CALSTRS

Regular Meeting

Item Number 10 – Open Session

Subject: Review of CalSTRS Funding Levels and Risks

Presenter(s): David Lamoureux and Rick Reed

Item Type: Information

Date & Time: November 5, 2021 – 45 minutes

Attachment(s): Attachment 1 – 2021 Review of Funding Levels and Risks Report

PowerPoint(s): Summary of Review of Funding Levels and Risks Report

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PURPOSE

The purpose of this item is to present the 2021 Review of Funding Levels and Risks report. This report is intended to assist the board and CalSTRS stakeholders in assessing the soundness and sustainability of the system and to better understand how the CalSTRS Funding Plan is expected to accomplish its goal of achieving full funding by 2046.

SUMMARY

CalSTRS' mission is to secure the financial future and sustain the trust of California's educators and provide retirement, disability and survivor benefits to them and their families. To that end, CalSTRS has come a long way. A few years ago, the fund was projected to run out of assets in about 30 years. Today, CalSTRS is financially stronger and better positioned to achieve full funding thanks to the adoption of the funding plan through Assembly Bill 1469 in 2014.

CalSTRS continually monitors the funding plan and the financial health of the fund. Formal assessments of funding levels and risks are provided to the board twice a year. These formal assessments are presented in the spring through the annual actuarial valuation report and in the fall through the Review of Funding Levels and Risks report. In addition to these two formal reports, CalSTRS provides updates to the board on the status of various funding-related risks as part of the semi-annual enterprise risk management report. These semi-annual reports are generally presented in September and March of each year.

The 2021 report is the sixth annual edition of the CalSTRS Review of Funding Levels and Risks report. The 2021 report includes four main sections focusing on the following:

- **Path to full funding**: Section discussing the significant changes in the past year and their impact on long-term funding and contribution rates.
- **The risk environment**: Section discussing the risks to long-term funding, including longevity risk, risks related to membership decline and future payroll growth and investment-related risk.
- **Measures of plan maturity and volatility**: Section discussing how increasing maturity levels impact contribution rate volatility.
- **Ability of the funding plan to reach full funding under different long-term actuarial assumptions**: New section added this year.

The report is based on the results of the June 30, 2020 actuarial valuation that was presented to the board in June 2021 and reflects the events that have taken place over the last fiscal year. Specifically, the report reflects $584 million in supplemental payments from the State of California that were included as part of the 2021-22 state's budget. It reflects the 27.2% investment return earned by CalSTRS in fiscal year 2020-21 and reflects the reduction in the number of active teachers experienced over the last fiscal year. This reduction has resulted in a payroll that has remained flat, below the assumed 3.5% annual growth.

Even if the recent decline in the number of active teachers had a negative impact, last year's events have strengthened CalSTRS' long-term sustainability and its goal of achieving full funding. This is demonstrated throughout the attached report. Projected funding levels are now higher than those presented as part of the June 30, 2020 actuarial valuation. In addition, every funding risk measure included in the report has improved over the last year.

It is worth noting that the impact of the 27.2% investment return will not be fully recognized in the funding of the Defined Benefit Program all at once. For funding purposes, the funded ratio reported by CalSTRS is based on the actuarial value of assets calculated using the 3-year asset smoothing policy adopted by the board. This value is a "smoothed" value that differs from the market value by reflecting only one-third of the net accumulated investment gains and losses. This approach is used to smooth out the impact of investment volatility on funding levels and contribution rates. As a result of the asset smoothing policy, it will take at least 3 years for the impact of the 27.2% return to be fully reflected in funding levels and contribution rates. Looking at it another way, two-third of investments gains from last year will be set aside and be available to dampen the impact of any potential investment losses over the next few years.

As a result of the rules set forth in the funding plan, the state and the employers will not share equally the impact of this better-than-expected investment return. While the state's share of CalSTRS unfunded actuarial obligation is now expected to be fully eliminated over the next 3 years, the employers' share will increase, resulting in the need for higher employer contribution rates than previously estimated in the most recent actuarial valuation.

Next May, when the results of the June 30, 2021 actuarial valuation are presented, the board will likely be in a position where the state contribution rate could be lowered below its current level and still allow the state to eliminate its share of the unfunded actuarial obligation by 2046.

However, CalSTRS still faces several risks that could impact its ability to reach full funding. The largest risk remains the risk from investment volatility, especially considering the CalSTRS Defined Benefit Program continues to mature, which will increase the system's sensitivity to investment volatility. The state's share of the unfunded actuarial obligation could quickly re-appear if CalSTRS were to experience a return below the assumed return. For these reasons, the board will likely be presented with options regarding the state contribution rate for fiscal year 2021-22 that will include an option to not lower the state contribution rate.

There is also growing concern related to the long-term payroll growth assumption of 3.5% used in the funding of the system. For the second year in a row, the number of active teachers who participate in the Defined Benefit Program declined, this time dropping by about 19,000, from 448,000 to 429,000. Furthermore, recent declines in the number of children enrolled in K-12 public schools and projected enrollment declines in the future may result in a need for less teachers in California. This could impact the number of active teachers who participate in the Defined Benefit Program and ultimately the growth in the payroll.

Even if inflation has recently been on the rise, long term, inflation is currently forecasted to be lower than 2.75% by many economists. Many retirement systems in the nation have lowered their inflation assumption below the 2.75% assumption currently used by CalSTRS. The federal government also lowered the long-term inflation assumption used in the 2020 actuarial valuation for Social Security from 2.6% to 2.4% per year. Inflation is a key component of two important economic actuarial assumptions used in the funding of CalSTRS Defined Benefit Program. It impacts expected payroll growth and the assumed investment return.

The outlook for investment returns has also changed over the last two years. Recent surveys of capital market assumptions such as the one published by Horizon Actuarial Services, LLC indicate the short-term outlooks for investment returns are lower than just 2 years ago. Many of these surveys reflect the fact interest rates are at historical low levels. These reduced outlooks toward the future, if they materialize and persist over the long term, could put pressure on CalSTRS ability to earn its assumed 7% investment return.

The next few years will be critical for the CalSTRS Funding Plan. The full impact of the COVID-19 pandemic on the economy, employment patterns and employers' budgets is still uncertain. With the expected decline in K-12 enrollments and its potential impact on the number of active teachers, the COVID-19 pandemic and its effect on the economy could potentially impact long-term actuarial assumptions such as price inflation, payroll growth, investment return and longevity.

As part of its on-going monitoring of the funding plan, CalSTRS performs a formal review of actuarial assumptions every four years, with the most recent review completed in January 2020. The next formal review is currently expected to be completed in 2024. Until then, CalSTRS will continue to monitor these assumptions to ensure they remain appropriate. If any events or changes were to warrant an adjustment to actuarial assumptions, the issue would be brought to the board for discussion, even if it meant such discussion would occur ahead of the normal four-year review cycle.

Note that a new addition to this year's Review of Funding Levels and Risks report is a section where the ability of the funding plan to reach full funding by 2046 was analyzed and tested against different sets of more conservative economic actuarial assumptions. The analysis showed CalSTRS is in a stronger position today to react to changes in actuarial assumptions than it was two years ago when actuarial assumptions were last reviewed. In fact, under all but one set of actuarial assumptions analyzed for the report, CalSTRS would still be projected to reach full funding by 2046. This is a significant improvement that places CalSTRS in a favorable position if there was a desire on the part of the board to adopt more conservative actuarial assumptions in the future.

CALSTRS

2021 Review of Funding Levels and Risks

Presented November 5, 2021

INTRODUCTION

This is the sixth annual edition of the CalSTRS *Review of Funding Levels and Risks* report. The CalSTRS *Review of Funding Levels and Risks* report provides information to the Teachers' Retirement Board, stakeholders, policymakers and the public to assess the soundness and sustainability of the CalSTRS Defined Benefit Program and to promote a better understanding of how well the CalSTRS Funding Plan is expected to accomplish its goal of achieving full funding by 2046.

To better understand the risks associated with funding the system, this report examines a range of potential negative outcomes, both economic and demographic, that could endanger the long-term funding of the system and prevent the system from reaching full funding.

This report is based on the June 30, 2020 annual valuation of the Defined Benefit Program and reflects all relevant changes that have occurred since the valuation, including the 27.2% investment return reported for the 2020–21 fiscal year and the 2021–22 budget for the State of California, which included $584 million in supplemental payments for CalSTRS from both Proposition 2 revenues and the General Fund. These funds are intended to bridge the gap from where the state contributions would have been had the state contribution rate not been frozen for fiscal year 2020–21 and to further reduce the state's share of the unfunded actuarial obligation.

This report includes four main sections focusing on the following:

- **Path to full funding:** Section discussing the significant changes in the past year and their impact on long-term funding and contribution rates.
- **The risk environment:** Section discussing the risks to long-term funding, including longevity risk, risks related to membership decline and future payroll growth and investment-related risk.
- **Measures of plan maturity and volatility:** Section discussing how increasing maturity levels impact contribution rate volatility.
- *New section this year*: **Ability of the funding plan to reach full funding under different long-term actuarial assumptions.**

EXECUTIVE SUMMARY

The California State Teachers' Retirement System was founded in 1913 with 120 retired members and 15,000 active members. More than 100 years later, CalSTRS remains committed to its mission to secure the financial future and sustain the trust of California's educators and to provide retirement, disability and survivor benefits to them and their families.

To that end, CalSTRS has come a long way. Prior to the 2014 adoption of the funding plan, the CalSTRS Defined Benefit Program was expected to run out of assets in about 30 years. Thanks to the funding plan and the limited rate-setting authority it provides the board to adjust the state and employer contribution rates, CalSTRS is now financially stronger and better positioned to react to a potential recession and achieve full funding.

CalSTRS continually monitors the funding plan and the financial health of the fund and provides formal assessments of funding levels and risks to the board twice a year. These formal assessments are presented in the spring through the annual actuarial valuation report and in the fall through the *Review of Funding Levels and Risks* report. In addition to these two formal reports, CalSTRS provides updates to the board on the status of various funding-related risks as part of the semi-annual enterprise risk management report. These semi-annual reports are generally presented in September and March of each year. CalSTRS will continue to monitor the current COVID-19 situation closely since it has the potential for affecting the three main risks identified in this report.

CalSTRS is also required by statute to provide a report to the Legislature every five years on the progress of the funding plan. The first progress **report** was completed and provided to the Legislature in June 2019. The next progress report is due in June 2024.

As shown in this year's *Review of Funding Levels* and Risks report, the 27.2% investment return earned by CalSTRS in 2020–21 has significantly improved projected funding levels. CalSTRS now expects the Defined Benefit Program to reach full funding prior to 2046 under current actuarial assumptions. As a result of the rules set forth in the funding plan, the state and the employers will not share equally the impact of this better-than-expected investment return. For more details, please refer to the "Path to full funding" section.

Key results and findings of this report include:

- The state's share of the CalSTRS unfunded actuarial obligation is now projected to be eliminated by June 30, 2023, well ahead of schedule.
- Long-term contribution levels for employers are expected to be higher than previously estimated in the most recent actuarial valuation.
- Anticipated decreases in enrollment in K-12 public schools could lead to future declines in the size of the active membership, resulting in lower than anticipated payroll growth. This could negatively impact CalSTRS' ability to achieve full funding, requiring contribution rate increases, especially for employers.
- The largest risk facing CalSTRS' ability to reach full funding remains investment-related risk, especially considering the Defined Benefit Program continues to mature, which will increase the system's sensitivity to investment experience. The state's share of the unfunded actuarial obligation could quickly increase and re-appear if CalSTRS were to experience a year in which the investment return is significantly below the assumed rate of return.
- A recession resulting in a period of low investment returns and a decline in the size of the active membership could hurt CalSTRS' ability to reach full funding. However, by having a funding plan in place, CalSTRS is better positioned today than it was 10 years ago to be able to react to and absorb the impact of a recession.
- The ability of the funding plan to allow CalSTRS to reach full funding is dependent on CalSTRS meeting its current actuarial assumptions over the long term. Uncertainty around inflation and payroll growth combined with the fact interest rates remain at historical low levels could put pressure on CalSTRS' ability to meet some of its long-term actuarial assumptions.

PATH TO FULL FUNDING

One of CalSTRS' main goals is to ensure a financially sound retirement system for California's educators. As mentioned earlier, progress toward this goal was made possible in 2014 with the passage of the CalSTRS Funding Plan.

The funding plan set out a measured schedule of contribution rate increases for members, employers and the state with the goal of achieving full funding by 2046. It also provided the board with limited authority to adjust rates to help keep the funding plan on schedule.

This section discusses how significant changes in the past year have impacted future funding levels and the contribution rates needed for the state and employers to continue the progress toward reaching full funding by 2046.

Significant changes in the past year

Over the last year, the board continued to exercise its authority to adjust contribution rates to keep the funding plan on track. At the June 2021 meeting, the board adopted an increase of 0.5% of payroll to the state supplemental contribution rate to ensure the state remains on the path to eliminate its share of CalSTRS' unfunded actuarial obligation by 2046. At that time, it was anticipated that increases in the state supplemental contribution rate of 0.5% of payroll would be needed for at least three more years.

At the same meeting, the board exercised for the first time ever the authority given by the funding plan to set the employer supplemental contribution rate. Recognizing uncertainty over the number of active teachers participating in the Defined Benefit Program and the increase a better-than-expected investment return would cause for the employer contribution rate, the board voted to keep the employer supplemental contribution rate at the existing level of 19.1% of payroll.

Even though the board voted to keep the total employer rate at 19.1% of payroll, the net employer contribution rate paid to CalSTRS increased from 16.15% of payroll in fiscal year 2020–21 to 16.92% in fiscal year 2021–22 due to a decrease in the rate relief provided by the state. As part of the 2020–21 state budget, the state redirected supplemental payments paid on behalf of employers to provide additional short-term contribution rate relief for anticipated economic conditions associated with the COVID-19 pandemic. The rate relief was set at 2.95% of payroll in 2020–21 and at 2.18% of payroll in 2021–22. Since the rate relief is set to expire after fiscal year 2021–22, employers are expected to face an increase of 2.18% of payroll for fiscal year 2022–23.

Despite concerns raised over a year ago on the potential impact of the COVID-19 pandemic on the economy, financial markets reached record highs over the last year. CalSTRS finished fiscal year 2020–21 with a 27.2% investment return, one of its highest returns in history. This return was more than 20% higher than the assumed investment return of 7%. Since investment return fluctuations can have a significant impact on projected funding levels and contribution rates, especially the state contribution rate, this return had a positive impact on projected funding levels and future state contribution rates.

The State of California also continued to demonstrate its commitment to the funding plan and CalSTRS' mission by committing $584 million in supplemental payments for CalSTRS as part of its 2021–22 budget. Specifically, the budget for the State of California included an additional $174 million from the General Fund to bridge the gap from where the state contributions would have been had the state contribution rate not been frozen by the state in 2020–21 and $410 million from Proposition 2 revenues to further reduce the state's share of the unfunded actuarial obligation.

Finally, the number of active teachers continued to drop for a second year in a row, this time by a greater number. Between 2019 and 2020, the number of teachers actively working dropped from about 451,000 to about 448,000. This was the first decrease in the number of active teachers in over seven years. Over the last year, the number of active teachers continued to drop to about 429,000. This reduction has resulted in a payroll that has remained flat, below the assumed 3.5% annual growth.

PATH TO FULL FUNDING

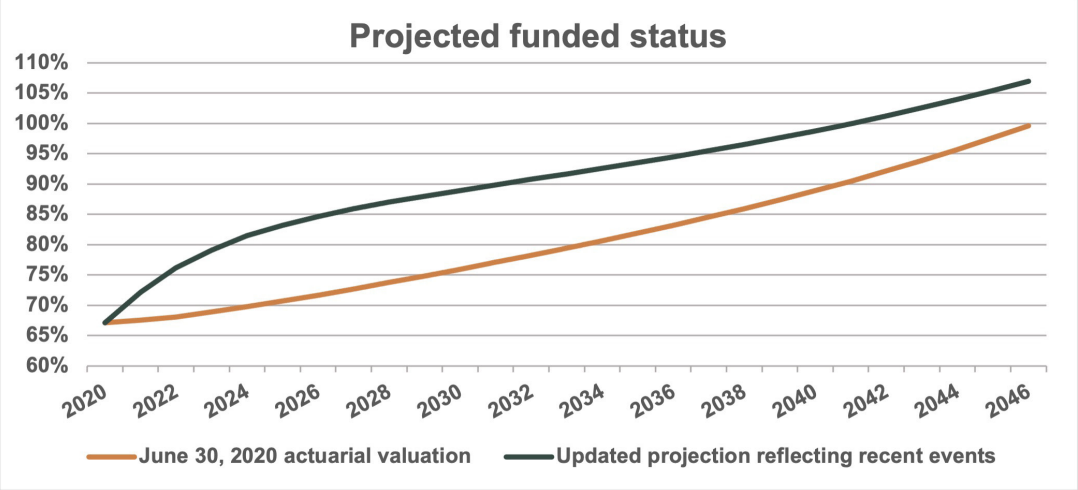
Even if the recent decline in the number of active teachers had a negative impact, last year's events have strengthened CalSTRS' long-term sustainability and its goal of achieving full funding. The state supplemental contribution rate, which a year ago was expected to continue to have to increase for three more years, could be eliminated a few years from now. This sudden change illustrates once again how sensitive the state contribution rate is to investment performance. The employer contribution rate on the other hand was negatively impacted by both the investment performance and the decline in active membership experienced over the last year. The impact of these events on projected funding levels and contribution rates is discussed in more details in the next few sections.

Projected funding levels

When the June 30, 2020 actuarial valuation was completed and presented to the board in June 2021, it assumed that CalSTRS would earn a 7% investment return in fiscal year 2020–21. It also did not reflect the $584 million in supplemental payments that the State of California adopted through its 2021–22 budget.

Note that for funding purposes, the funded ratio reported by CalSTRS is based on the actuarial value of assets calculated using the three-year asset smoothing policy adopted by the board. This value is a "smoothed" value that differs from the market value by reflecting only one-third of the net accumulated investment gains and losses. This approach is used to smooth out the impact of investment volatility on funding levels and contribution rates. As a result of this asset smoothing policy, it will take at least three years for the impact of the 27.2% return to be fully reflected in funding levels and contribution rates. Looking at it another way, two-third of investments gains from last year will be set aside and be available to dampen the impact of any potential investment losses over the next few years, acting like a rainy-day fund.

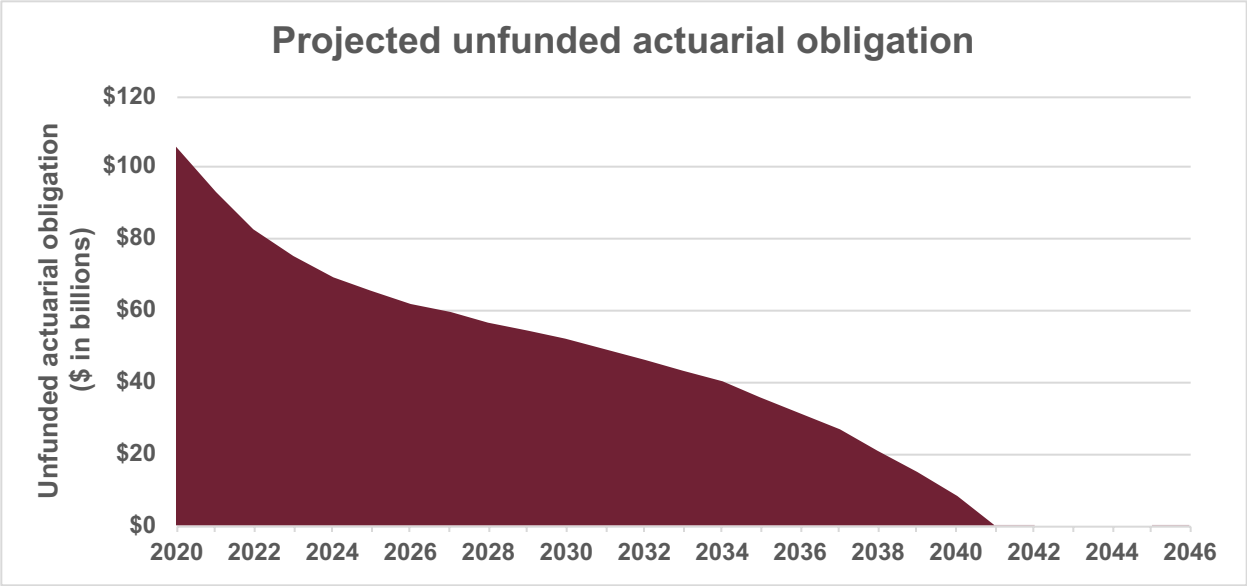
The following chart compares projected funding levels presented to the board in June 2021 as part of the June 30, 2020 actuarial valuation to the revised projected funding levels reflecting last year's events, including the 27.2% investment return. Note that the chart assumes the fund will earn 7% every year into the future.



As shown above, funding levels are now projected to be significantly higher than anticipated in the June 30, 2020 actuarial valuation. The Defined Benefit Program is now expected to reach 80% funded in 2024, 10 years earlier than previously projected. Full funding is now expected to occur in 2041, five years ahead of schedule.

The projected unfunded actuarial obligation has also been positively impacted by the investment performance over the last year. In the June 30, 2020 actuarial valuation, the unfunded actuarial obligation was determined to be $105.9 billion. Assuming the fund would earn 7% every year, the unfunded actuarial obligation was projected to continue increasing to about $115 billion over the next few years before starting to decrease. As can be seen in the following chart, the unfunded actuarial obligation is now expected to decrease every year in the future and be fully eliminated by 2041.

PATH TO FULL FUNDING



It is important to remember that these projections assume all actuarial assumptions will be met in the future. Specifically, it assumes the fund will meet its 7% return assumption and that payroll will grow at 3.5% over the long term. A period of low investment returns could materially impact future funding levels and future unfunded actuarial obligations.

As will be demonstrated later in this report, CalSTRS is in a better position today to react to a recession than a year ago. However, even if the probability of reaching full funding has improved over the last year, the risk of not reaching full funding by 2046 is still present and will never be fully eliminated.

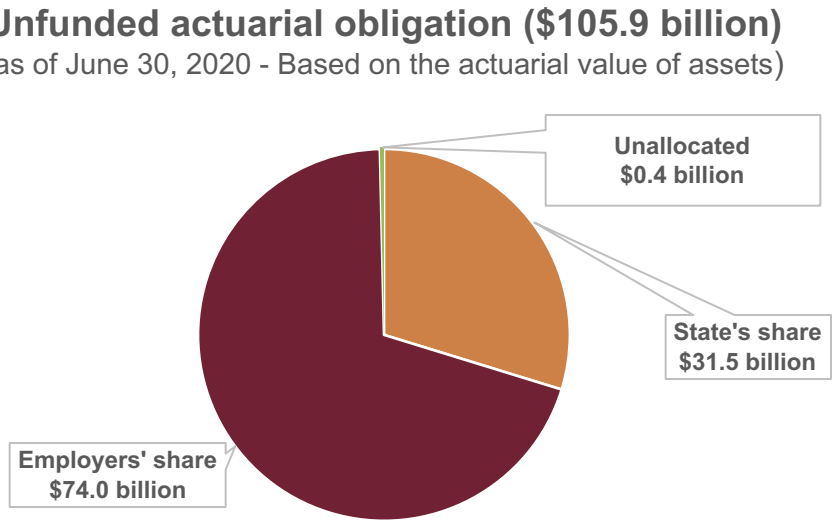
Projected breakdown of the unfunded actuarial obligation

Although the system is currently on a path to full funding, it is important to understand how the events in the last year have impacted the breakdown of the unfunded actuarial obligation into its various parts.

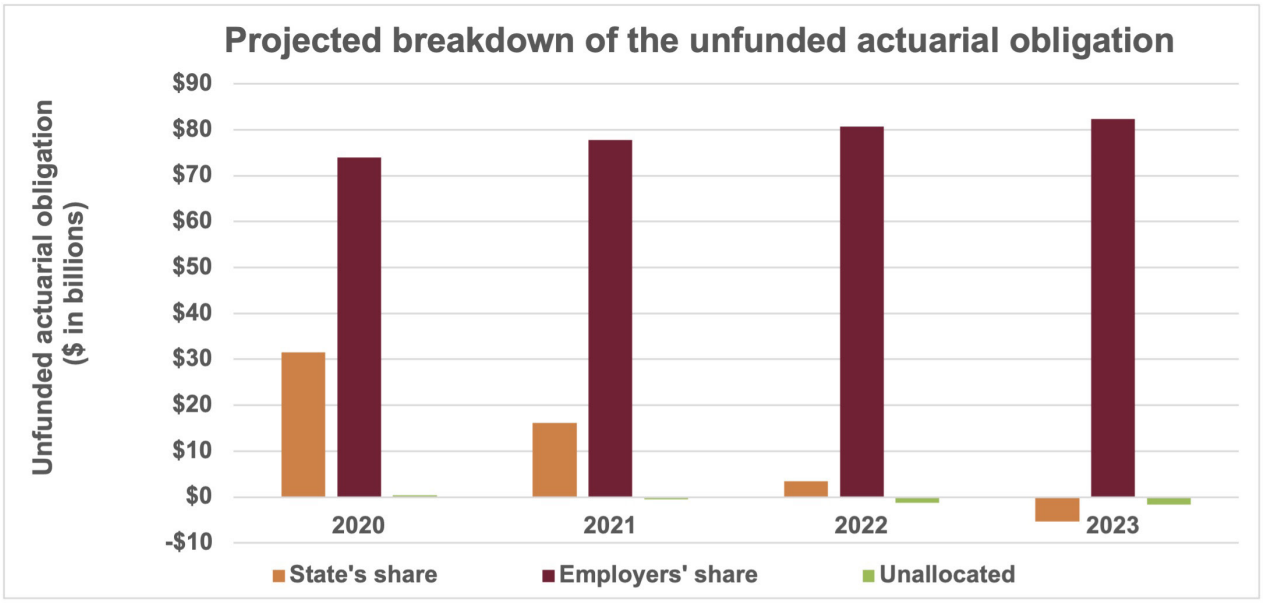
As per the rules of the funding plan, the unfunded actuarial obligation is divided between the state, the employers and the unallocated portion. The unallocated portion of the unfunded actuarial obligation is the portion for which the funding plan provided no authority to CalSTRS to adjust contribution rates to pay it down.

The following chart illustrates the breakdown of the unfunded actuarial obligation as of June 30, 2020, prior to the last year's events. In the June 30, 2020 actuarial valuation, the unfunded actuarial obligation was determined to be $105.9 billion. As can be seen, the employers were responsible for about 70% of that unfunded actuarial obligation, while the state was responsible for about 30%.

PATH TO FULL FUNDING



As shown earlier, the unfunded actuarial obligation is now projected to steadily decline each year in the future. However, the breakdown of the unfunded actuarial obligation between the various parts will not change in a consistent manner. The following chart illustrates that both the state and the unallocated portions are expected to decrease and become a surplus by June 30, 2023, while the employer's share of the unfunded actuarial obligation is projected to increase.



To understand why the employers' share of the unfunded actuarial obligation is expected to increase over the next few years, one must look at the rules of the funding plan.

PATH TO FULL FUNDING

Pursuant to those rules, employers are responsible for paying the unfunded actuarial obligation associated with the Defined Benefit Program benefit changes that have taken place since July 1, 1990. In the late 1990s, the California Legislature and Governor adopted several benefit improvements that resulted in CalSTRS paying higher benefits to its retirees. When funding levels dropped during the 2001 dot-com bust and the 2008 Great Recession, contributions were not increased to fund those higher benefits, and employers are now responsible for paying back to the Defined Benefit Program the cost of the increased benefits since their adoption. In 2000, the California Legislature and Governor also adopted a benefit improvement that resulted in members contributing 6% of salary to the Defined Benefit Program instead of 8%, with the remaining 2% of salary diverted to the Defined Benefit Supplement Program for a 10-year period. This amount is also factored into the employers' share of the unfunded actuarial obligation for the Defined Benefit Program.

As per the rules of the funding plan, the employers' share changes each year based on the actual investment return earned by CalSTRS. Looking at it another way, it is like employers being responsible for a debt with an interest rate that is tied to CalSTRS' actual investment return. When CalSTRS earns more than 7%, this debt increases faster than expected, resulting in an increase in the employers' share of the unfunded actuarial obligation. Similarly, a return below 7% results in a decrease in the employers' share of the unfunded actuarial obligation. Because of the 27.2% investment return in 2020–21, the employers' share of the unfunded actuarial obligation is expected to increase from $74 billion on June 30, 2020, to about $82 billion on June 30, 2023. As shown in more details in the next section, increases in the employers' share of the unfunded actuarial obligation will result in the need for higher employer rates than projected in the June 30, 2020 actuarial valuation over the long term. This is a counterintuitive outcome resulting from the rules set by the funding plan.

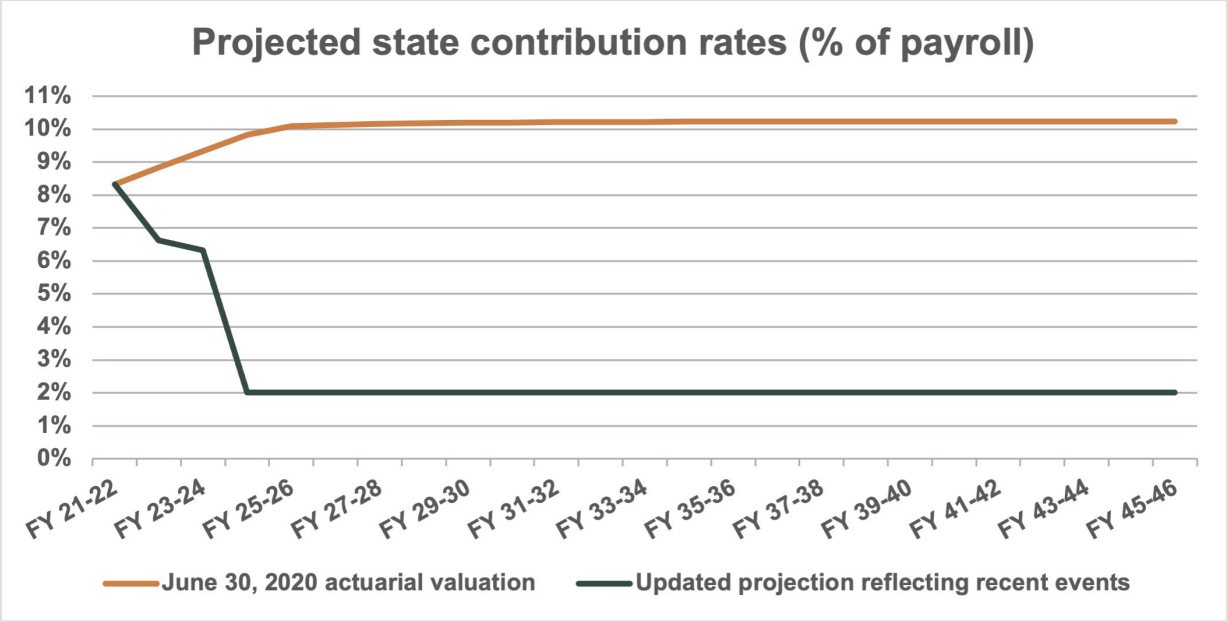
Projected contribution rates

As discussed earlier, last year's events have significantly impacted the projected breakdown of the unfunded actuarial obligation. Over the next few years, the employers' share is expected to increase while the state's share is expected to decrease. In fact, the state's share is expected to be eliminated by June 30, 2023.

As a result, the state contribution rate is now expected to be much lower than projected in the June 30, 2020 actuarial valuation while the employer contribution rate is now expected to be higher long term.

To illustrate the impact last year's events had on projected state contribution rates, following is a chart comparing the projections from the 2020 actuarial valuation and the revised projection reflecting these recent events. The chart also assumes that future investment returns will be 7% each year. The impact of future investment returns is discussed later in this report in the "Investment risk" section.

PATH TO FULL FUNDING



The state contribution rate is now expected to drop to the minimum statutory rate of 2.017% by fiscal year 2024–25. This is a significant reduction over the projections included in the June 30, 2020 actuarial valuation when the state rate was expected to increase for another three years until reaching about 10% of payroll. This is an 8% reduction in the long-term state contribution rate. This significant reduction highlights how sensitive the state contribution rate is to investment performance. It is important to remember the above projections were performed assuming the fund will meet its 7% return assumption and that payroll will grow at 3.5% over the long term. A period of low investment returns could materially impact future state contribution rates.

In contrast, the employer contribution rate is now expected to be higher than projected in the June 30, 2020 actuarial valuation as a result of the projected increase in their share of the unfunded actuarial obligation.

This was anticipated in June 2021 when the board exercised its authority to set the employer supplemental contribution rate for the first time in CalSTRS history. The board was presented with options to set the employer contribution at a level higher than calculated in the actuarial valuation. These options were consistent with the board valuation policy since they increased the likelihood CalSTRS would collect the amount of contributions anticipated by the valuation while reducing the risk employers may not be able to eliminate their share of the unfunded actuarial obligation by 2046.

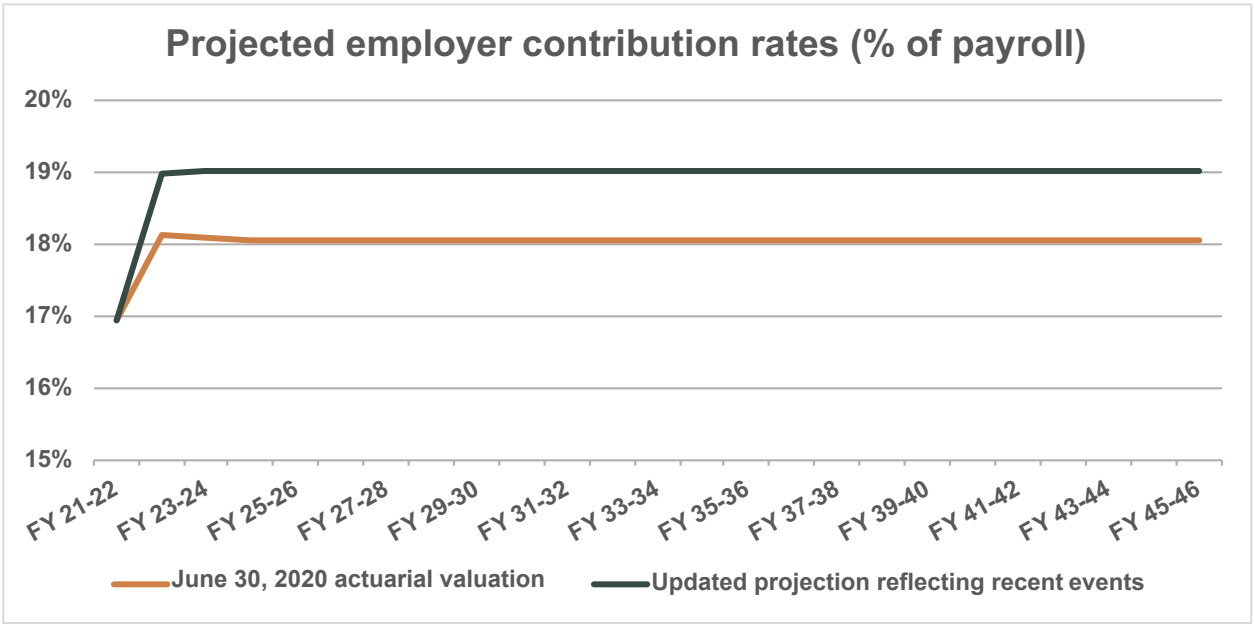
At that time, the board was informed CalSTRS had seen a surge in the number of retirements, which led to slower payroll growth than anticipated. CalSTRS was also on track to earn an investment return well in excess of its 7% investment return assumption. Both were indicators that the employer contribution rate would potentially have to be higher long term than calculated in the actuarial valuation.

Given that, the board voted to keep the employer rate at its existing level of 19.1% of payroll. This decision reduced the risk employers may not be able to eliminate their share of the unfunded actuarial obligation by 2046, increased the likelihood CalSTRS will collect the contributions anticipated by the valuation and provided more rate stability for employers.

PATH TO FULL FUNDING

Note that even though the board adopted a total employer rate of 19.1% of payroll for fiscal year 2021–22, the net employer contribution rate is currently 16.92% of payroll. Employers are paying less than the rate set by the board because of the rate relief of 2.18% of payroll provided by the state for this fiscal year. The rate relief is scheduled to expire at the end of the fiscal year. As a result, the net employer contribution rate is likely to increase by more than 2% of payroll in 2022–23 unless the state provides additional relief.

Below is a chart comparing the projected employer contribution rates from the 2020 actuarial valuation and the revised projection reflecting recent events.



The long-term expected employer contribution rate has increased by about 1% and is now projected to be near 19% of payroll, near the employer contribution rate adopted by the board for fiscal year 2021–22. Once again, the above projections were performed assuming the fund will meet its 7% return assumption and that payroll will grow at 3.5% over the long term. A slower payroll growth could materially impact future employer contribution rates.

THE RISK ENVIRONMENT

The events of the past two years have brought risk into stark focus. The emergence of the COVID-19 pandemic has had far-reaching effects on our lives and society. For CalSTRS, the full impact of the pandemic will not be known for many years; however, it highlights the importance of taking a holistic approach to the consideration and analysis of the risks encountered in the funding of the system. Previous Funding Levels and Risks reports have highlighted the fact that as a system, CalSTRS faces risk in several facets, but most significant are longevity risk, the risk of a decline in payroll and investment-related risks. The COVID-19 pandemic has impacted all three of these risks in different ways, and it is likely to continue to impact these risks both in the short and long term.

In addition to the above risks, another important aspect of funding is the other various demographic assumptions CalSTRS uses to assess funding levels and determine future costs. The board last reviewed and adopted actuarial assumptions in January 2020. These assumptions were developed and adopted under "normal" conditions. In a global pandemic it is reasonable to wonder if members will behave as they would normally. For example, CalSTRS experienced higher than usual retirements in fiscal year 2020–21. Similar trends have also been experienced across the country, and most states saw significant declines in the number of children enrolled in K–12 public schools. Although the actuarial assumptions adopted by the board are for the very long term and most likely still appropriate, short-term deviations can have long-term financial impacts on the funding plan.

This section will examine the risk associated with longevity, payroll growth and investments with emphasis placed on the continued impact of the COVID-19 pandemic.

Longevity risk

Each year, this report updates and examines the impact of longevity on the funding of the system. Longevity risk refers to the potential that members live longer than anticipated, and thus, the lifetime benefit they receive lasts longer than expected. This section includes information on how the COVID-19 pandemic has impacted the number of CalSTRS members' deaths. It also analyzes longevity from a historical perspective and how CalSTRS addresses the risk using generational mortality.

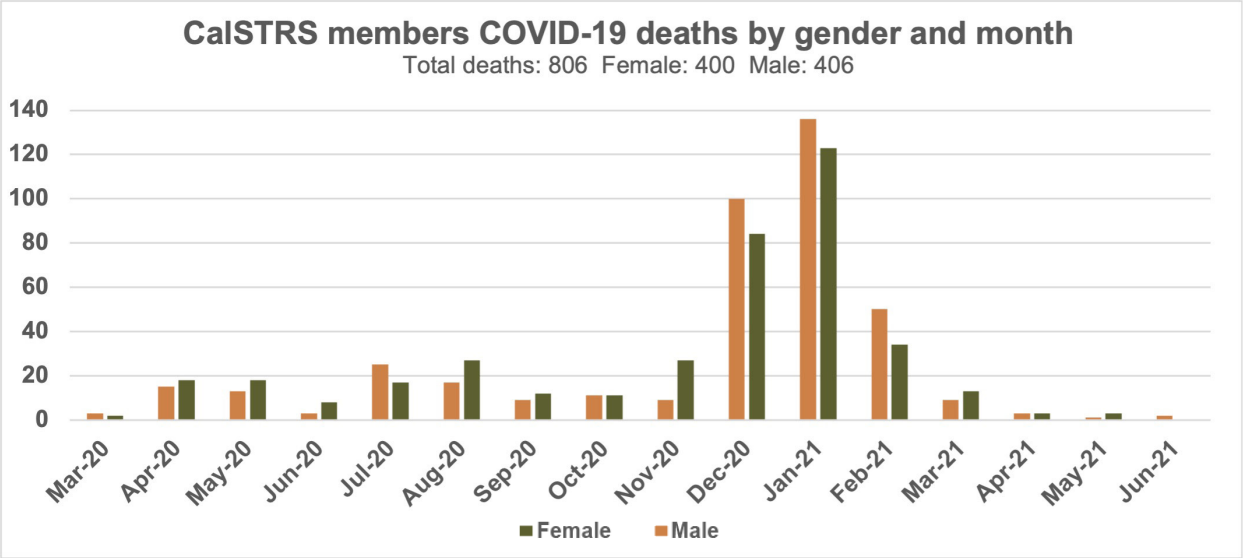
Tracking COVID-19 deaths

The COVID-19 pandemic adds extra uncertainty to CalSTRS' projections of life expectancy. It is not clear whether the pandemic will have long-term or only short-term impacts on mortality. CalSTRS will not know for certain the full impact for several years.

In April 2020, CalSTRS began a process of tracking mortality and collecting information for deaths of members and beneficiaries related to COVID-19. CalSTRS relies on the death certificates indicating COVID-19 as a reason of death. From these certificates, CalSTRS then collects the associated demographic information (e.g., age, gender, geographical location and CalSTRS membership status). The first known COVID-19-related death of a CalSTRS member was reported in March 2020.

The following chart summarizes the number of COVID-19 related deaths of CalSTRS members by month since the beginning of the pandemic all the way through the end of June 2021.

THE RISK ENVIRONMENT



As illustrated, there have been a total of 806 COVID-19 related deaths through June 30, 2021. Looking at the pattern, it is very similar to the pattern seen in the U.S. with the peak number of deaths in the December 2020 through January 2021 period.

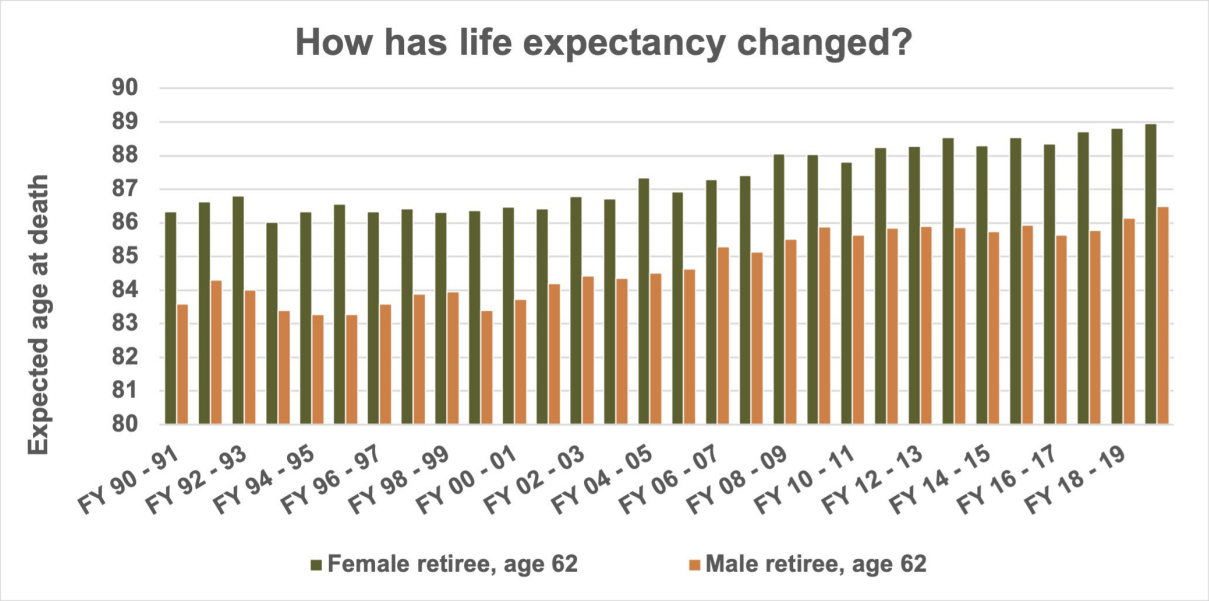
If we include all deaths, CalSTRS observed about 9,800 deaths during fiscal year 2020–21. About 8,300 from retired members and about 1,500 from beneficiaries. The total number of deaths was about 1,400 more than expected. Again, a similar pattern has been observed worldwide where the actual number of deaths has exceeded what would normally be anticipated. These excess deaths have also been greater than the number of reported COVID-19 deaths, potentially due to an under-reporting of COVID-19-related deaths.

Since CalSTRS has experienced a higher than expected number of deaths, it is likely to result in actuarial gains. The actual impact will be determined and reflected as part of the June 30, 2021 actuarial valuation that is expected to be presented to the board in May 2022.

Historical and projected life expectancy

CalSTRS has been tracking the life expectancy of CalSTRS retired members since 1990. The following chart shows the historical trend of life expectancy for a CalSTRS member retiring at age 62.

THE RISK ENVIRONMENT

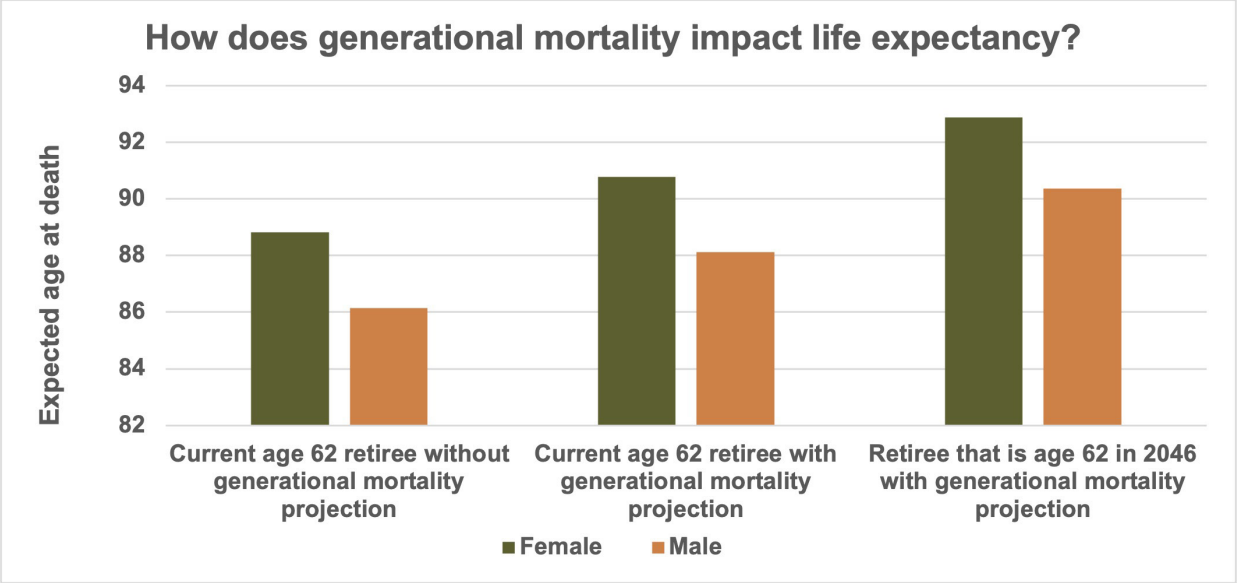


As illustrated, there is small variation from year to year, but the overall trend is of increasing life expectancy over the past 30 years. In fact, since 1990, both male and female members have seen an almost two and a half-year increase in life expectancy. At the time this report was being prepared, CalSTRS had not yet received the data needed to include the impact of the COVID-19 deaths from fiscal year 2020–21. The impact will be reflected in this chart in the 2022 version of the report. CalSTRS will continue to monitor the situation to determine whether the COVID-19 pandemic will impact long-term life expectancies.

The board made an important decision for the long-term sustainability of CalSTRS when it adopted in 2017 the use of a technique known as generational mortality. This technique anticipates future improvements in life expectancy in the funding of the system, recognizing potential improvements in mortality ahead of time. CalSTRS currently uses an annual mortality improvement factor of 1.1% for most ages.

The following chart illustrates the impact of generational mortality on a typical member retiring at age 62. Without generational mortality, a member retiring today would be expected to live to the age of about 89 for a female and age 86 for a male. By including generational mortality, the same member would be expected to live to age 91 for a female and to age 88 for a male. This effect compounds over time as the chart shows; by 2046, a member retiring at age 62 would be anticipated to live two additional years, to age 93 for a female and age 90 for a male.

THE RISK ENVIRONMENT



To get an idea of the financial implications of the improvement in life expectancy, consider that, for the 2020–21 fiscal year, CalSTRS paid close to $16.5 billion in benefits. If each member receiving a benefit today lives an additional two years, that would result in an additional $33 billion in benefits over the life of the members as compared to what would have been paid if there were no improvements in mortality over time.

By adopting generational mortality, CalSTRS is accounting for these anticipated increases in life expectancy when determining the contribution rates needed to fund the system, putting CalSTRS in a stronger funding position as a result. CalSTRS reaffirmed its assumptions on both mortality rates and the 1.1% mortality improvement factor when it adopted the 2020 Actuarial Experience Analysis in January 2020. In addition to the formal review of actuarial assumptions every four years, CalSTRS monitors life expectancy annually through this report.

Membership and payroll growth risk

Another area of risk that has already been impacted by the COVID-19 pandemic is the risk associated with membership and payroll growth. CalSTRS assumes the Defined Benefit Program payroll will grow by 3.5% annually over the long term. This assumption implies in part that the number of active members in the Defined Benefit Program will remain stable over time. This assumption is key in determining contribution rates and whether the funding plan will successfully eliminate the current unfunded actuarial obligation by 2046 since CalSTRS collects contributions as a percentage of payroll. If the payroll declines or fails to grow as assumed, CalSTRS' ability to make progress towards full funding could be at risk.

It is important to realize that when payroll fails to increase as assumed, it does not increase the overall cost to fund retirement benefits, nor does it change the dollar amount required to eliminate the unfunded actuarial obligation. However, the contribution rates needed to collect these contributions must increase just to collect the same amounts. If the needed increases in the contribution rates exceed the limits imposed by the funding plan, CalSTRS may not be able to reach full funding by 2046. Later in this report, the impact of payroll growth on CalSTRS' ability to reach full funding is measured in combination with the impact of lower-than-assumed investment performance.

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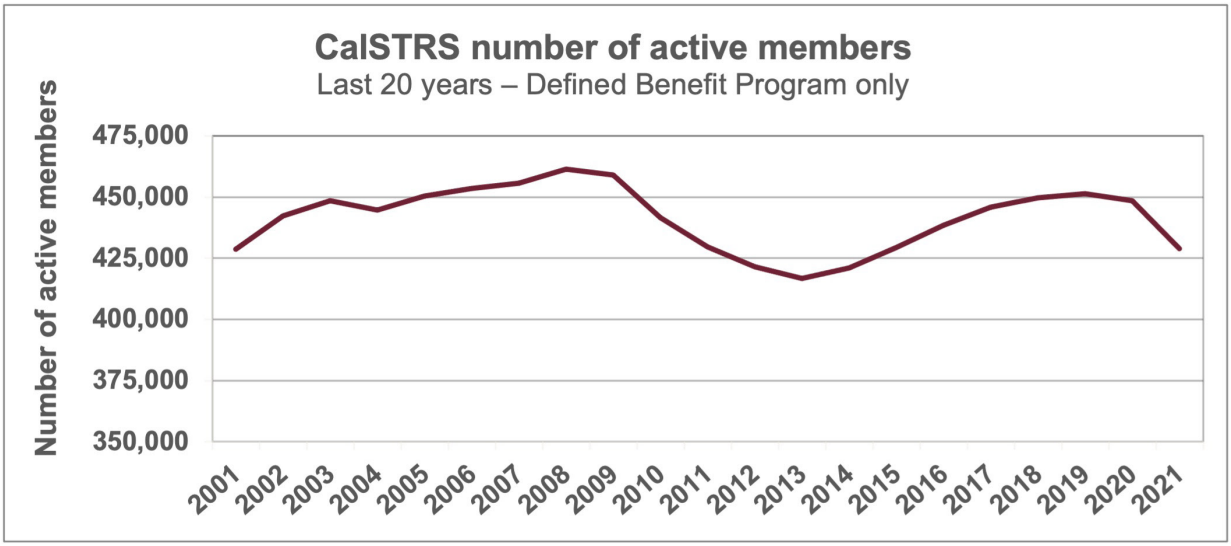
Recent decline in active membership

Since the beginning of the COVID-19 pandemic, CalSTRS has seen a decline of more than 20,000 in the number of active members who participate in the Defined Benefit Program. The following chart shows the number of active members participating in the Defined Benefit Program for the last 20 years.

The number of active teachers has dropped for the second year in a row. The total number of active members has dropped from 451,000 on June 30, 2019, to about 429,000 as of June 30, 2021. The number of active members is back to the levels last seen when the funding plan was adopted. This reduction in active membership contributed to lower payroll growth than expected over the last two years. After increasing by only 2.4% between 2019 and 2020, the payroll has remained flat over the last year, caused mostly by the decline in the number of teachers. As a result, CalSTRS collected about $200 million less in contributions from employers than anticipated in 2020–21, and the long-term employer contribution rate is expected to increase by about 0.5% of payroll.



A likely contributor to the decline in active membership was the higher-than-expected retirements CalSTRS experienced in fiscal year 2020–21. Although an increase in retirements would normally not impact long-term funding, decisions made by employers about whether to replace the teachers who have retired can impact CalSTRS' ability to reach full funding by 2046, especially if it leads to an overall reduction in the number of teachers working in California and a reduction in total payroll. As reported to the board in September, the number of service retirements for the 2020–21 fiscal year came in approximately 8% higher than the previous fiscal year but was lower than the trend seen after the first six months of the fiscal year. CalSTRS will continue to monitor retirements, the number of active teachers and their impact on long-term funding.

Enrollment in K–12 public schools

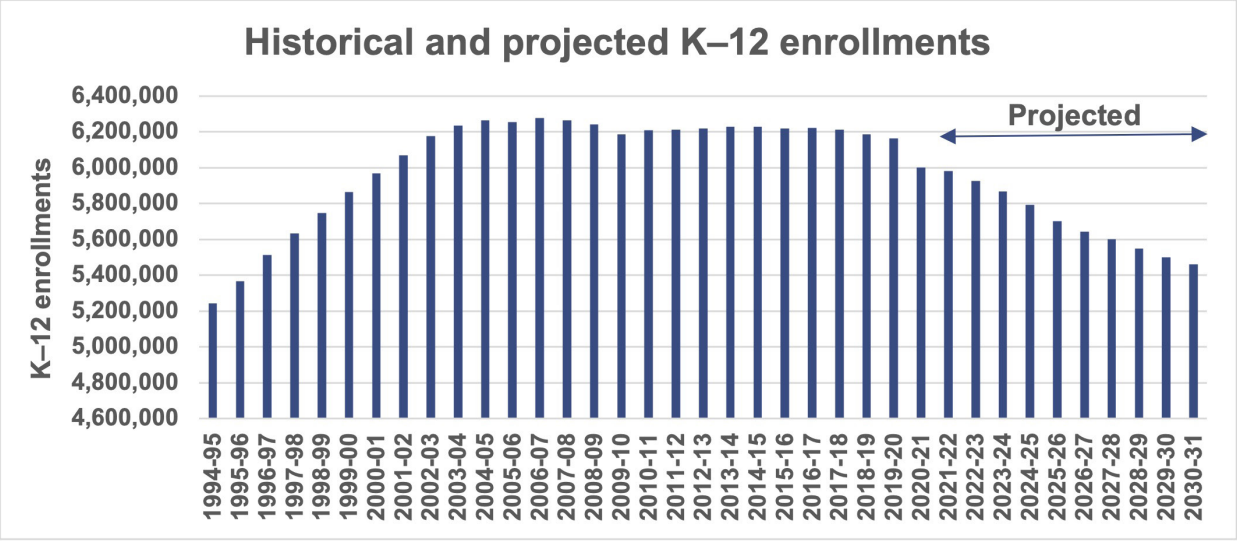
An area of particular concern related to payroll growth and the number of teachers in California is the decreasing population of children enrolled in K-12 public schools in California. In 2020–21, California experienced its largest ever drop in enrollment in a single year. Total enrollment in public schools in California dropped by about 160,000, or a 2.6% reduction.

THE RISK ENVIRONMENT

This declining trend was experienced throughout the country. Even states such as Texas, Florida, Arizona, North Carolina and Georgia that saw population increases during the pandemic experienced similar decreases in school enrollment.

Several factors contributed to the drop in K-12 enrollments in 2020–21. Since the beginning of the COVID-19 pandemic, the number of homeschool students in grades K-12 in the United States doubled from about 2.5 million in 2019 to almost 5 million in 2021. Enrollment in private schools also increased during the pandemic. The number of children enrolled in private schools in California increased by 4% in 2020–21. What is unclear is whether the decrease in overall enrollment is permanent or simply a temporary effect of the COVID-19 pandemic.

Looking ahead further, in June 2021, the State of California updated its projection of K–12 enrollments for California. The updated projection assumes the number of children enrolled in K–12 public schools will continue to decline for the next 10 years. The most recent projection anticipates a decline of about 9% over the next 10 years. Compared to five years ago, this would represent a 12% reduction in K–12 enrollment. As shown below, the number of children enrolled in K–12 public schools is now expected to drop to levels last seen in California in the mid-1990s.



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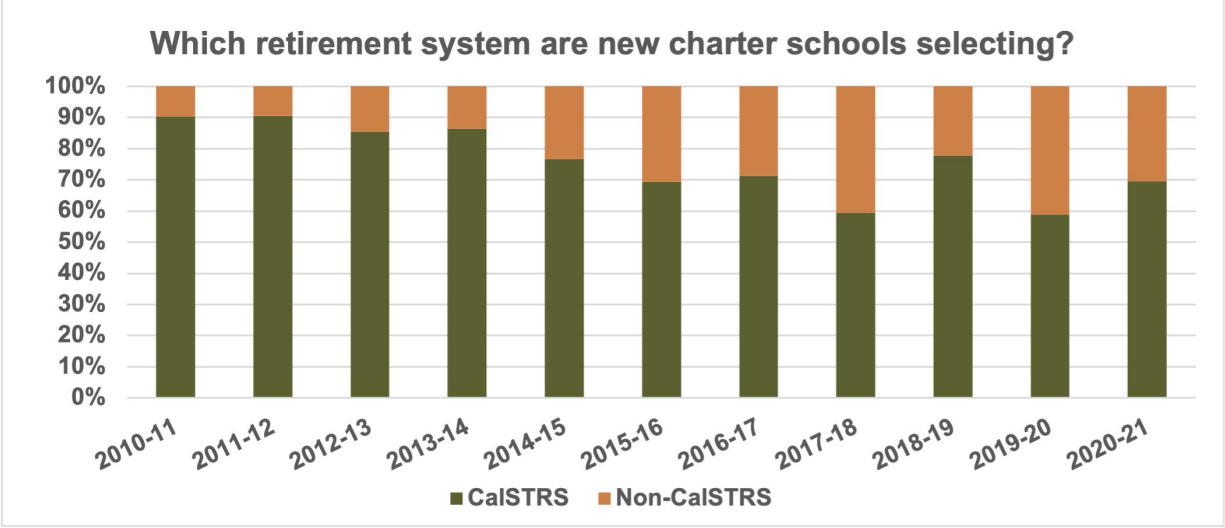
If the anticipated reduction in enrollment results in a need for fewer teachers in California, it would impact the number of active teachers who participate in the Defined Benefit Program and ultimately the growth in payroll. The situation could worsen if school districts were to face budget issues and rely either on layoffs or hiring freezes, leaving positions vacant as teachers leave or retire to reduce budget pressure. One countervailing force that could potentially offset some of the factors listed above is the adoption of universal transitional kindergarten that was included in the 2021–22 state budget. This essentially creates a new grade that will likely require more teachers to staff the new classes. This initiative is currently being phased in over several years. It is unclear how this will impact future payroll and the number of teachers. CalSTRS will continue to monitor the situation closely. However, based on the revised projected decline in K–12 enrollment, it might be necessary to adjust the payroll growth assumption either prior to or as part of the next experience study.

Update on charter schools not electing CalSTRS

For the past several years, CalSTRS has observed a trend amongst newly created charter schools of selecting a retirement system other than CalSTRS. When initially created, a charter school has the option to join CalSTRS or provide an alternate retirement benefit. Before the adoption of the funding plan, it was typical to have over 90% of newly created charter schools opting for CalSTRS benefits. However, as the following chart shows, since about 2014, between 20% and 40% of newly created charter schools have been selecting an alternate retirement system and have not elected to join CalSTRS. Note that the COVID-19 pandemic seemed to have slowed the growth in the number of charter schools in California. In 2020–21, only 23 new charter schools were created, the smallest number ever created in a single fiscal year in California. Just two years ago, 113 new charter schools were created in California.



Despite this recent trend, most charter schools still provide a CalSTRS benefit to their teachers. In the 2020–21 fiscal year, about 88% of the 1,296 charter schools provided a CalSTRS benefit. In terms of number of teachers, based on the most recent data from the California Department of Education, there were approximately 37,000 full-time equivalent teachers working in charter schools. Of those, about 32,200, or 87%, are covered by CalSTRS, and 4,800 have a non-CalSTRS benefit. Note that 4,800 represents just over 1% of CalSTRS' active member population. It is likely that if all these charter schools had instead elected to provide CalSTRS benefits, CalSTRS payroll would be about 1% higher today.

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If the total payroll was 1% higher, the employer contribution rate would be lower by about 0.15% of payroll. A higher payroll would not result in a lower unfunded actuarial obligation and would not impact the overall dollar amount needed to pay it down. However, as a percentage of payroll, the contribution rates would be lower.

Investment risk

Investment volatility and the risk that CalSTRS may not be able to meet its assumed investment return over the long-term remains the greatest risk facing CalSTRS today. The combination of a maturing system and the decreasing timeframe of the funding plan only serves to exacerbate this risk.

The funding plan interacts with investment volatility risk in several ways. First, when investment returns are below expectations, the unfunded actuarial obligation increases, requiring additional contributions to bridge the gap. The funding plan provides the board limited authority to increase contribution rates for both the state and employers through 2046 for this purpose.

Second, although employers are currently responsible for the greatest share of the unfunded actuarial obligation, the state bears the greatest risk when it comes to investment volatility. This is due to rules set in the funding plan, which allocate the largest share of the assets to the state. As a result, its share of the unfunded actuarial obligation is most sensitive to investment volatility. In this year's report, this can be seen with how the 27.2% investment return for fiscal year 2020–21 has significantly changed the outlook for funding levels and the state contribution rate. Assuming the fund earns 7% over the next two years, the state's share of the unfunded actuarial obligation is now projected to be eliminated by 2023.

Third, the specific restrictions that the funding plan places on contribution rate increases for both the state and employers limit CalSTRS' ability to respond to investment volatility. The board has authority to increase the state's contribution rate by a maximum 0.5% of payroll each year with no limit on the maximum rate. The employer rate can be increased by 1.0% of payroll each year with a maximum rate of 20.25% for employers.

The risk associated with this aspect of the funding plan is particularly evident given the sensitivity of the state's share to investment volatility. The 27.2% return has reduced this risk and improved the capacity of the funding plan to be able to react to possible periods of low investment returns. This will be demonstrated in this report through the various risk measures.

Finally, the fact that the funding plan has an expiration date results in a declining period over which to fund any existing and new unfunded actuarial obligation. The funding plan set the target of 2046 to fully fund the Defined Benefit Program, after which the board's authority to adjust contribution rates expires. As the 2046 deadline approaches, CalSTRS' capacity to withstand economic stresses will be limited.

Risk of sustained low returns and lower payroll growth

Soon after the COVID-19 pandemic started in 2020, the U.S. economy entered a recession that impacted the investment performance for CalSTRS in 2019–20 when the return was 3.9%. In last year's report, it was feared that the investment performance would remain below the assumed return for fiscal year 2020–21. Instead, last year was one of the best for CalSTRS in terms of investment performance with a return of 27.2%.

Still, the risk that investment returns could be suppressed over a sustained period remains. Since periods of low returns often occur during recessions, it is beneficial to analyze both the impact of low investment returns with the impact of significant reductions in the number of active members and payroll. In past recessions, CalSTRS has experienced both periods of low investment returns combined with significant reductions in the number of active members and payroll. These are the situations that would most stress the funding plan.

For this section, various combinations of investment returns and payroll growth over a five-year period were analyzed to see how the funding plan would react and whether CalSTRS would still be able to reach full funding by 2046.

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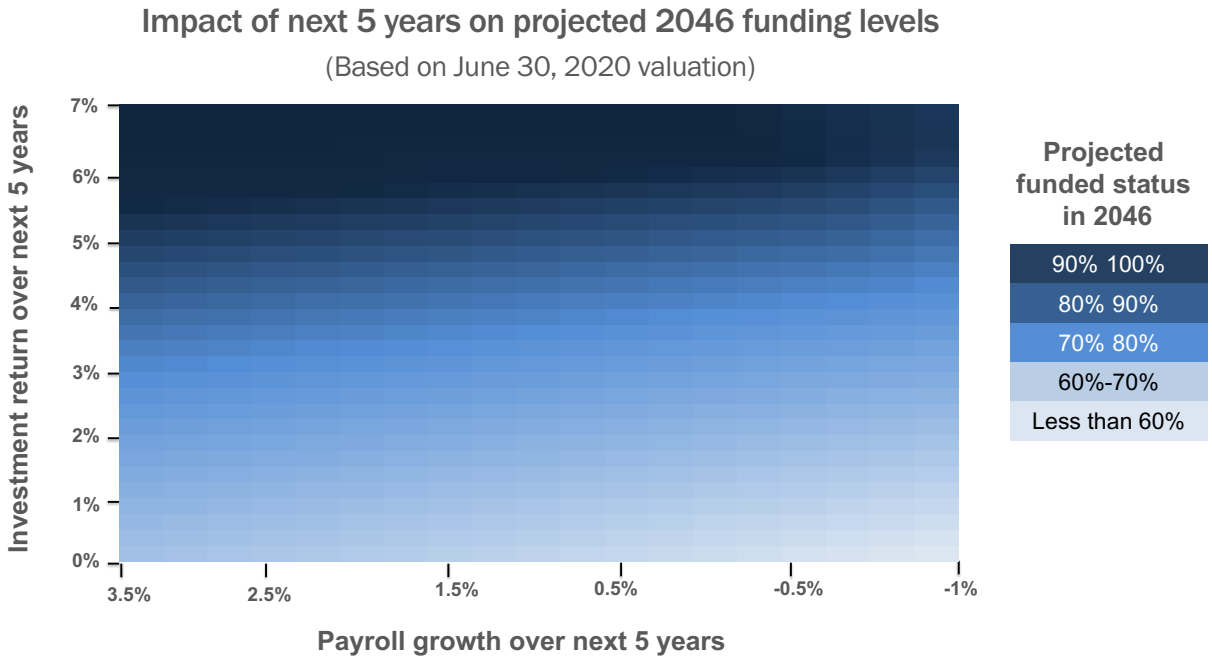
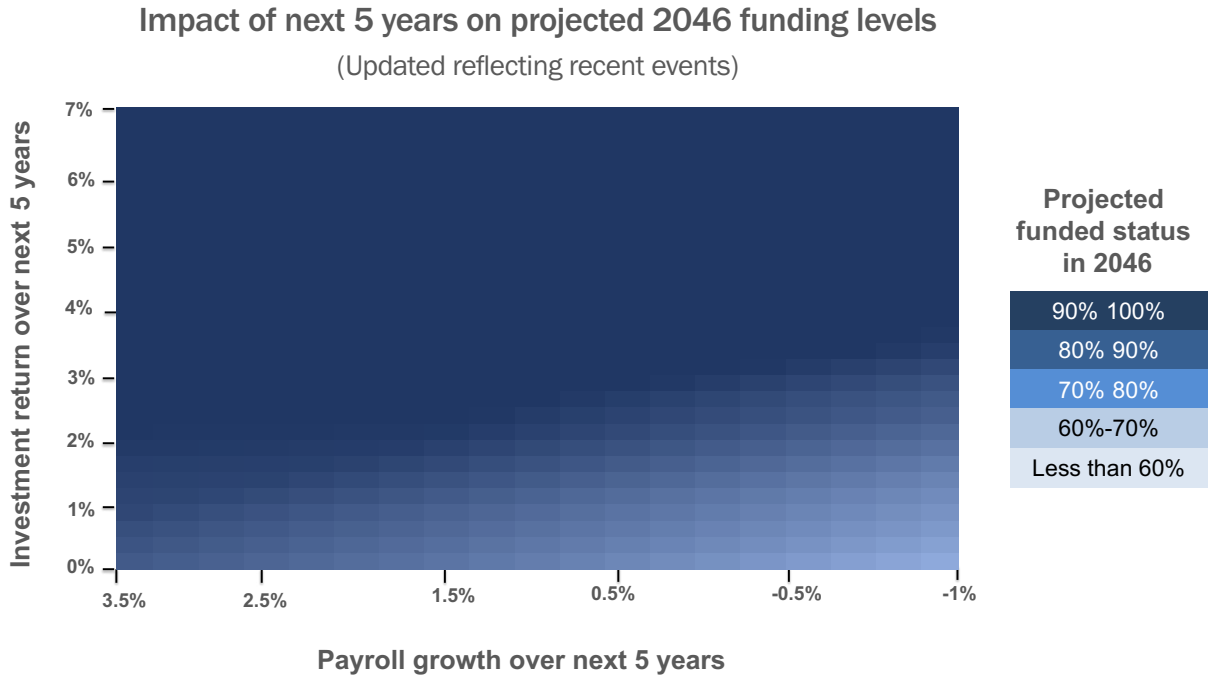
To demonstrate how the event of the last year have improved the capacity of the funding plan to react to a future recession, the analysis was performed first based on the results of the June 30, 2020, valuation and then reflecting last year's events. The results of this analysis are presented in the form of two heat maps. The darkest shade of blue indicates the projected funded status in 2046 is at or near 100% while the lightest shade of blue indicates the funded status would be below 60% in 2046, below the levels when the funding plan was adopted. Note that beyond the first five years, it was assumed that all actuarial assumptions, including the 7% investment return assumption, would be realized through 2046.





THE RISK ENVIRONMENT

As seen by comparing both heat maps, the 27.2% investment return in the last fiscal year has significantly improved the ability of the funding plan to react to a recession to stay on track toward reaching full funding by 2046. The second heat map reflecting recent events is dominated by the darker shade of blue, indicating the funding plan is now in a much stronger position to react to a recession.

However, CalSTRS is still at risk of not being able to reach full funding if faced with a more severe recession. These more severe scenarios are in the bottom right corner of the chart. For example, the financial crisis in 2007 through 2009 triggered a severe recession that, if repeated, would fit in the bottom right corner in the above two charts.

In the scenarios where CalSTRS would not be able to reach full funding, changes would likely be needed to the funding plan either to allow for higher contribution rates or to extend the funding plan. It is worth noting that these scenarios do not assume that an economic recovery will occur. Past recessions were typically followed by some level of economic rebound with the number of teachers and corresponding payrolls recovering to pre-recession levels. A recovery would likely relieve some of the stress placed on the funding plan's capacity to recover funding levels.

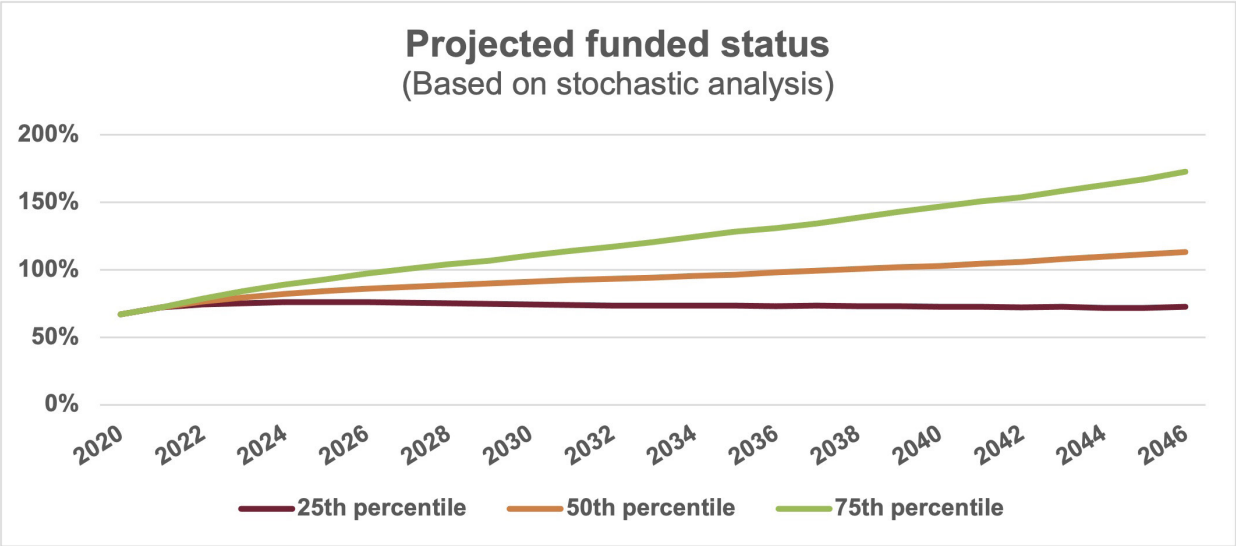
A period of sustained low returns and lower payroll growth would also impact the state and employer contribution rates. Member contribution rates would not be impacted. A lower payroll growth would have the most impact on the employer rate. For example, if investment returns were 7% over the next five years, but payroll growth is flat, the state rate would still be expected to decrease to 2.017% within three years while the employer rate would reach the maximum rate of 20.25% by 2023–24 and stay there through the end of the funding plan. However, if investment returns were to be 0% for the next five years while payroll grows at the assumed rate, the state contribution rate would need to increase to 17% of payroll while the employer rate would not have to increase for employers to eliminate their share of the unfunded liability by 2046. A combination of both lower returns and lower payroll growth would normally result in both the state and the employers having to contribute more. In the worst-case scenario in the above heat map, the employer rate would have to be set at the maximum rate of 20.25% through the end of the funding plan while the state rate would increase every year until reaching about 17% of payroll. These increases would not be enough to allow CalSTRS to reach full funding. In that scenario, the Defined Benefit Program would be expected to be about 63% funded in 2046.

Impact of long-term investment performance

Another useful way to analyze the ability of the funding plan to react to investment volatility and meet its full funding goal is to use a stochastic model. A stochastic model uses a technique known as Monte Carlo simulation in which a large number of random hypothetical scenarios are generated. These scenarios are calibrated to have the statistical characteristics of the CalSTRS investment portfolio, using both the capital market assumptions and asset allocation adopted by the board in 2019. For this analysis, 5,000 simulations of hypothetical future returns were generated. For each simulation, the assets and liabilities for the system were projected forward for more than 30 years. With this information, it is possible to assess the impact of long-term investment performance and volatility on the funding levels.

The following chart shows the 25th, 50th and 75th percentiles of the projected funded status for the Defined Benefit Program. Note that the compounded investment return over the period was about 5.7% for the 25th percentile and just above 8.6% for the 75th percentile.

THE RISK ENVIRONMENT



These simulations illustrate clearly just how much volatility there is in the future funding of the system. In 2046, the 25th percentile funded status is 73%, and the 75th percentile is 173%. This means there is a one in two chance that the funded status in 2046 will fall in this wide range. The 50th percentile in 2046 is now 113%, a significant improvement over last year when the 50th percentile was just below 100%. This exemplifies again how the investment performance in fiscal year 2020–21 has strengthened the funding plan and improved CalSTRS' ability to reach full funding.

Risk measures

This section updates the risk measures that were introduced in previous *Funding Levels and Risks reports*. These measures were reassessed for this report using the 5,000 stochastic scenarios discussed earlier, which were calibrated to simulate possible future investment returns from the recently adopted asset allocation and capital market assumptions. These measures are intended to assess three main risks:

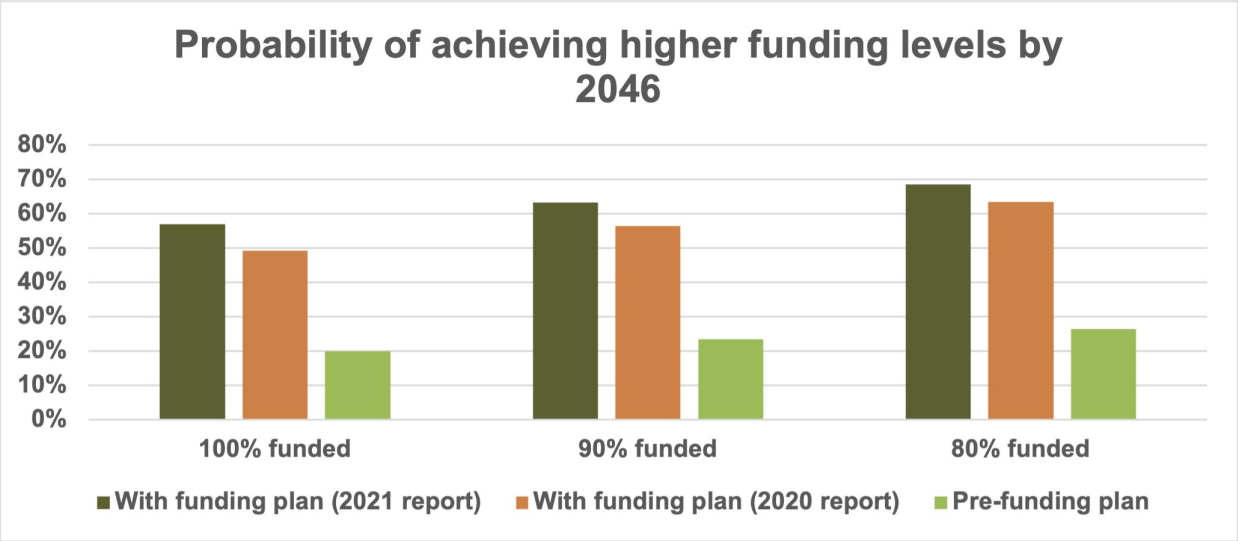
- Ability of achieving full funding
- Risk of low funding levels
- Risk of high state contribution rates

Probability of achieving full funding

The funding plan sets a target of achieving a 100% funded status by the target year of 2046. As discussed earlier, the fund was previously projected to reach a funded status near but just below 100% by 2046. However, because of last year's events, it is currently projected to reach 100% funded by 2041. There is a great deal of uncertainty in this projection. To better understand how likely the plan is to make progress towards its goal of reaching full funding by 2046, the first risk measure quantifies the probability that the funded status attains specific funding thresholds by the 2046 target date.

THE RISK ENVIRONMENT

The following chart illustrates the probability that, by the 2046 target year, the fund will have attained a funded status of either 100%, 90% or 80%. For comparison, the chart also shows the risk measure's levels from the previous year's report.



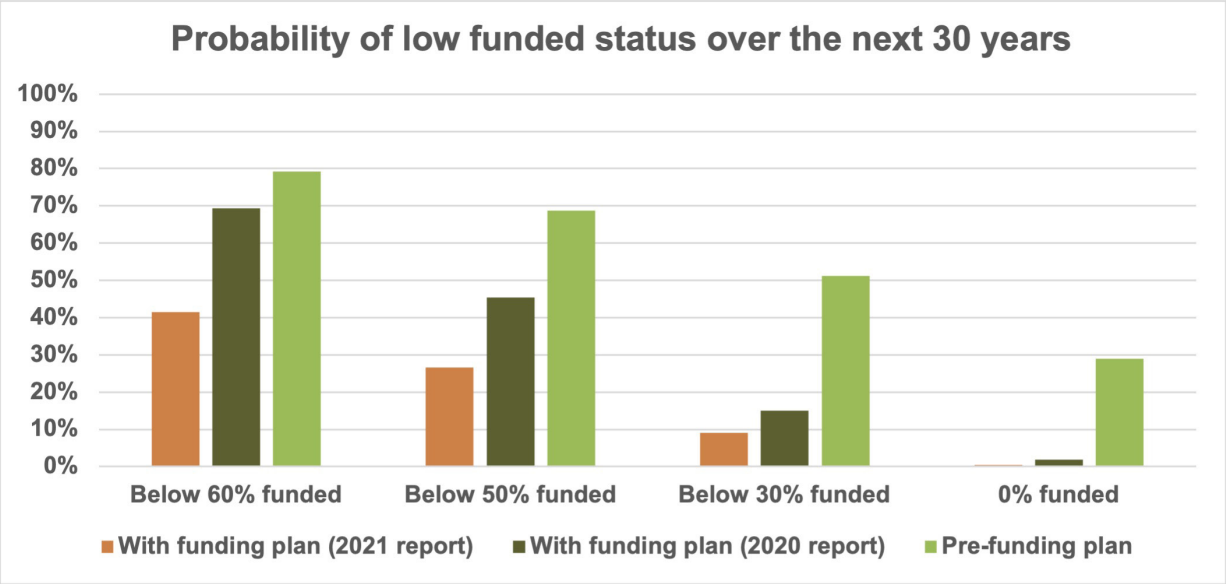
One aspect that stands out from the previous chart is that the probabilities of reaching each of the threshold funding levels have increased since the previous report. This is mostly due to the 27.2% investment performance last year. It also highlights how investment volatility creates the most risk for CalSTRS to be able to reach full funding. The above chart also shows the probability of reaching the various funding levels had the funding plan not been implemented. As shown, the fund would have much lower probabilities of reaching full funding by 2046 had the funding plan not been adopted.

Probability of low funding levels

Prior to the passage of the funding plan in 2014, the fund was projected to run out of assets by 2046. Although the funding plan has almost eliminated the risk of completely depleting the assets by 2046, there is still a risk that the funded status would decline and fall to uncomfortably low levels. This risk will never be fully eliminated due to the maturity level of the system, the investment volatility implied by the CalSTRS asset allocation and the rate-setting limitations.

THE RISK ENVIRONMENT

The second risk measure quantifies the risk of funding levels declining by measuring the probability that the funded status will fall below certain thresholds at any point over the next 30 years. The following chart shows the probability that the funded status will fall below 60%, 50%, 30% or down to 0% at some point over the next 30 years. It compares how this risk measure has changed over the last year and compares to the probabilities had the funding plan not been adopted.



As illustrated above, the probability the fund runs out of assets in the next 30 years has been almost eliminated, falling to below 1%. Had the funding plan not been adopted, there would be about a 30% chance of running out of assets. The chart also shows that there is a much lower probability of falling to a low-funded status this year as compared to last year. This is due, again, to the 27.2% investment return last fiscal year.

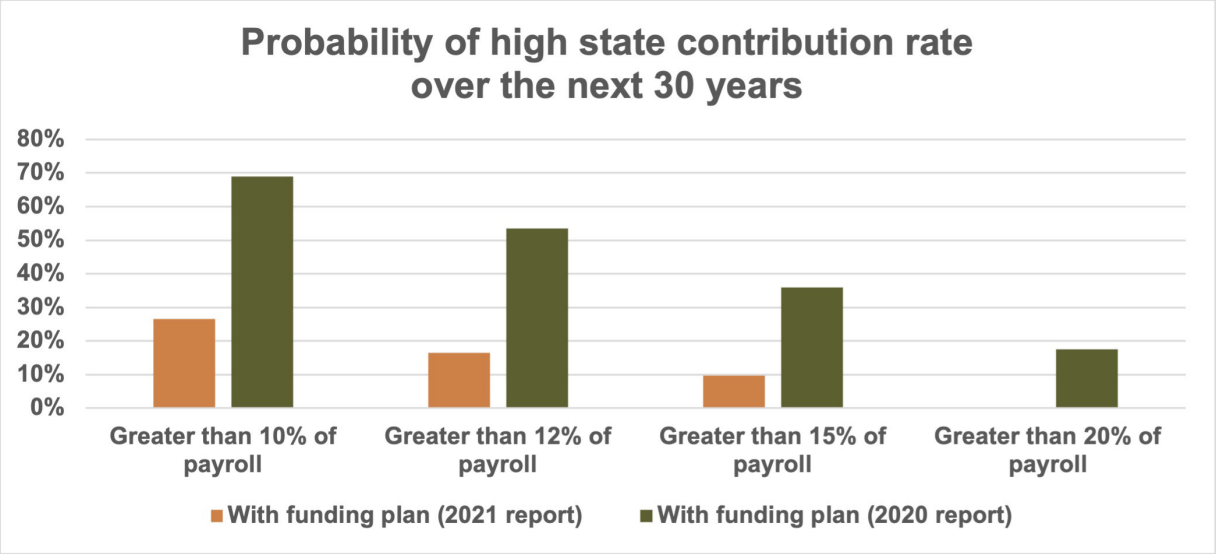
Probability of high contribution rates

The final risk measure considers the likelihood that the state's contribution rate increases to specified thresholds. This risk measure focuses specifically on the state because the employers have a cap of 20.25% on their contribution rate, and the employer rate is generally not significantly impacted by investment performance under the rules of the funding plan. Thus, the risk is essentially mitigated in statute for employers. Furthermore, the state's share of the unfunded actuarial obligation has greater sensitivity to volatility in the investment returns, increasing the risk that the state rate will need to be increased in the future.

Under the rules set in the funding plan, the state contribution rate can increase each year by no more than 0.5% of payroll with no limit on the actual rate. Last June, the board adopted an increase of 0.5% of payroll in the state supplemental contribution rate. As a result, the state supplemental rate is 6.311% for fiscal year 2021–22. This supplemental rate is in addition to the state base rate of 2.017%. In total, the state contributes 8.328% of payroll to fund its share of the unfunded actuarial obligation of the Defined Benefit Program for fiscal year 2021–22. In addition, the state pays another 2.5% of payroll to fund the Supplemental Benefit Maintenance Account, CalSTRS' inflation protection program.

The following chart updates the probabilities that the state contribution rate exceeds specified thresholds over the next 30 years. For comparison, the chart also shows the probabilities that were reported for this risk measure last year. For context, the state's contribution rate is currently projected to drop over the next few years and to go down to the base contribution rate of 2.017% by fiscal year 2024–25.

THE RISK ENVIRONMENT



As a comparison, last year the state contribution rate was expected to increase to 10.9% of payroll over the next few years. The rates do not include the 2.5% for SBMA.

The above chart shows that, at all levels, the probability the state experiences a high contribution rate has significantly decreased since the previous year. The decreases in the probabilities were caused by the investment return for fiscal year 2020–21 and the fact the state contribution rate could be lowered the next few years, setting a new lower starting point for the maximum 0.5% of payroll increases allowed under the funding plan. This is a factor that should be considered next year when the board could be in a position to lower the state contribution rate.

MEASURES OF PLAN MATURITY AND VOLATILITY

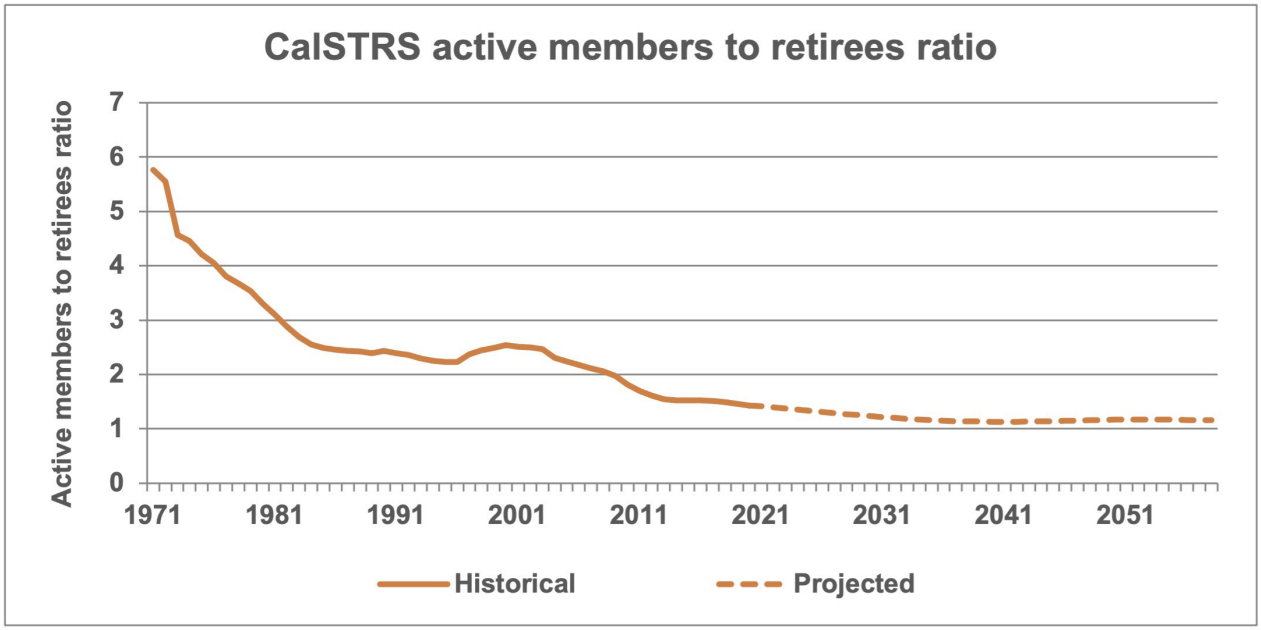
As expected, CalSTRS continues to mature as a pension plan. As pension plans mature, they become more sensitive to certain risks. Understanding plan maturity and how it affects the ability of CalSTRS to tolerate risk is essential when analyzing how investment return volatility, improvements in longevity or even growth in payroll and size of active membership could impact the ability of CalSTRS to reach full funding.

In this section, the maturity of the system is examined in the context of the number of active members to retirees, the projected cash flows and the volatility ratios, which measure the volatility in contribution rates in response to the volatility in investment returns.

Active members to retirees ratio

The aging of the population and the retirement of the baby boomers has been felt by all retirement systems across the nation. This demographic shift has long been predicted by actuaries and reflected in the funding of the system. Even though it was anticipated, this demographic shift has increased the amount of risk faced by the system.

There are various ways to assess the maturity level of a retirement system. One is to look at the ratio of active members to retirees. In the early years of a retirement system, the ratio of active to retired members will be very high as the system will be mostly composed of active members. As the system matures, the ratio starts declining. A mature system will often have a ratio near or below one. For CalSTRS and other retirement systems in the U.S., these ratios have been declining steadily in recent years. The follow ing chart illustrates CalSTRS' historical and projected active members to retirees ratio.



MEASURES OF PLAN MATURITY AND VOLATILITY

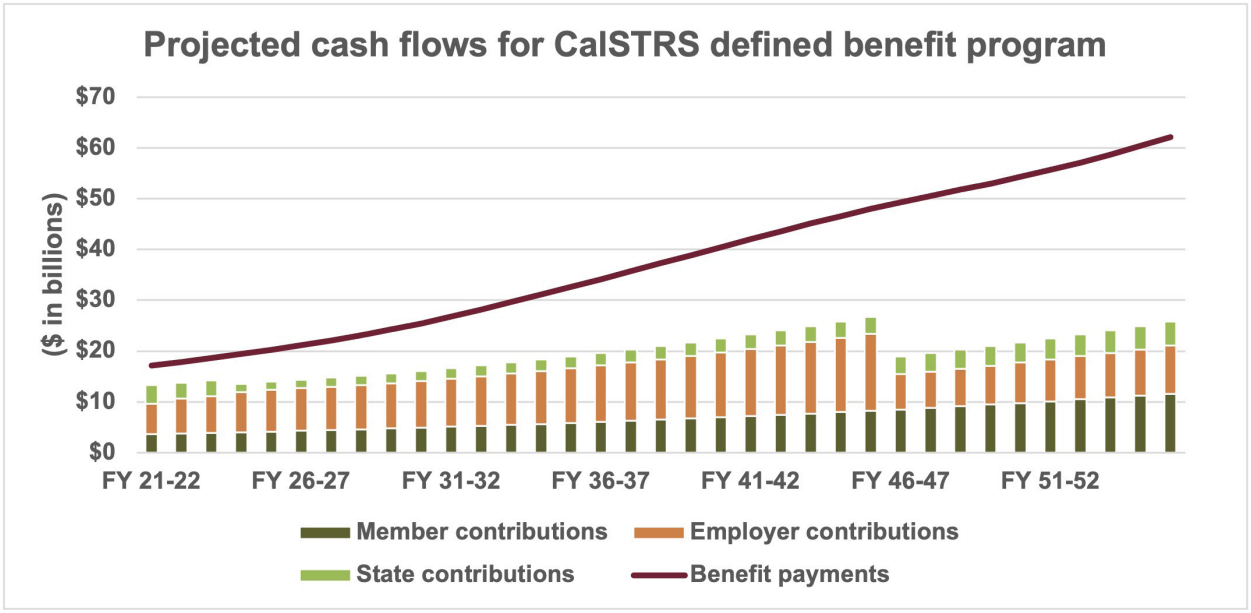
As can be seen in the previous chart, the ratio of active to retired members for CalSTRS was about 6-to-1 in 1971. The ratio has decreased steadily over time. Today the ratio is about 1.5-to-1. The ratio is projected to approach 1-to-1 over the next 40 years. Assuming the number of active members in the system remains at about 429,000, this ratio is not expected to go below one over that time period.

A decline in the CalSTRS active member population could accelerate this trend and push the ratio below one. Similarly, if improvements in life expectancy end up being greater than the improvements currently built into the actuarial assumption, it would impact the active to retiree ratio and potentially bring the ratio closer to one over a shorter period of time and even possibly below one.

Projected cash flows

The cash flows for a retirement system are another good indicator of the maturity level of the system. As a pension plan matures, it is normal for benefit payments to exceed contributions coming into the system. Having negative cash flows does not indicate the plan has been poorly managed. When prefunding a pension plan, it is important to remember that the objective is to accumulate assets to pay benefits. Put another way, the objective of prefunding is to ultimately create negative cash flows.

CalSTRS first experienced negative cash flows in 1999. The gap between contributions and benefits paid increased over time, peaking at about $6 billion in fiscal year 2013–14. With the passage of the funding plan and the increased contributions from members, employers and the state, the gap has narrowed the last few years. The following chart shows the projected cash flows for the Defined Benefit Program and Supplemental Benefit Maintenance Account combined.



MEASURES OF PLAN MATURITY AND VOLATILITY

As shown in the chart above, the gap between benefit payments and contributions will continue to increase year after year, especially after the state supplemental contribution rate is expected to be eliminated in fiscal year 2024-25. In fact, the gap is now projected to be much greater than just a year ago as a result of the 27.2% investment return last year since the state contribution rate is now expected to be approximately 2% long term instead of 11%, as anticipated last year. Beyond 2046, the gap is expected to sharply increase once the contribution rates return to their pre-funding plan level.

It is important not to view negative cash flows as an issue and to remember pension plans are designed to pay benefits. It is normal for mature pension plans to have benefit payments that exceed contributions coming into the system. Even if negative cash flows are a natural state for any mature pension fund and must be considered as part of the asset liability management process of a pension plan, negative cash flows do not necessarily imply the system will have to sell assets to make benefit payments. Cash generated from investments such as coupons on bonds, rent on real estate and dividends must be considered as well as the relative size of the cash flows compared to the total assets in the fund.

Today, enough cash is being generated from investment income to cover the gap. The gap between projected benefit payments and future contributions is expected to represent about 2% to 2.5% of the assets through the end of the funding plan. Cash generated by investments would have to be at least 2.5% of total assets to avoid having to sell assets to pay benefits. Over the last 30 years, cash generated by investments has averaged 2.7%.

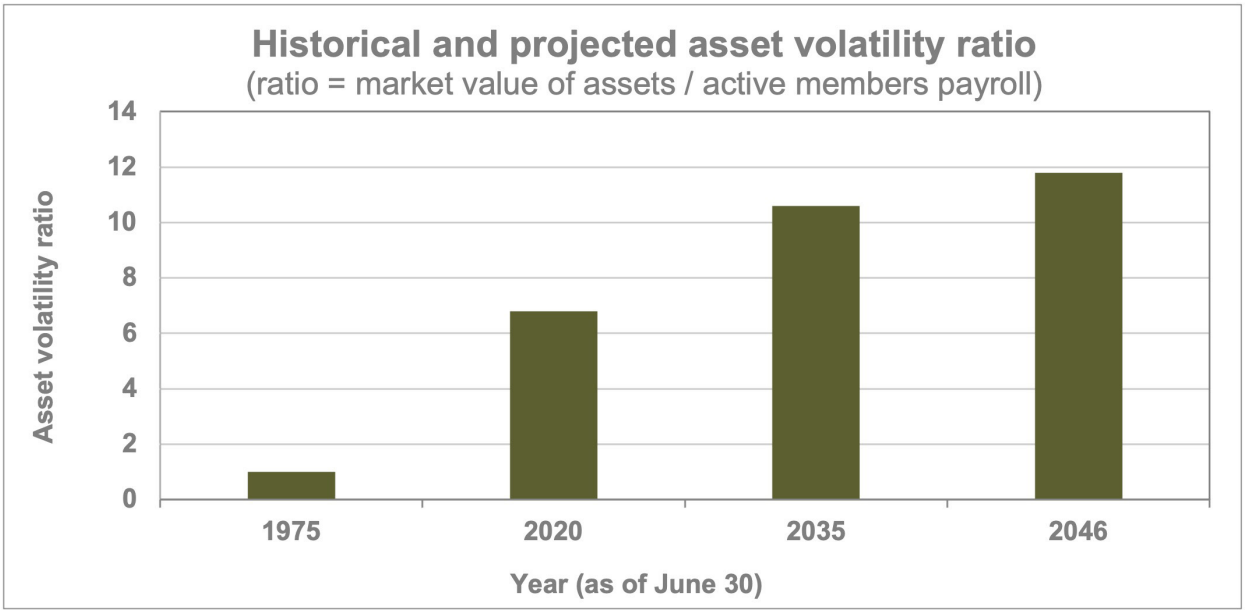
Increasing volatility

As retirement systems become more mature, these systems are subject to increased volatility in the contribution rates needed to fully fund the benefits. The drop in the active-to-retiree ratio over the last decade has increased the contribution volatility risk for CalSTRS, and this volatility risk will continue to increase as the ratio continues to drop in the future.

One indicator of the contribution volatility is the asset volatility ratio. The asset volatility ratio is the ratio of the market value of assets over the total payroll for active members. Plans with a high ratio will be subject to higher contribution volatility.

The asset volatility ratio for CalSTRS has increased significantly over the last 40 years. Back in 1975, the asset volatility ratio was at about one, meaning the assets of the plan were about the same size as the payroll. The size of the assets, when compared to payroll, has increased steadily over time. As of the most recent actuarial valuation, the asset volatility ratio was about 7. This is typical for a mature system like CalSTRS. This means that the contribution volatility is currently about seven times higher than it was in 1975. As shown on the following chart, the asset volatility ratio for CalSTRS is expected to continue to increase over time, reaching about 10.5 in 15 years and almost 12 by the end of the funding plan.

MEASURES OF PLAN MATURITY AND VOLATILITY



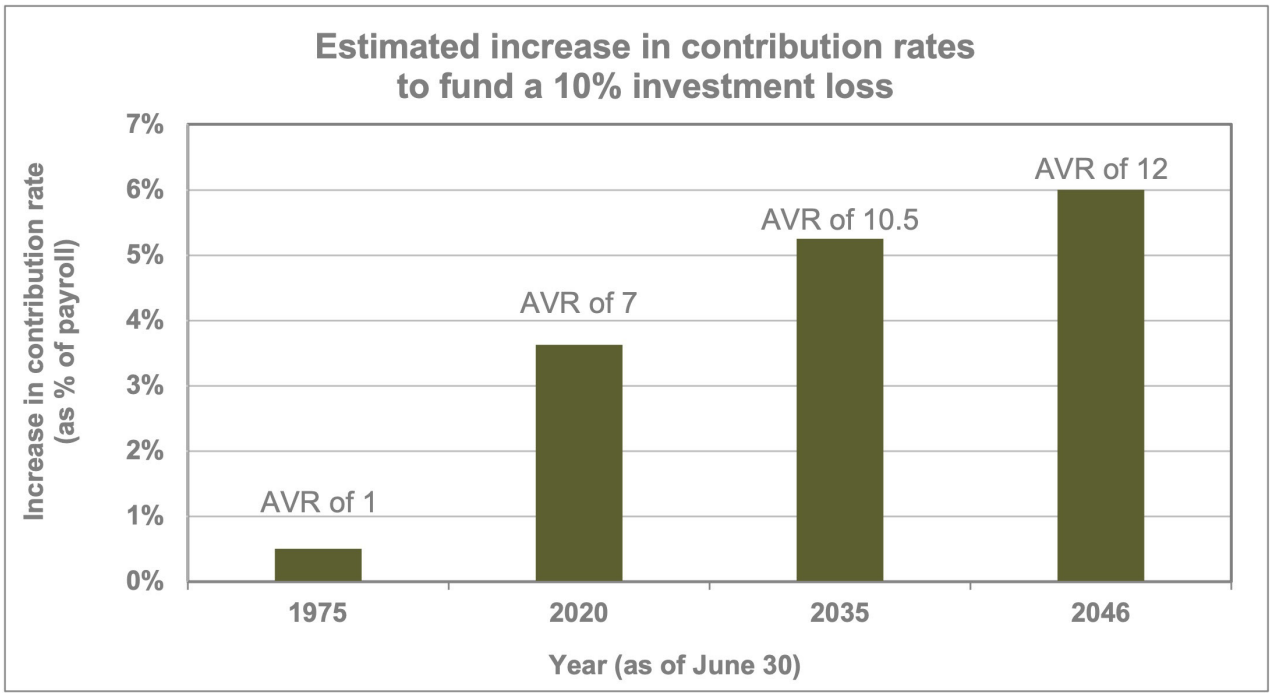
There are various reasons why the asset volatility ratio is projected to increase over time. One is expected improvements in funding levels. As of the June 30, 2020 actuarial valuation, the Defined Benefit Program was about 67% funded. If the system was 100% funded today, the asset volatility ratio would be 9.4. As additional contributions flow into the system pursuant to the funding plan, the funded ratio is projected to improve and move toward the target of being 100% funded. As a result, the asset volatility ratio will increase over time. In addition, the system has not yet reached its full maturity stage. As more members retire, the asset volatility ratio is also expected to continue to increase.

It is important to keep in mind that there is nothing to "fix" if the asset volatility ratio is high. A high asset volatility ratio simply indicates that there is more money invested for the plan—a good thing overall. It should, however, serve as a reminder that the more money invested, the more of an impact investment gains and losses will have on the contribution levels needed to fully fund the system.

With the expected increases in asset volatility ratio over time, the funding risk of the system will be greater in 20 years than it is today, resulting in greater volatility in the level of contributions that would be needed to ensure the plan remains 100% funded over the long term.

To help demonstrate this increased contribution volatility, the following chart displays the cost to eliminate, over a 30-year funding period, the unfunded actuarial obligation created from a 10% investment loss. Note that a 10% investment loss represents a return of -3%, or a return 10% less than the assumed 7% investment return. Over the last 20 years, the system has experienced a loss of this magnitude or worse on four occasions.

MEASURES OF PLAN MATURITY AND VOLATILITY



Further compounding contribution rate volatility is an aspect of the funding plan that is often overlooked. The fixed time frame for paying down the unfunded actuarial obligation by 2046 will result in a declining amortization period, increasing contribution volatility going forward. Today, the existing shortfall is amortized through 2046, over a period of 25 years. In 10 years, any remaining shortfall will be amortized over 15 years. If markets were to fall short of expectations in 20 years, the shortfall would have to be paid over a five-year period, requiring higher contributions than would normally be needed if the funding period was 30 years. As a result, the limited rate-setting authority granted to the board is more likely to be insufficient in 20 years, following an economic downturn, due to the combined impact of the funding period shortening and maturity levels increasing.

ABILITY TO REACH FULL FUNDING UNDER DIFFERENT ACTUARIAL ASSUMPTIONS

So far, this report has included discussions and risk measures illustrating the funding plan's capacity to react to short-term and long-term deviations from the current actuarial assumptions and meet the goal of reaching full funding by 2046. For all scenarios analyzed in this report, it was assumed that actuarial assumptions would remain the same when calculating the liabilities.

For this section, the ability for the funding plan to reach full funding by 2046 will be tested against different economic actuarial assumptions. For each scenario analyzed, both the liabilities and the assets were projected using the revised set of assumptions, assuming the change would be long-term and permanent.

Including this information in this report is not an indication that actuarial assumptions must be changed. The information is provided for informational purposes only to help illustrate how the funding plan would absorb the impact of using more conservative actuarial assumptions in the funding of the system.

Various combinations of actuarial assumptions for the investment return, price inflation and payroll growth were analyzed to see how the funding plan would react and whether CalSTRS would still be able to reach full funding by 2046. These assumptions were selected since they have been impacted the most by the COVID-19 pandemic and could be subject to change in the next review of actuarial assumptions.

Even if price inflation has recently been on the rise, inflation over the long term is still forecasted to be lower than 2.75% by many economists. Many retirement systems in the nation have lowered their inflation assumption below the 2.75% assumption currently used by CalSTRS. The federal government lowered the long-term inflation assumption used in the actuarial valuation for Social Security from 2.6% to 2.4% per year. Inflation is a key component of two important economic actuarial assumptions used in the funding of the Defined Benefit Program. It impacts expected payroll growth and the assumed investment return.

Regarding the investment return assumption, recent surveys of capital market assumptions such as the one published by **Horizon Actuarial Services, LLC,** indicate short-term outlooks for investment returns are now lower than they were two years ago. Many of these surveys reflect the fact interest rates are at historically low levels. These reduced outlooks toward the future, if they materialize and persist over the long term, could put pressure on CalSTRS' ability to earn its assumed 7% investment return over the long term.

As was indicated earlier in the report, if the anticipated reduction in enrollment in K-12 public schools results in a need for fewer teachers in California, it would impact the number of active teachers who participate in the Defined Benefit Program and ultimately the growth in the payroll.

For this report, the ability of the funding plan to react to changes in actuarial assumptions was tested by lowering the investment return assumption to 6.75% and 6.5%. The price inflation was lowered to 2.5% when the investment return was lowered. For all scenarios, the payroll growth assumption varied from 3.5% to 3% and 2.5%. The current assumptions are 7% for the investment return, 2.75% for price inflation and 3.5% for the payroll growth.

The table below shows the projected funded status in 2046 for each set of actuarial assumptions.

Projected funded status on June 30, 2046

Future payroll growth	Investment return 7%	Investment return 6.75%	Investment return 6.5%
3.50%	107.0%	105.7%	103.5%
3.00%	107.3%	104.2%	100.9%
2.50%	106.1%	101.9%	98.4%

As can be seen in the above table, under all scenarios, except for the scenario where the investment return assumption is lowered to 6.5% and the payroll growth is lowered to 2.5%, the funded status is expected to be greater than 100% by June 30, 2046. This is a significant improvement compared to 2020 when the board adopted the current actuarial

ABILITY TO REACH FULL FUNDING UNDER DIFFERENT ACTUARIAL ASSUMPTIONS

assumptions. At that time, even under the current assumptions, the funded status was not expected to exceed 100% by 2046. This significant improvement was the result of the 27.2% investment return last fiscal year.

Adopting more conservative assumptions could also impact contribution rates for the state, employers and 2% at 62 members. The state contribution rate would normally be most impacted by a change in actuarial assumptions. However, the 27.2% investment return in 2020–21 has drastically changed this situation.

The table below shows the average state contribution rate to the Defined Benefit Program through 2046 under each assumption scenario. The board adopted a state contribution rate of 8.328% of payroll (excluding SBMA) for the Defined Benefit Program for fiscal year 2021–22. Reflecting last year's events, the state contribution rate is now expected to drop to 2.017% in fiscal year 2024–25 and stay there through 2046. As a result, the state contribution rate is currently expected to average 2.6% of payroll through 2046.

Average state contribution rate through 2046

Future payroll growth	Investment return 7%	Investment return 6.75%	Investment return 6.5%
3.50%	2.6% of payroll	2.9% of payroll	4.9% of payroll
3.00%	2.6% of payroll	2.9% of payroll	4.9% of payroll
2.50%	2.6% of payroll	2.9% of payroll	4.9% of payroll

Adopting more conservative actuarial assumptions would increase the average state contribution rate but not as much as would have been expected a year ago, prior to the 27.2% return. In all scenarios, the average rate is lower than the current state contribution rate, indicating the board could be in a position to lower the state contribution rate even if more conservative assumptions were used in the funding of the system.

The table below shows the average employer contribution rate to the Defined Benefit Program through 2046 under each assumption scenario. The board adopted an employer contribution rate of 19.1% of payroll for fiscal year 2021–22.

Average employer contribution rate through 2046

Future payroll growth	Investment return 7%	Investment return 6.75%	Investment return 6.5%
3.50%	19.0% of payroll	19.9% of payroll	20.0% of payroll
3.00%	19.8% of payroll	20.2% of payroll	20.2% of payroll
2.50%	20.2% of payroll	20.2% of payroll	20.2% of payroll

Adopting more conservative actuarial assumptions would increase the average employer contribution rate through 2046. Note that a rate of 20.2% indicates the employer rate would have to increase to the maximum rate of 20.25% and stay there through 2046.

Adopting more conservative actuarial assumptions could also impact the 2% at 62 member contribution rate. Under the California Public Employees' Pension Reform Act of 2013 (PEPRA), 2% at 62 members are required to pay at least one-half of the normal cost of their Defined Benefit Program benefit, rounded to the nearest quarter of one percent. The normal cost is the annual cost for each year of service that is necessary to adequately fund the benefits over time if all assumptions are met. Adopting a more conservative investment return assumption will increase the normal cost. However, to impact 2% at 62 members, the normal cost would have to change by more than 1% since the last time the member contribution rate was set. The table shows the 2% at 62 member contribution rate and whether an increase would be required under each assumption scenario.

ABILITY TO REACH FULL FUNDING UNDER DIFFERENT ACTUARIAL ASSUMPTIONS

2% at 62 member contribution rate

Future payroll growth	Investment return 7%	Investment return 6.75%	Investment return 6.5%
3.50%	10.205% No increase	10.205% No increase	11.205% 1% increase
3.00%	10.205% No increase	10.205% No increase	11.205% 1% increase
2.50%	10.205% No increase	10.205% No increase	11.205% 1% increase

The contribution rate for 2% at 62 members would not have to increase if the investment return assumption was reduced to 6.75%. It would have to increase by 1% if the investment return assumption was lowered to 6.5%. As indicated earlier, the price inflation assumption was also lowered to 2.5% for these scenarios. Had price inflation been kept at 2.75%, the 2% at 62 member contribution rate would have had to increase by 0.5% of salary under the 6.75% investment return assumption.

This analysis shows that CalSTRS is in a stronger position today than a year ago and would be expected to reach full funding if the board elected to adopt more conservative actuarial assumptions in the funding of the system.

Although the current assumptions are still appropriate for use in the funding of the system, the situation could change between now and the next review of the actuarial assumptions. The next formal review of the actuarial assumption will be conducted in 2023 and presented to the board in 2024. This formal review is part of the ongoing monitoring of the funding plan and is performed every four years. If the long-term economic outlook changes to the point where an adjustment to actuarial assumptions should occur ahead of schedule, the issue would be brought to the board for discussion.

CONCLUSION

This report discusses a variety of risks associated with the funding of CalSTRS. Even if the funding situation has greatly improved over the last year, significant risks remain that could prevent the system from reaching full funding by 2046.

Although the risks related to longevity, active membership decline and future payroll growth are real and important, the fact remains that the largest risk facing CalSTRS is risk from investment returns falling short of the assumed return. This risk will continue to increase over time simply due to the natural maturing of the system and the scheduled end date of the funding plan, currently set at 2046.

The next few years will be critical for the CalSTRS Funding Plan. The full impact of the COVID-19 pandemic on the economy, employment patterns, K–12 enrollment and employers' budgets is still uncertain. CalSTRS will continue to monitor the COVID-19 pandemic and how it may affect the funding of the system over the next few years, especially the impact a decline in K–12 enrollment may have on the number of teachers participating in the Defined Benefit Program. CalSTRS will also continue to monitor teacher retirements and whether these teachers are being replaced by new teachers who join the Defined Benefit Program. If the expected decline in K–12 enrollments materializes and impacts the number of active teachers, CalSTRS may have to revise its long-term payroll growth assumption.

The next formal review of actuarial assumptions is currently scheduled to be performed in 2023 and presented to the board for adoption in early 2024. As part of its on-going monitoring of the funding plan, CalSTRS performs these formal reviews of actuarial assumptions every four years. The most recent review was completed in January 2020.

Until then, CalSTRS will continue to monitor these assumptions to ensure they remain appropriate. If any events or changes were to warrant an adjustment to actuarial assumptions, the issue would be brought to the board for discussion, even if it meant such discussion would occur ahead of the normal four-year review cycle. As shown in this report, CalSTRS is in a stronger position today than a year ago and would be expected to reach full funding if the board were to adopt more conservative actuarial assumptions in the funding of the system.