COVID-19

As of the publication of this document, there have been close to 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 and continue through today. 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 many unknowns regarding the potential long-term impacts to CalPERS.

The pandemic has the potential to alter the experience of the retirement system in several different areas. These include, investment returns, inflation, deaths, retirements, terminations, disability retirements, pay increases, etc. Experience in these areas will impact future actuarial valuation results and required contributions.

Impacts on the pension system to date

- In FY 2020-21 mortality was 20.1% over expected
- In FY 2021-22 mortality was 15.3% over expected
- 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 2 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 the June 30, 2021 valuations were less material than if deaths occurred among younger retirees. We expect to see similar results in the June 30, 2022 valuations.

Long-term 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.

A larger concern is the impact of the pandemic on inflation and on employers' ability to continue to make required contributions to CalPERS. Even before the pandemic, employers' ability to make future required contributions was a concern. Increased inflation due in part to lingering supply chain issues and decreased revenues resulting from the pandemic have added to this concern.

Several employers have utilized budget management tools such as golden handshakes, furloughs, pay decreases and staff reductions to reduce short-term spending. In addition, many employers have issued Pension Obligation Bonds using the proceeds to reduce or eliminate CalPERS unfunded liability. There are risks to these tools and it remains of utmost importance that employers use appropriate due diligence.

Inflation

Inflation recently experienced a 40-year high when US consumer prices jumped by 9.1% in June 2022. Factors that are likely contributing to the current levels of inflation include supply chain issues persisting from the COVID-19 pandemic, high gas prices due in part to the war in Ukraine and the presence of a strong labor market. It appears likely high inflation will persist in the near-term. It remains to be seen how long before inflation declines to Federal Reserve targets. Given the transitory nature of some of the causes of the current high inflation and continued efforts by the Federal Reserve to reduce inflation through interest rate increases, it is expected that inflation will gradually return to levels near our current long-term inflation assumption of 2.3%. However, we will continue to monitor actual inflation levels as well as inflation forecasts by economists and investment professionals in order to assess whether a change to this assumption may be appropriate. Temporary high inflation can have significant impacts on CalPERS and its members as discussed below.

Cost of Living Adjustments (COLAs)

CalPERS retirees are entitled to cost of living adjustments based on the specific provisions adopted by the plan sponsor. Provisions vary, but most existing retirees are expected to receive higher benefit increases in the near-term while higher inflation persists. This is expected to result in somewhat higher employer contributions. While retirees' benefits will likely experience higher increases, these increases will likely not fully maintain current purchasing power for many retirees.

Pay Increases

Workers' wages generally tend to keep pace with inflation. However, pay increases may lag higher inflation measurements due to the time it takes to negotiate bargaining agreements. Future pay increases to CalPERS members exceeding the assumed increases will also lead to higher employer contributions. Such increases will be in the form of higher dollar contributions but required employer contributions expressed as a percentage of payroll will not be impacted to the same extent. For example, if plan members experience salary increases 5% greater than expected, the normal cost percent of the plan may not change materially. However, when the employer contributes future required normal costs, the unchanged normal cost percent will be applied to higher payroll resulting in higher dollar contributions.

Other Factors

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 PEPRA members. Increases to this pay limit due to higher inflation will increase employer contributions. In addition, certain federal limits that apply to qualified retirement plans are also impacted by inflation. These include limits on member compensation and benefit amounts. However, the impact of these federal 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 these federal limits due to higher near-term inflation will generally simply result in a different allocation of costs between the PERF and RBF.

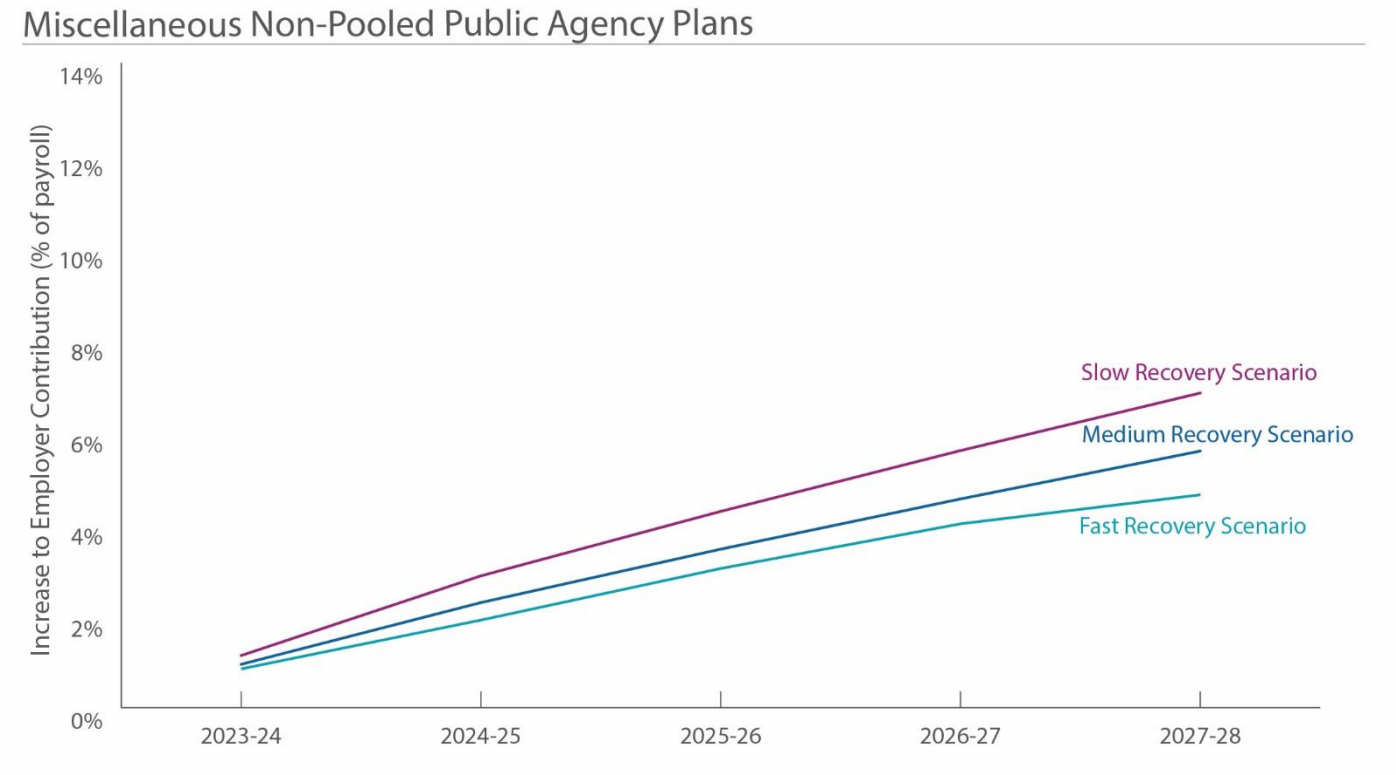
Estimated Contribution Impact

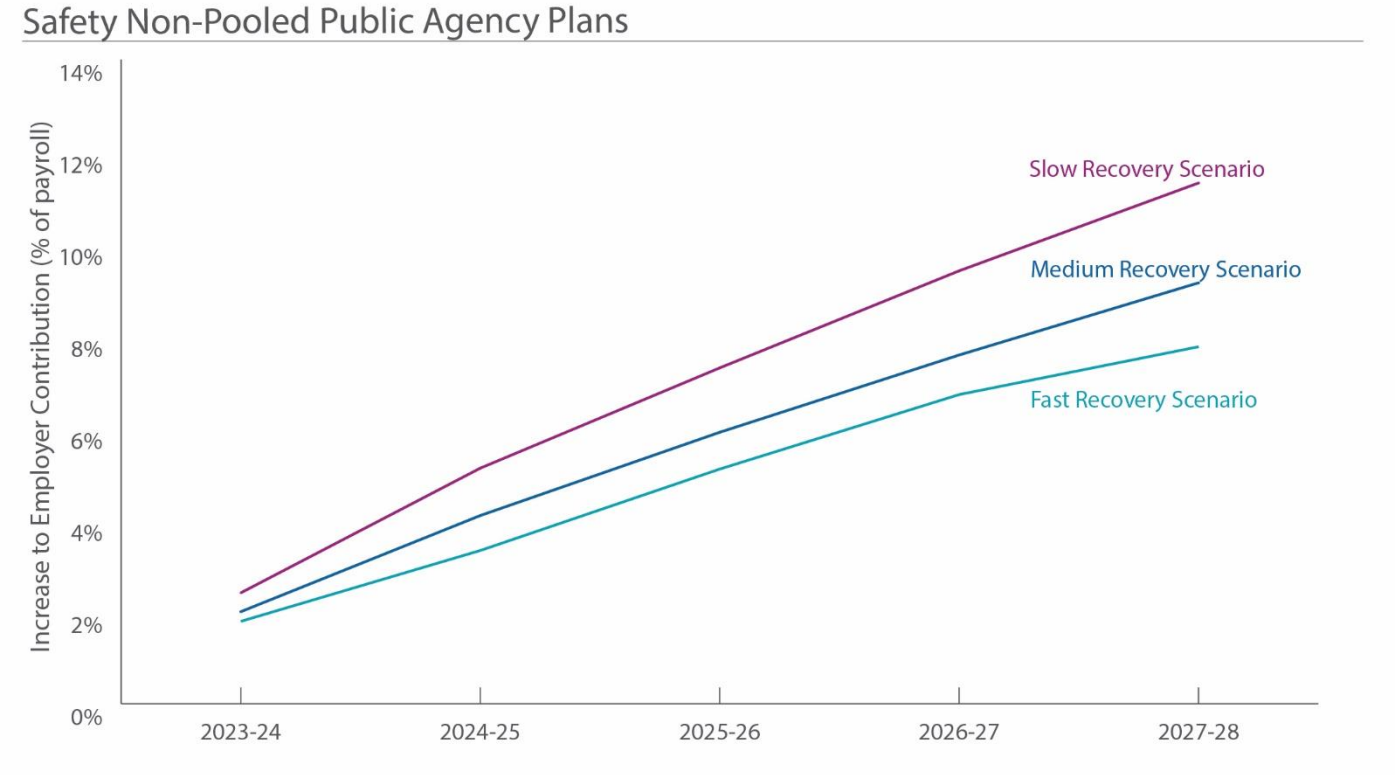
For purposes of estimating the impact of inflation on future contributions, we selected three reasonable scenarios for future near-term inflation. The three scenarios considered are shown below. The difference between the scenarios is the speed with which it takes to return to the expected price inflation of 2.3% (slow, medium, and fast).

Projection Year	Fast Recovery	Medium Recovery	Slow Recovery
1	5.0%	5.0%	5.0%
2	8.0%	8.0%	8.0%
3	3.0%	4.0%	6.0%
4	2.3%	3.0%	4.0%
5 and beyond	2.3%	2.3%	2.3%

The charts below provide estimates of the additional employer costs that may arise under various scenarios for higher near-term price inflation. As stated above, increases to member earnings consistent with the inflation scenarios may take several years to materialize. However, for simplicity, the results below assume such pay increases occur immediately following the measurement of the higher inflation values. In addition, due to the phenomenon discussed above regarding how contributions are expected to change as dollar amounts versus rates of payroll, we have chosen to represent results as estimated contribution increases expressed as percentages of current payroll without adjustments for higher assumed inflation. This provides a better comparison of current dollar costs versus projected higher dollar costs. Finally, the graphs below provide median results for non-pooled plans. Actual results for individual plans can be somewhat higher or lower than the median. In particular, the actual results for plans with higher contracted COLA levels or with higher liability volatility ratios are likely to be higher than the median results.

Estimated Median Impact of High Inflation on Employer Contribution Rates





Impacts of Plan Maturity

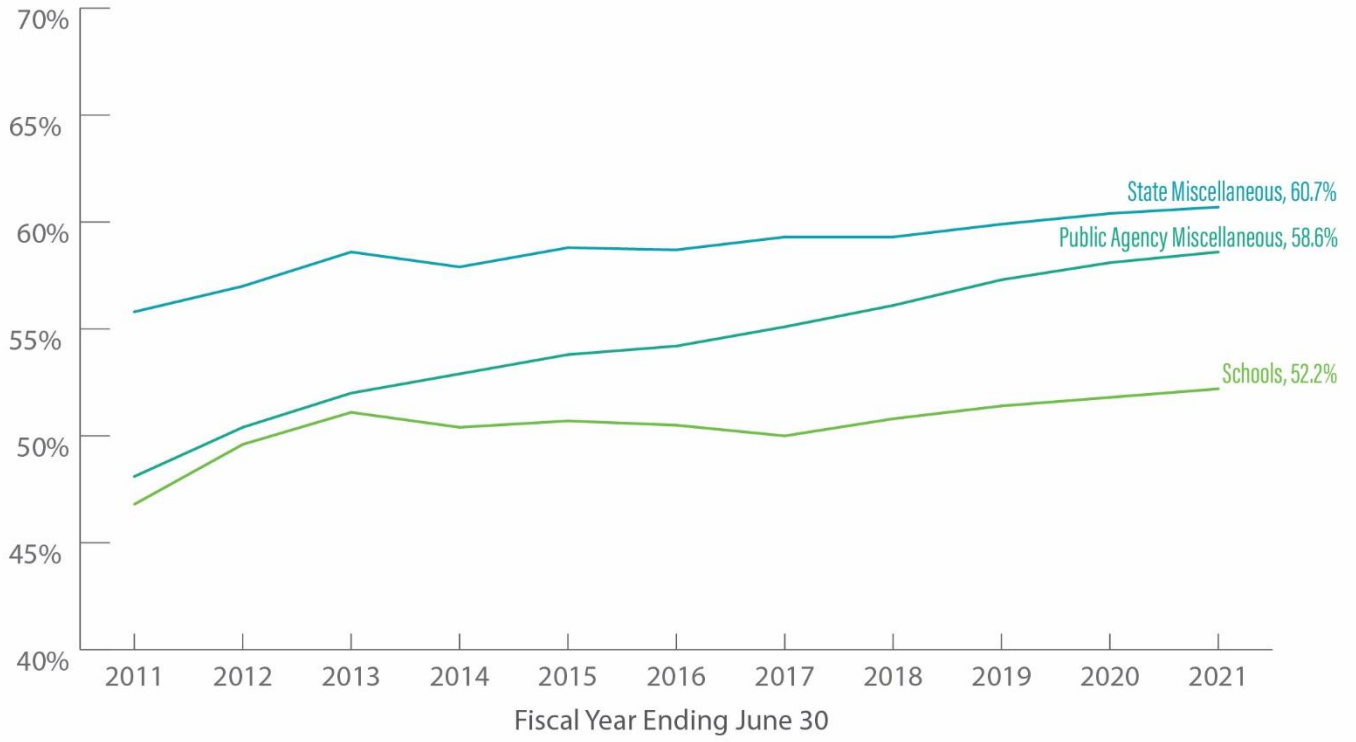
The aging of the population and the retirement of the baby boomer generation are well known demographic shifts that have long been predicted and considered in the funding of the system. The higher number of retirements experienced over the previous ten years was anticipated, and this trend is expected to continue over the next several years as the remainder of the baby boomer generation leaves the workforce to enter their retirement years. Even though anticipated, demographic shifts such as this impact risk measures identified in this report and should be part of any discussion on funding levels and risks.

A simple way to look at the maturity level of CalPERS and its plans is to look at the ratio of active members to retirees. An ever 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, as seen in the charts below, 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.

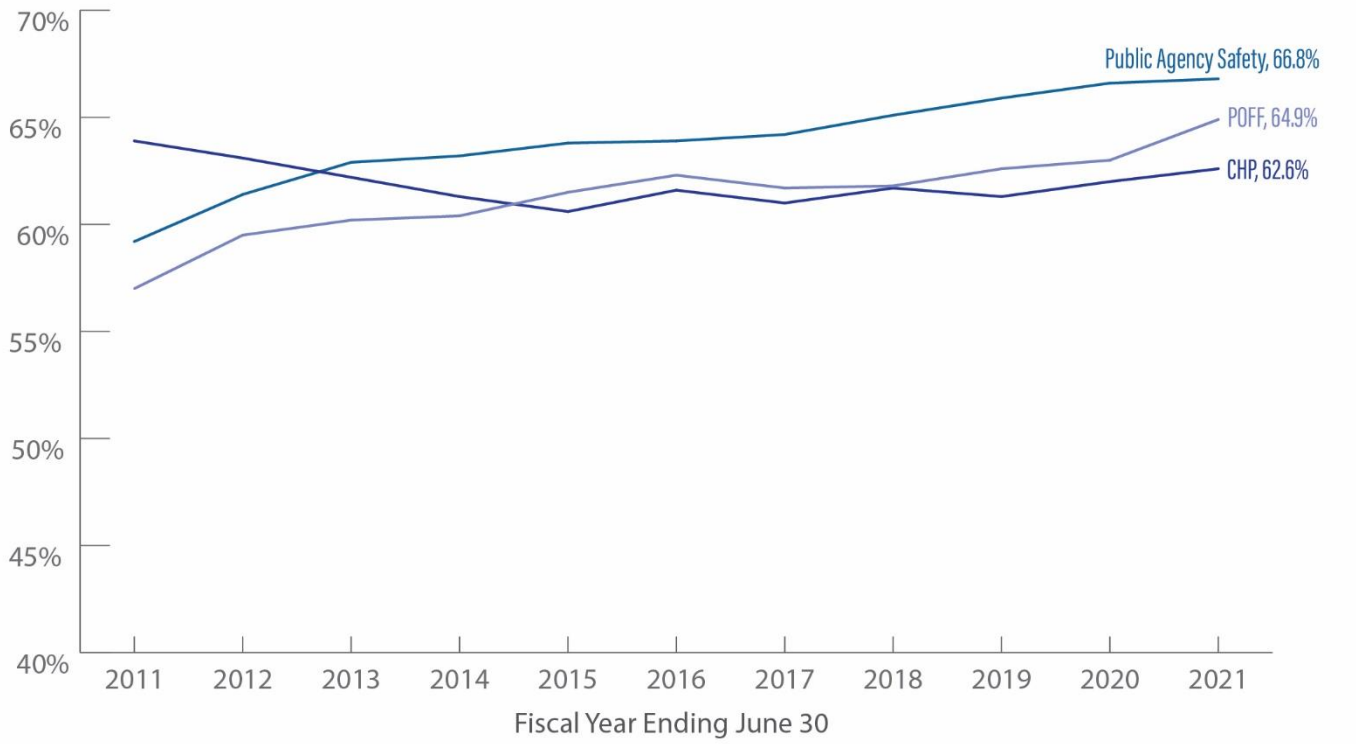
The steep incline in this measure from 2011 through 2013 was largely attributable to the wave of retirements experienced during the most recent recession. A similar increase may be seen if we experience another recession in the near future.

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 unfunded liability is appropriate to avoid the depletion of plan assets.

Ratio of Retiree Accrued Liability to Total Accrued Liability (June 30, 2011 through June 30, 2021)



Ratio of Retiree Accrued Liability to Total Accrued Liability (June 30, 2011 through June 30, 2021)



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.

The projected increases in the AVR are only partially due to demographic maturation. The other factor causing the AVRs to increase is the 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 plans mature, they accrue more assets and liabilities, both in an absolute sense, but also in relation to the financial resources of the plan sponsor. This means that when financial markets fail to deliver a strong return or even collapse like they did in 2008–2009, it can lead to very high contribution levels. These high contribution levels could result in severe financial stress for employers. Larger swings in required contributions are generally due to investment experience. However, other factors such as unexpected pay increases or mortality experience can also produce material contribution changes.

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:

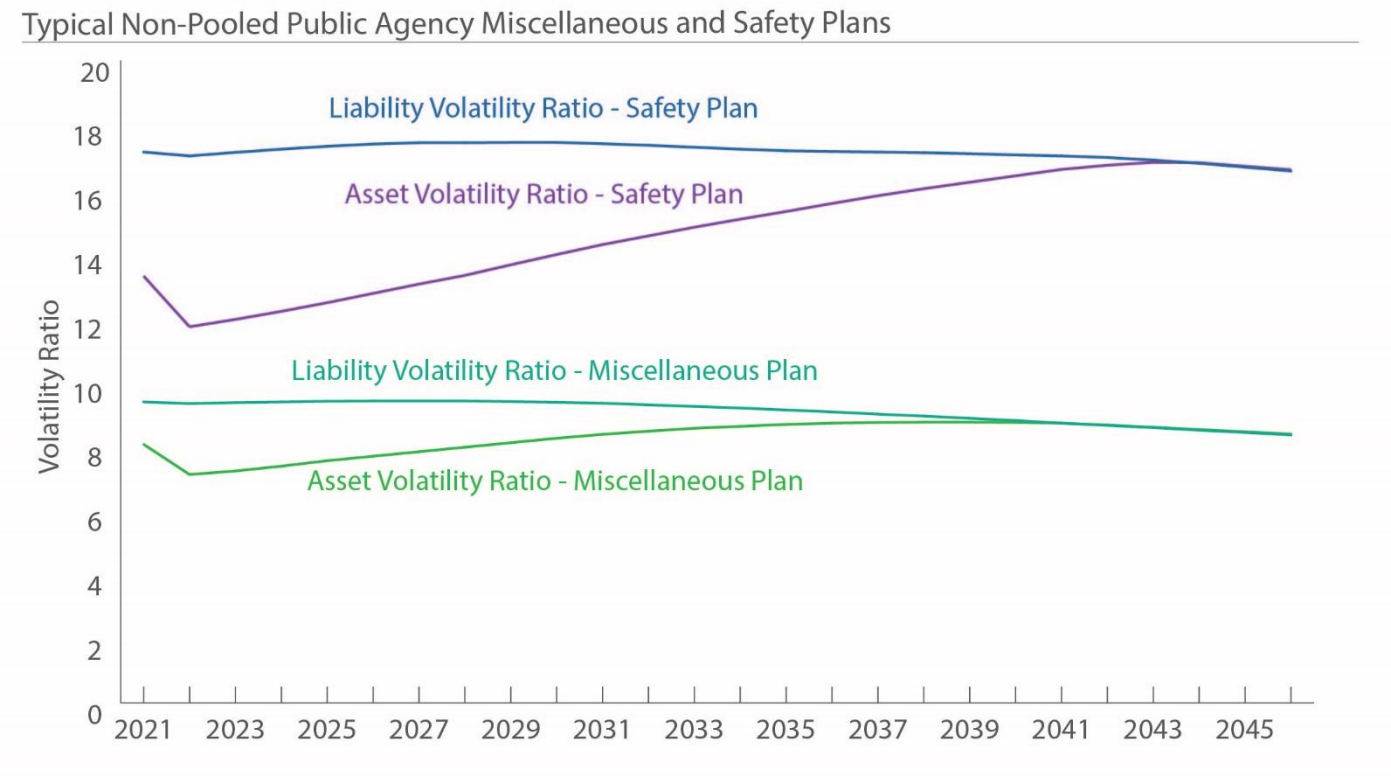
- The age of the plan
- The funded ratio of the plan
- The level of benefits provided by the plan
- Changes to the membership of the plan, for example if fire services are moved from a city to a county, etc.

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 already relatively high which indicates most CalPERS plans already face high contribution volatility.

The gap between Asset Volatility Ratios and Liability Volatility Ratios is generally determined by the funded status of a plan. Lower funded plans have lower AVRs that are projected to approach the LVRs over time as the plan approaches full funding. As these AVRs increase, so too will contribution volatility due to future investment returns.

The chart below shows projected AVRs and LVRs for typical public agency plans. Additional charts for the State Miscellaneous Plan, the School's Pool and less typical public agency plans can be found in the appendix.

Projected Asset and Liability Volatility Ratios



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. Employers who may be more sensitive to such volatility may wish to create or increase funding toward a stabilization or rainy-day fund such as the new California Employers' Pension Prefunding Trust (CEPPT). Eventually, there will be downward pressure on AVRs as liabilities for benefits earned by PEPRA members become a larger portion of total liabilities.

Trend Toward Lower Expected Returns and Discount Rates

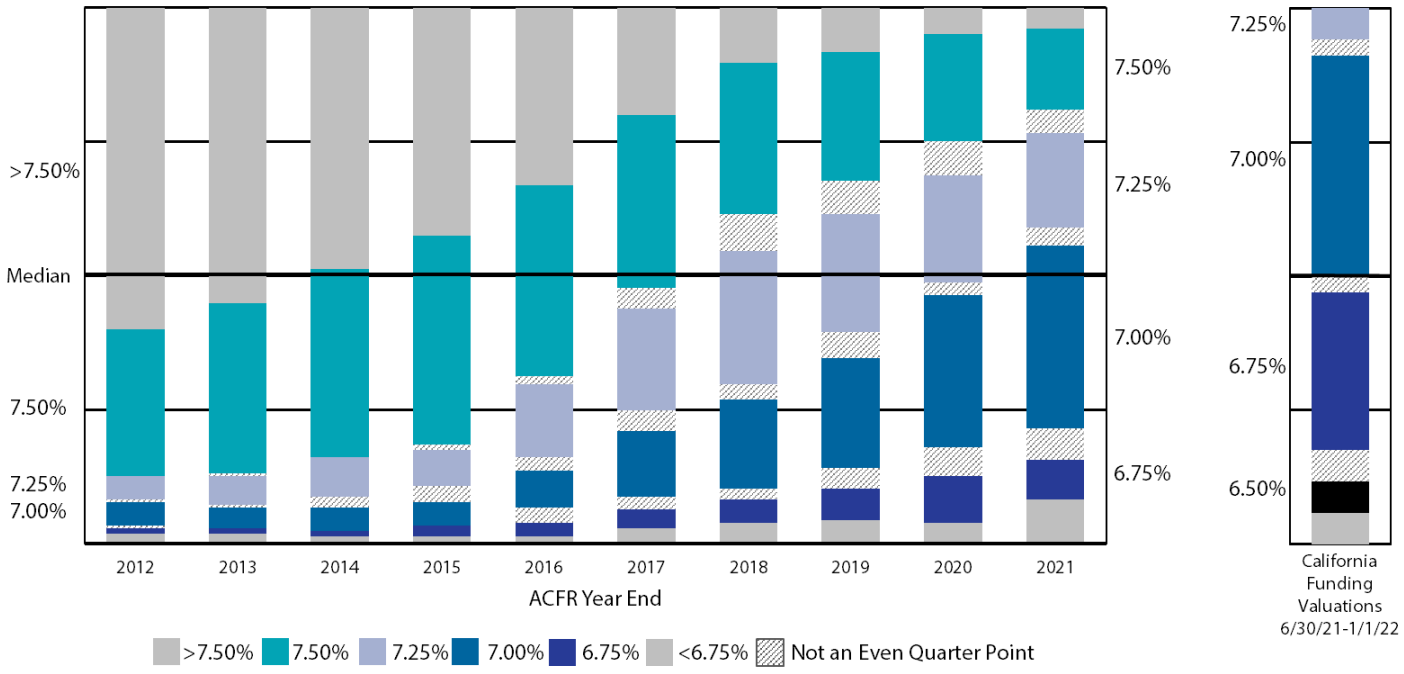
In addition to demographic forces, concerns about lower returns over the next 10 to 20 years persist. The trend nationally for public pension plans in recent years has been a reduction in the rate of return assumption.

Not only have bond yields trended downward, well below historical averages, but forecasts of economic growth and inflation also remain lower than they were prior to 2009. This means that plans must 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. Over the prior year, price inflation has increased, and the Federal Reserve has responded by increasing interest rates. Whether this will impact long-term assumptions remains to be seen.

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 2012 through 2021.

The survey shows that based on the available 2021 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: Center for Retirement Research at Boston College Public Plans Data (left), downloaded September 19, 2022 and California Funding Valuations (right)

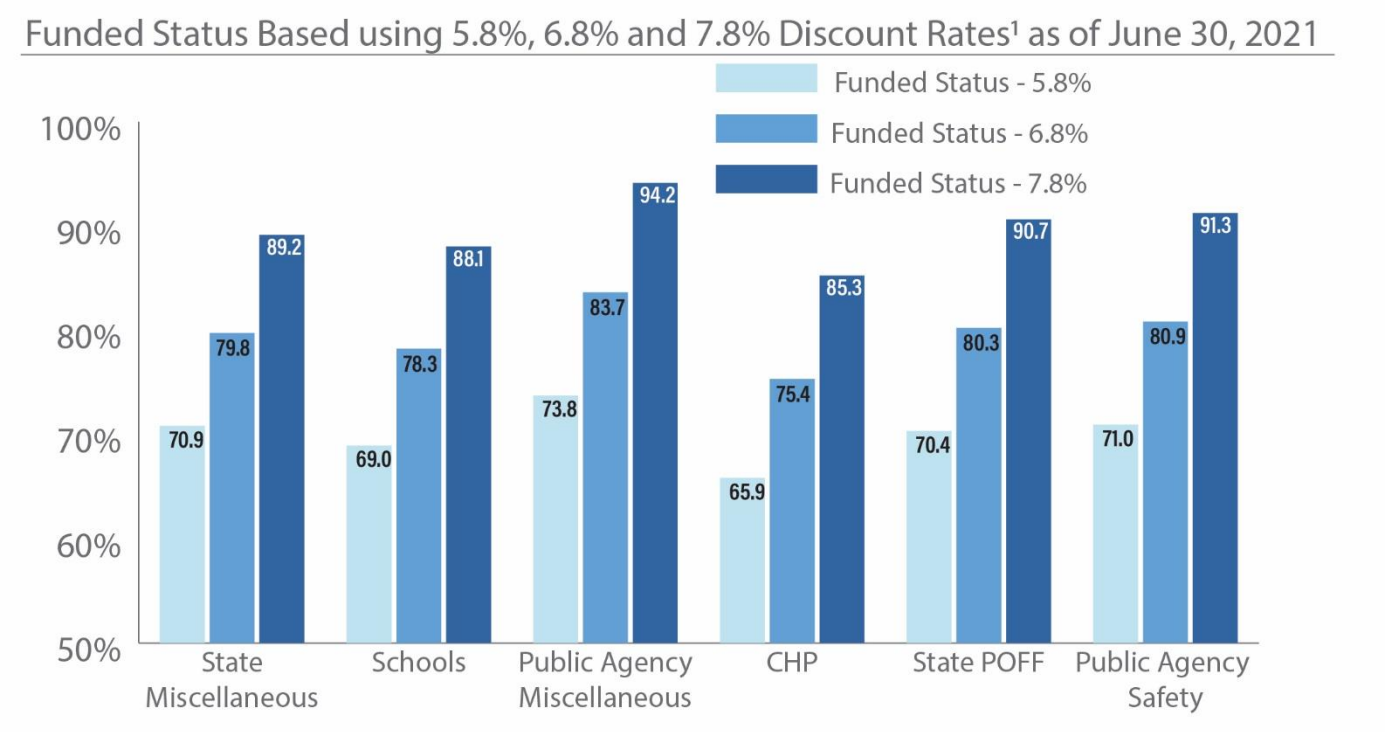
Each year from 2012 through 2021 between 15% and 40% of the systems included in the survey reduced their discount rates.

Since the Public Plans Data was compiled from available 2021 ACFR information, it is somewhat out of date compared to current funding practices. For example, in the data used for the chart, the 2021 ACFR discount rate for CalPERS is 7.25%. For funding purposes, CalPERS used a discount rate of 7.00% for three years before reducing it to 6.80% in the 2021 funding valuation.

The Actuarial Office performed 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 from funding valuations with valuation dates ranging from June 30, 2021 through January 1, 2022 and are shown to the right of the Public Plans Data. The survey found that discount rates ranged from 6.00% to 7.25%. There were 17 systems with discount rates at or above 7.00% and 17 systems with discount rates at or below 6.80%.

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



[1]Inflation 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 more/less risky 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.

Managing Risk

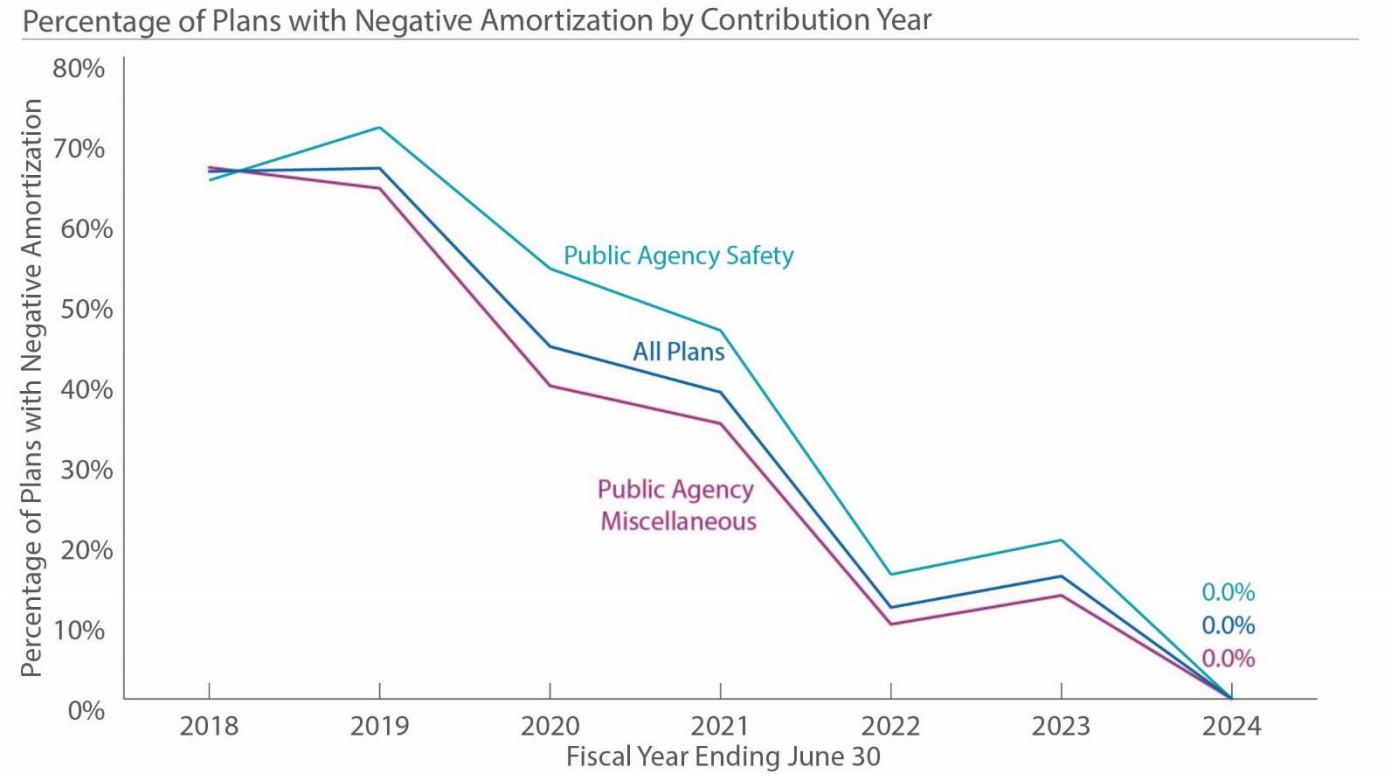
Current Amortization Progress

The goals of a retirement system's amortization policy should be to pay down existing unfunded liability 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 unfunded liability. However, it is still possible under the current policy that a plan's required payment toward the UAL is less than one year of interest on the UAL. The main factors that can produce this result are 1) recent increases in the UAL due to investment losses for which required payments are in the 5-year ramp-up period, and 2) the relatively long average remaining amortization period for the UAL due to older bases with longer periods. As shown in the chart below, the number of rate plans subject to negative amortization has declined over the last few years as the recent UAL bases due to investment losses and assumption changes approach the end of the 5-year ramp-up period.

While the chart below indicates that no CalPERS plan has a required UAL payment for FY 2023-24 that is less than interest on the UAL, we expect that following the investment loss for FY 2021-22, several plans will have required UAL payments for FY 2024-25 that will be less than interest on the UAL.



The Actuarial Amortization Policy addresses situations where an employer has requested an extension of the amortization of the UAL due to a financial necessity. 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 newly created 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:

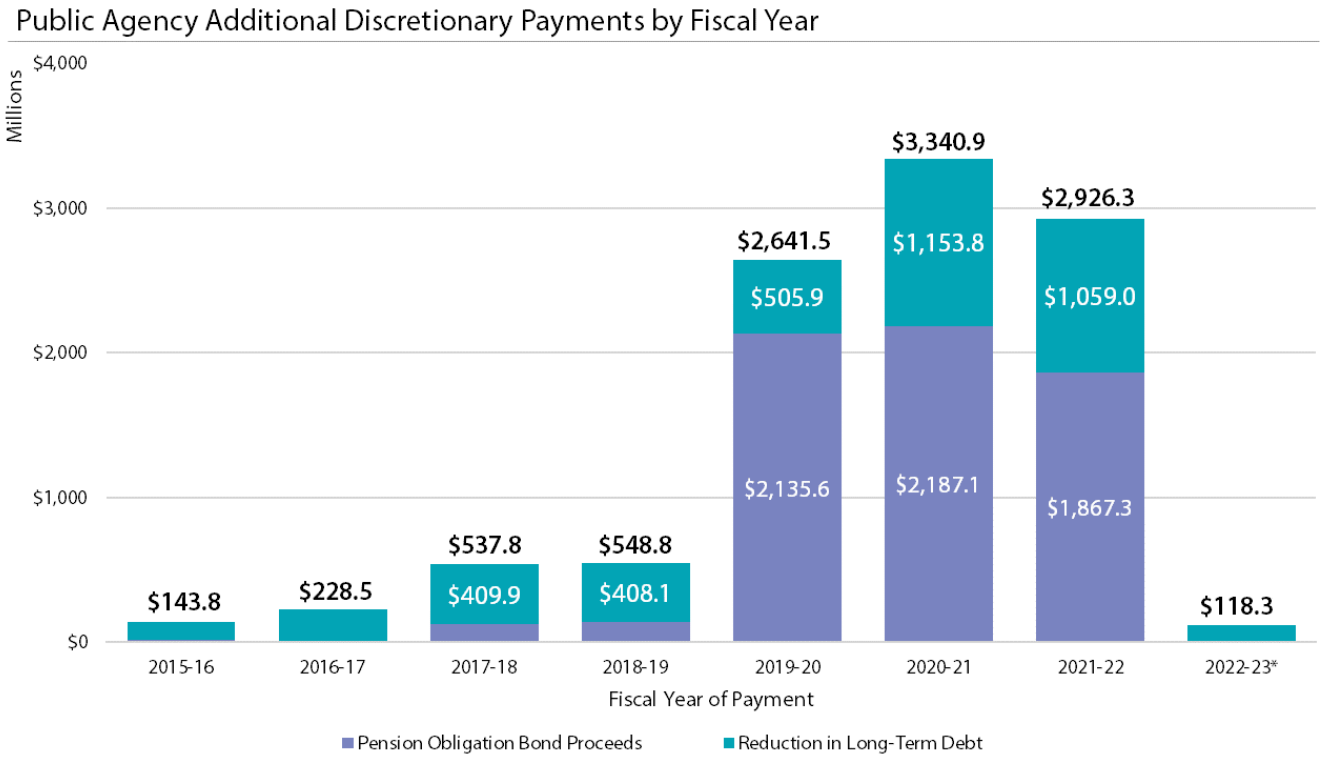
- Expected savings in interest paid and lowering the overall cost of the pension program
- Lower risk of low funded status in the future
- Lower risk of high contributions in the future
- A reduction to net pension liability for financial reporting purposes
- A reduction in pension expense for financial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

The form of these additional discretionary payments (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 unfunded liabilities. 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 2022-23, the State is expected to contribute over $3 billion more than the actuarially required contributions.

In addition to additional discretionary payments, 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 may start to decline.

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 in each of the last two years.



*ADPs from July 1, 2022 through September 30, 2022

ADP information was provided by the CalPERS Financial Office. POB issuance data was downloaded from the California Debt and Investment Advisory Commission at https://www.treasurer.ca.gov/cdiac/debt.asp.

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 unfunded accrued liability (UAL) payments. This also includes both lump sum annual UAL payments and voluntary Additional Discretionary Payments (ADP's). 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 2022, a total of 77 employers have established CEPPT accounts with assets under management totaling approximately $90 million.

Conclusion

Over the last few years various external factors have had material impacts on the experience of the Retirement System. While some of the impacts may have led to short-term improvements in the current funding levels of the system, other factors have worsened the funded position and pose additional threats to the system in the future.

Recent factors that were favorable to the funded status of the system were:

- Significant investment gains during the 2020-21 fiscal year
- Higher than expected mortality likely due to the COVID pandemic

Factors that were unfavorable to the current funding levels of the system and pose potential future threats are:

- Significant investment losses during the 2021-22 fiscal year
- Financial strain on employers due in part to the COVID pandemic
- High levels of inflation over the last 1-2 years which may persist
- Potential ongoing effects of COVID
- Potential economic downturn in the near-term
- Reduced expectations of future investment returns

The combined impact of the above factors has the potential to worsen the funded status of the system and result in large increases to required contributions for employers and members. The ability of employers to continue making required contributions to the system is the area of greatest concern.

While certain external factors are outside of the control of the system, CalPERS and its participating agencies have responded to these risks in a number of positive ways such as:

- The recent adoption of new 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 adoption of a new investment policy which maintains favorable investment return expectations and associated volatility
- Improvements in the processes of setting actuarial assumptions which are expected to lead to less volatile contributions rates in the future
- 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 including the possible impacts of the existing Funding Risk Mitigation Policy
- 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

With the anticipated increases in required employer contributions, due primarily to the investment losses experienced during the 2021-22 fiscal year, combined with current economic difficulties caused by the pandemic, inflation, and turbulent investment markets, some employers will likely have difficulty making required CalPERS contributions over the next several years. In addition, near-term forecasts by investment and economic professionals suggest it may be difficult to achieve a 6.8% investment return in the near-term. This potential for further increases to required employer contributions increases the risk that individual agencies may struggle to make required CalPERS contributions leading to potential contract terminations and possible benefit reductions. While 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, 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. CalPERS and its participating employers have taken many positive steps to manage the risks of the system. Continued focus on the risks described in this report, and opportunities to minimize and manage them, will be of utmost importance going forward.

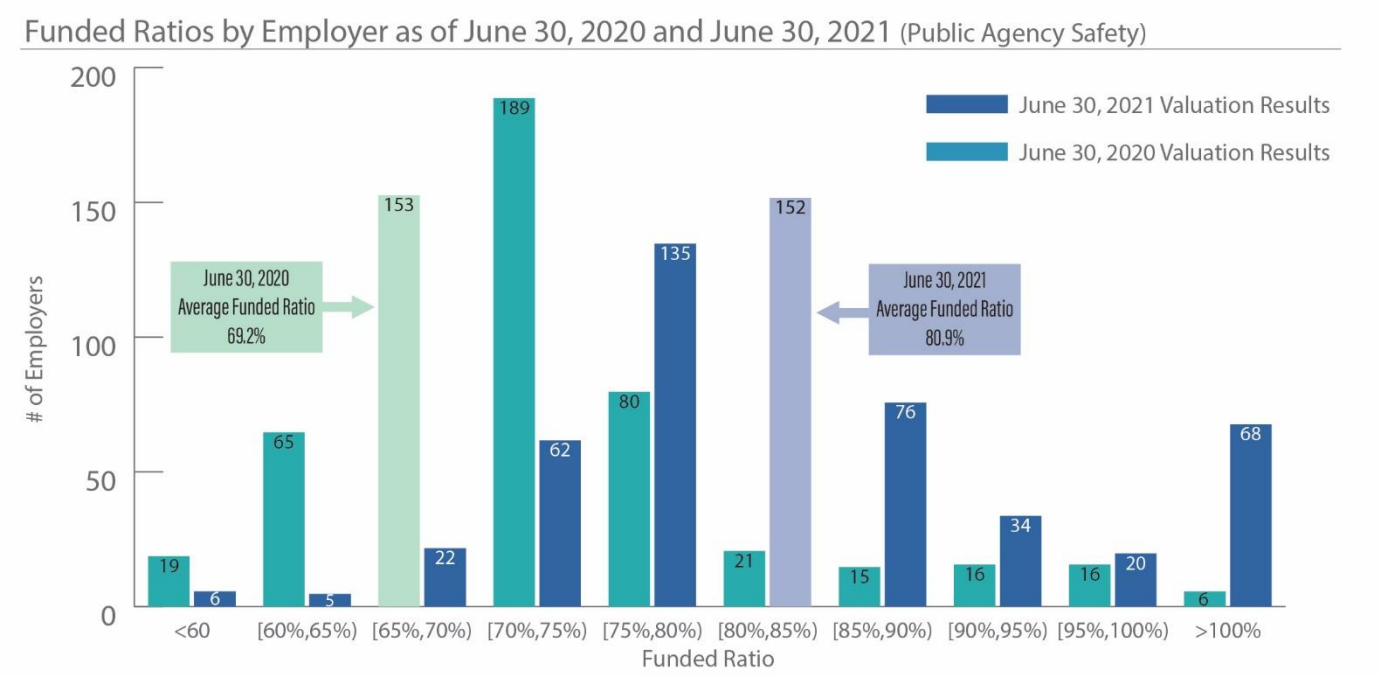
Appendix A – Public Employees' Retirement System (PERS) Summary Statistics

	June 30, 2020	June 30, 2021
Number of Actives[1]	861,976	844,905
Number of Transferred[1]	167,375	166,686
Number of Separated[1]	433,500	458,012
Number of Receiving[1]	869,819	897,640
Payroll	$58.6 billion	$58.7 billion
Entry Age Accrued Liability	$554.1 billion	$587.3 billion
Market Value of Assets	$390.4 billion	$476.2 billion
Unfunded Liability	$163.7 billion	$111.1 billion
Funded Status	70.5%	81.1%
Prior Year Benefit Payments	$26.1 billion	$27.7 billion
Prior Year Employer Contributions	$22.0 billion	$20.0 billion
Prior Year Employee Contributions	$4.9 billion	$4.8 billion

[1]These 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.

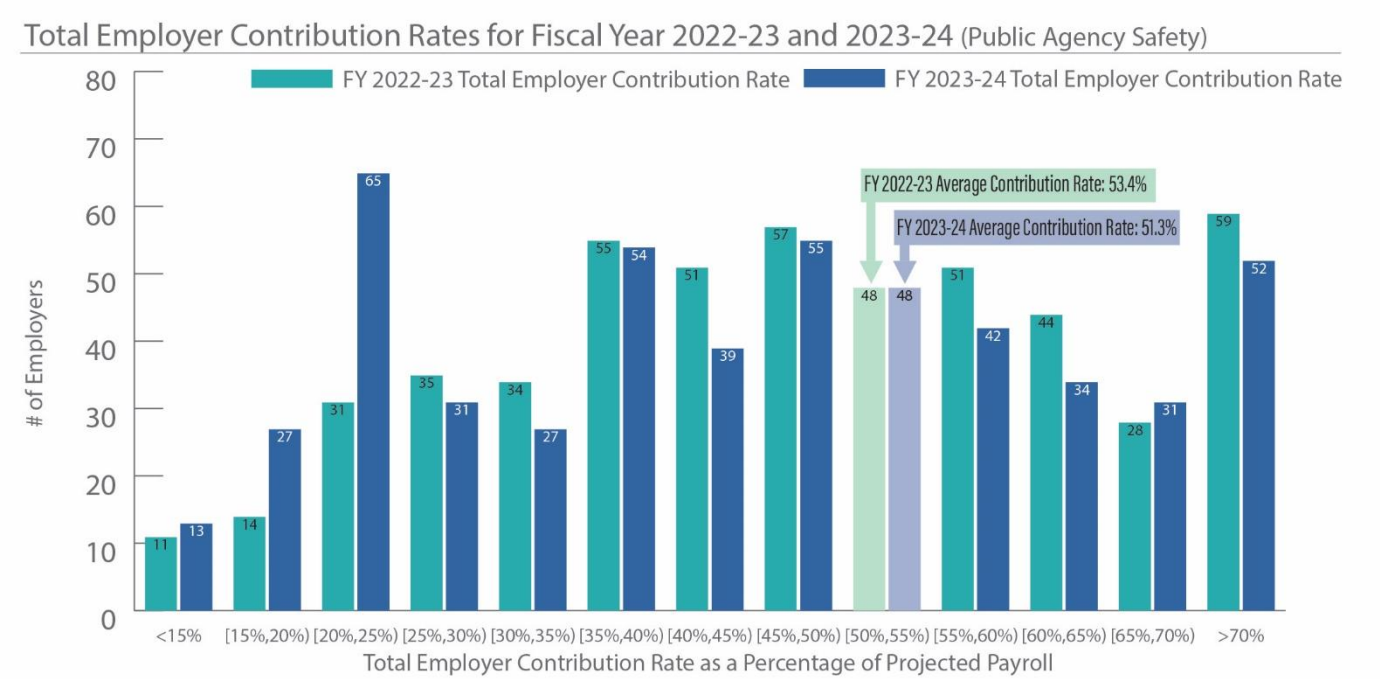
Appendix B – Results of June 30, 2021 Public Agency Valuations for Safety Plans

Public Agency Funded Ratios for Safety Plans

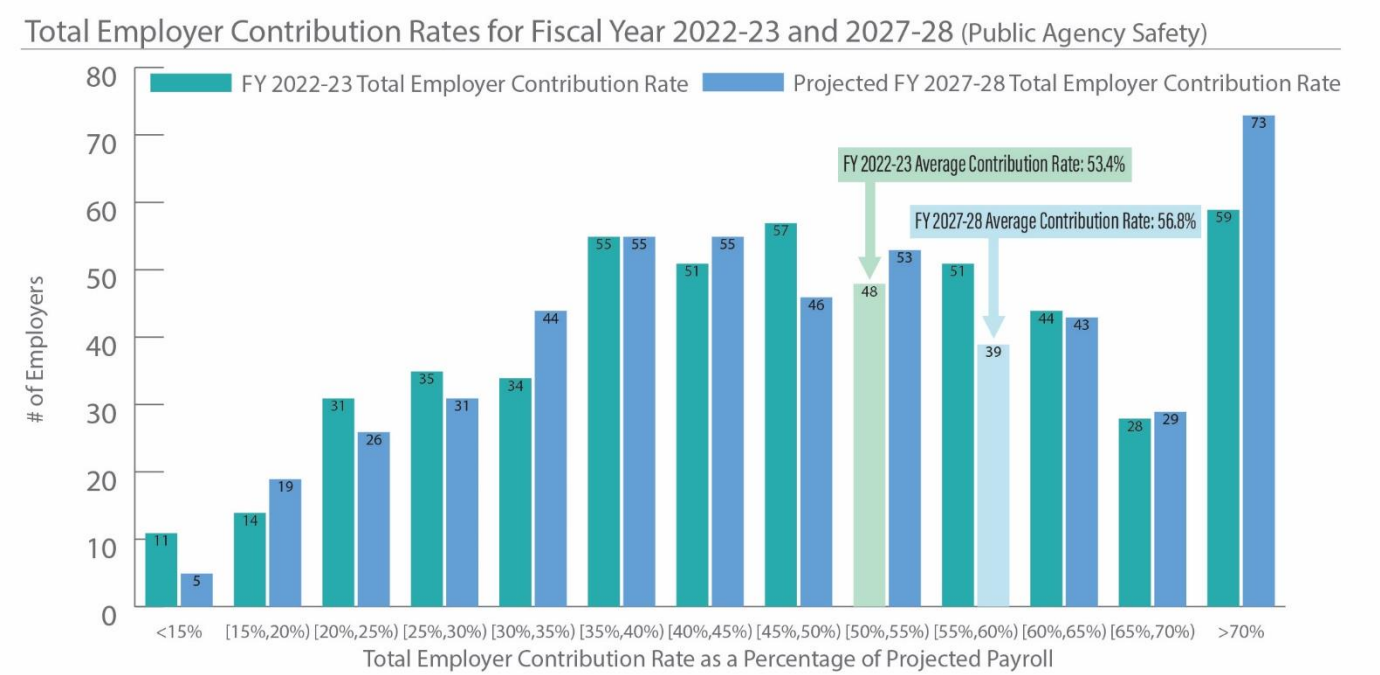


Public Agency Contribution Rates for Safety Plans

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 unfunded liability (converted to a percent of payroll).

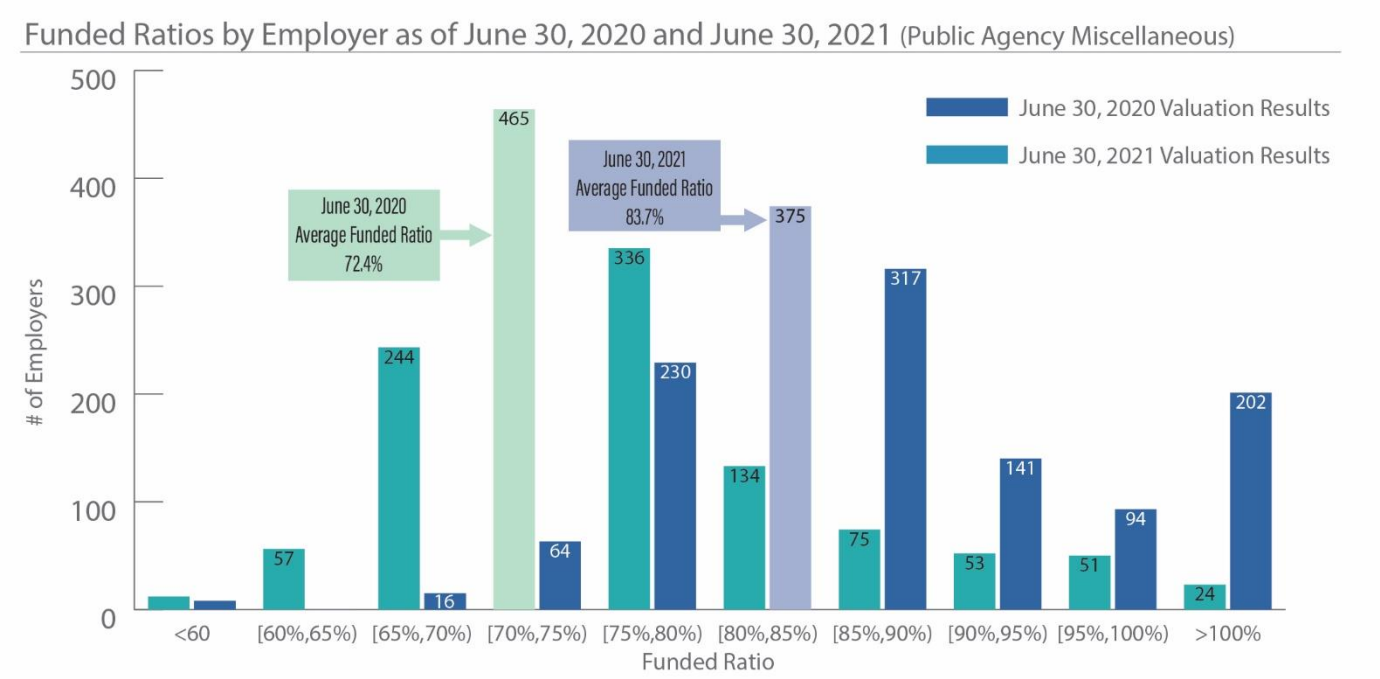


The following table displays the actual and projected total employer contribution rates for public agency safety plans that contract with CalPERS for benefits. These contribution percentages reflect both the required normal cost contribution percentage and the required payment toward any unfunded liability (converted to a percent of payroll). FY 2027-28 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 unfunded liability becomes a large percentage of the decreasing payroll. In addition, the projected contributions are based on experience through June 30, 2021. There will be additional investment, economic and demographic experience that will impact the projected rates before they become actual rates in the future.



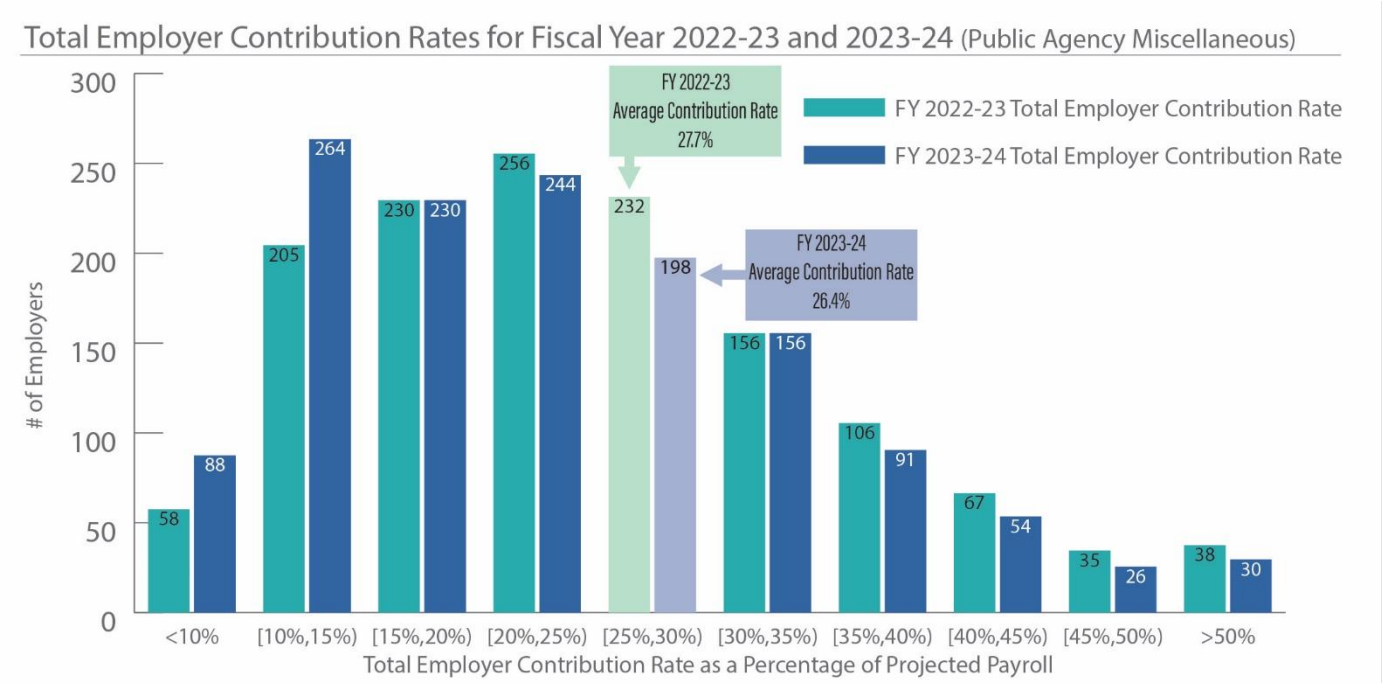
Appendix C – Results of June 30, 2021 Public Agency Valuations for Miscellaneous Plans

Public Agency Funded Ratios for Miscellaneous Plans

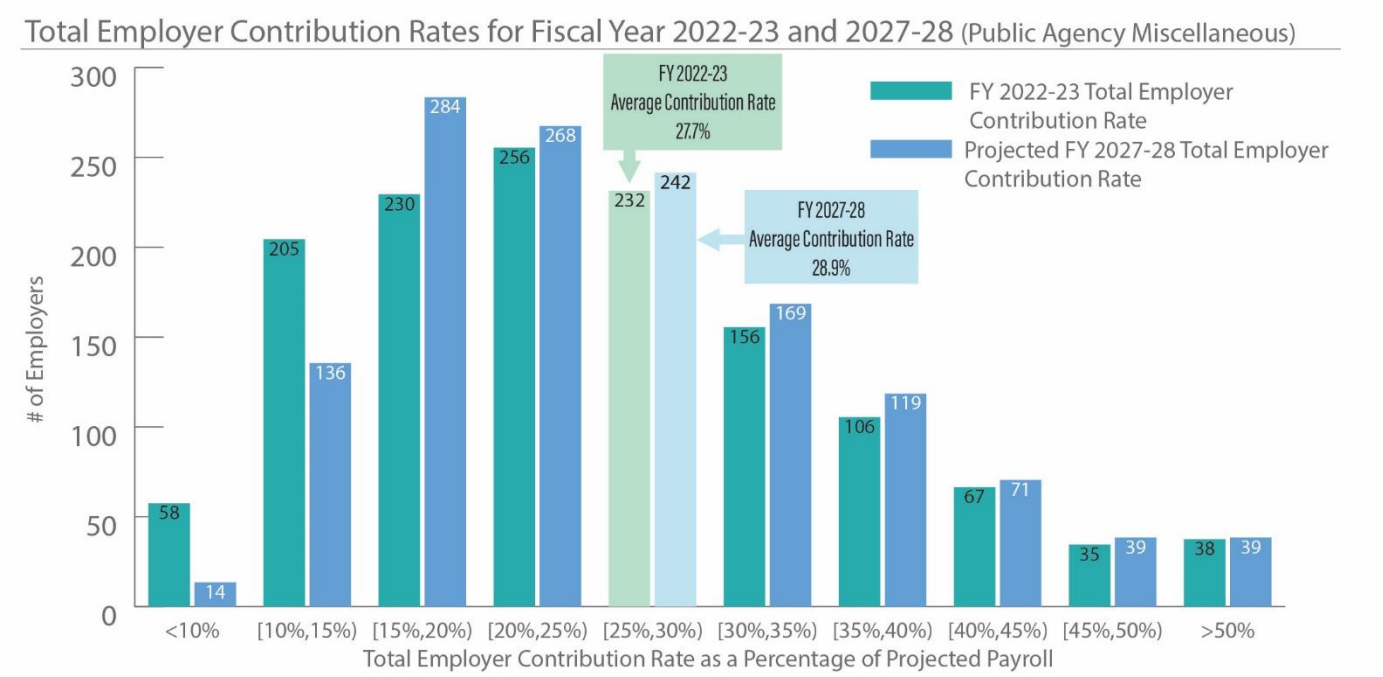


Public Agency Contribution Rates for Miscellaneous Plans

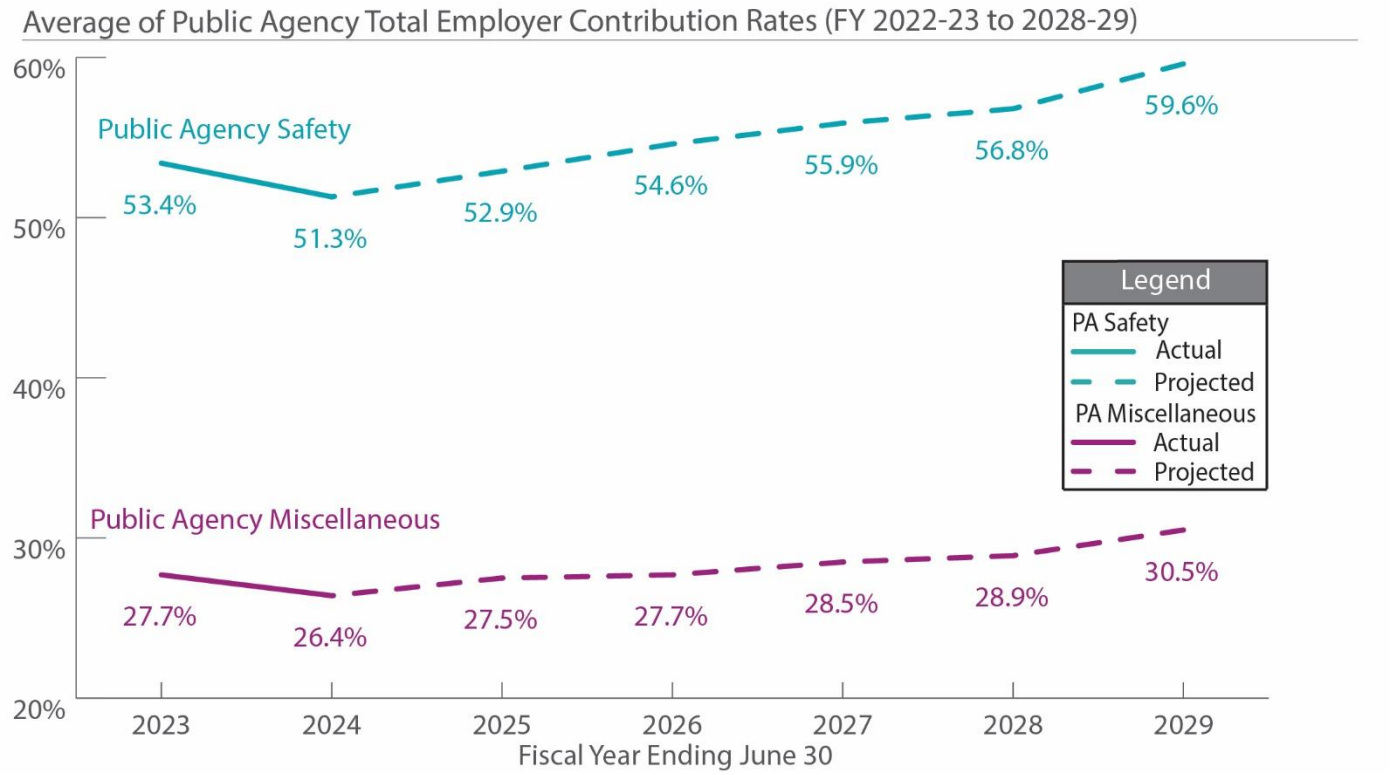
The following table displays the total employer contribution rates for public agency miscellaneous plans that contract with CalPERS for benefits. These contribution percentages reflect both the required normal cost contribution percentage and the required payment toward any unfunded liability (converted 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 unfunded liability (converted to a percent of payroll). FY 2027-28 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 unfunded liability becomes a large percentage of the decreasing payroll. In addition, the projected contributions are based on experience through June 30, 2021. There will be additional investment, economic and demographic experience that will impact the projected rates before they become actual rates in the future.

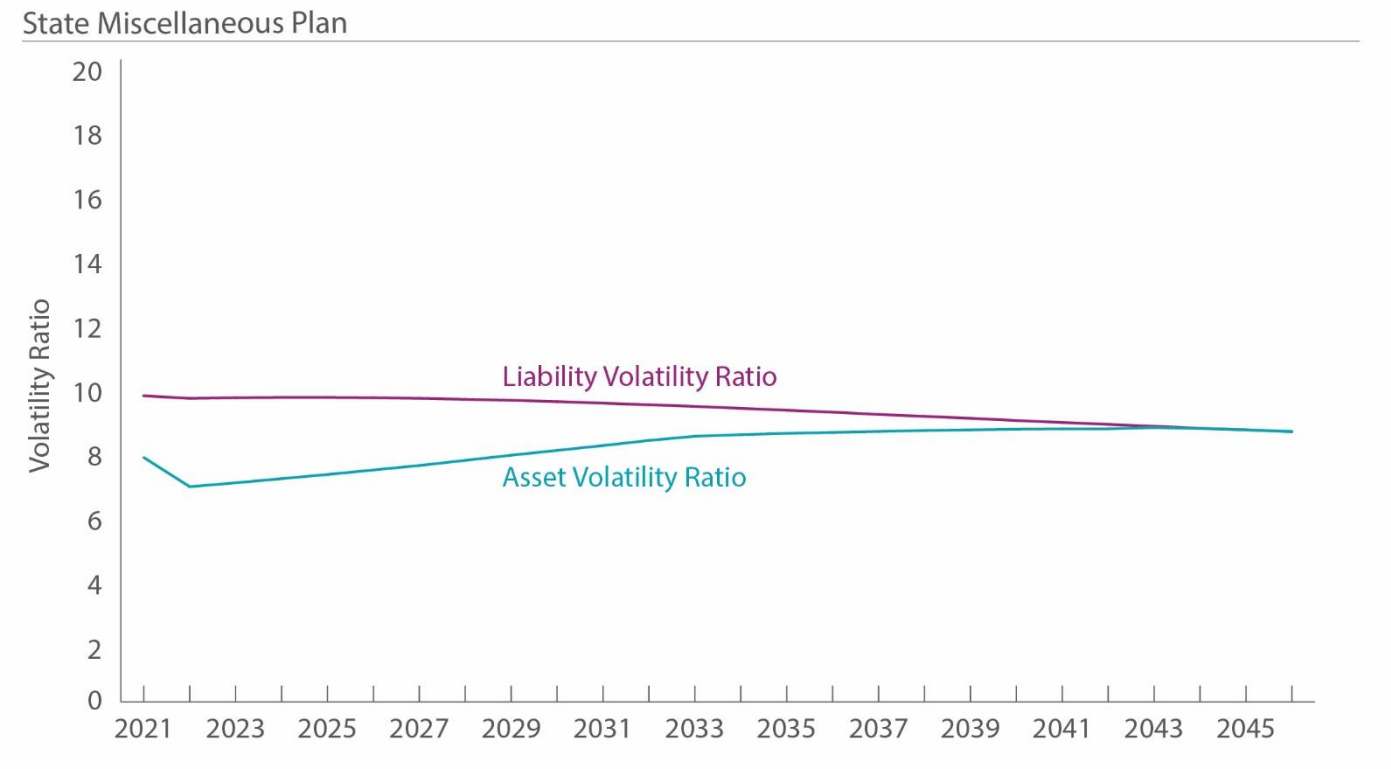


Appendix D – Recent and Projected Employer Contribution Rates

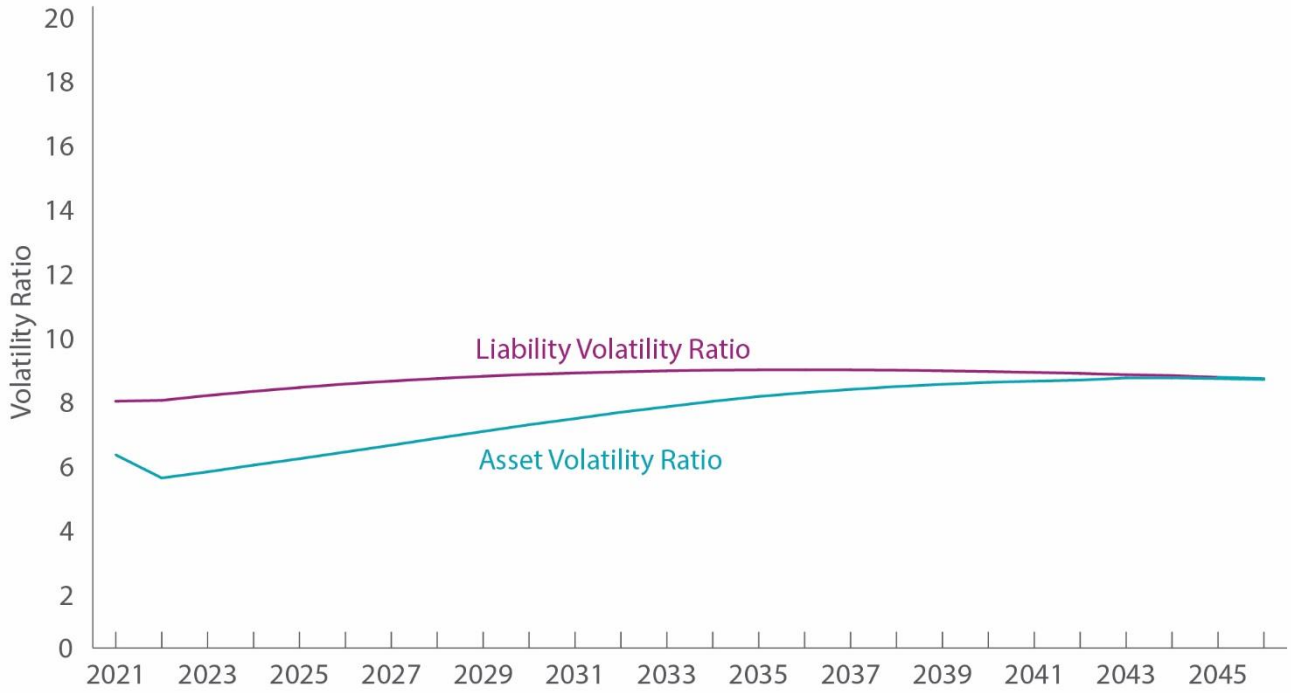


Appendix E – Asset and Liability Volatility Ratio Charts

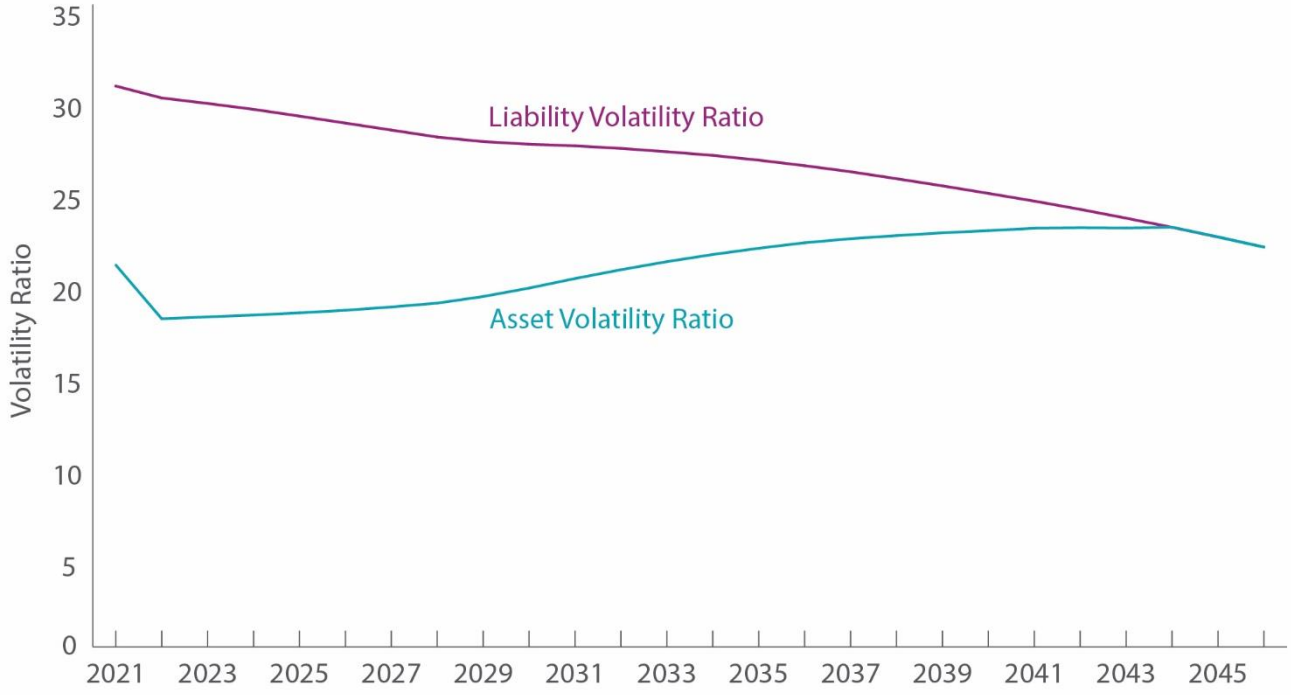
As discussed in the Impacts of Plan Maturity section, this appendix contains the Asset and Liability Ratio charts for the State Miscellaneous Plan, the School's Pool and less typical public agency plans.



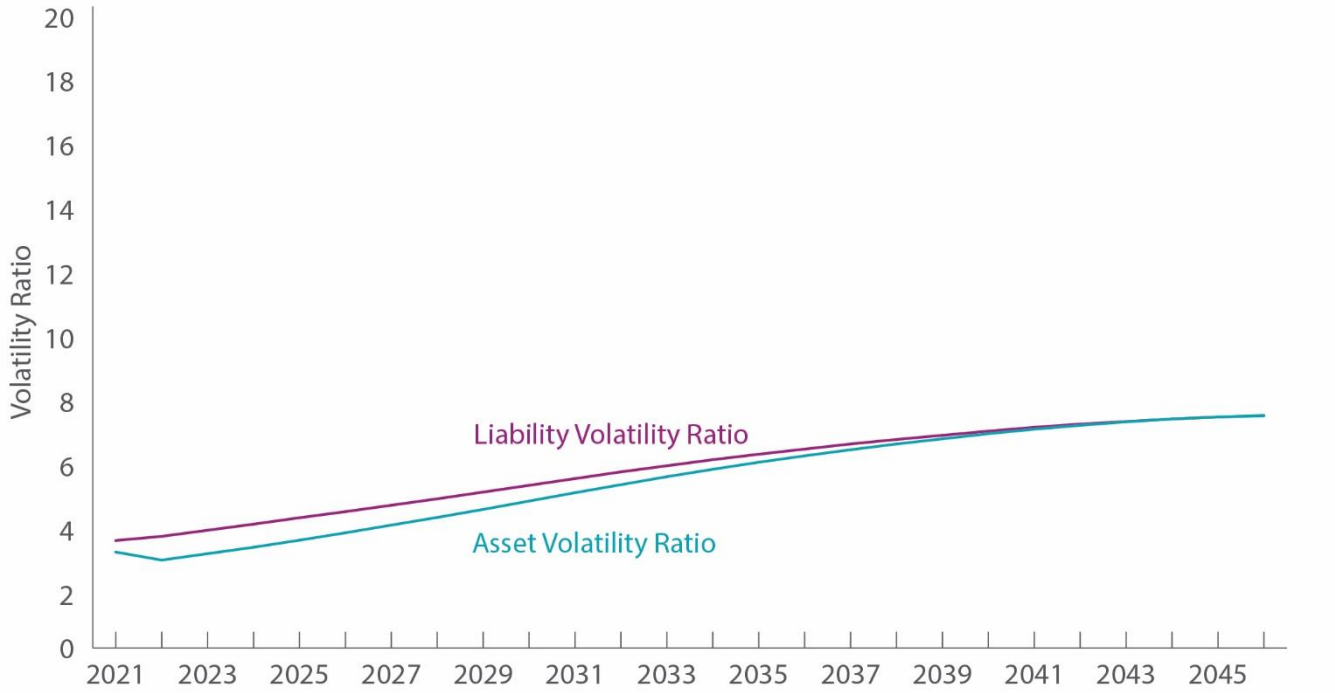
School's Pool



Super Mature Safety Plan



Less Mature Miscellaneous Plan



2022 Annual Review of Funding Levels and Risks

November 2022