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April 19, 2022

Teachers' Retirement Board
CalSTRS
P. O. Box 15275
Sacramento, CA 95851-0275

Re: Analysis of Potential SBMA Plan Changes

Dear Members of the Board:

As requested, we have performed a cost analysis of potential revisions in benefits paid from the Supplemental Benefit Maintenance Account (SBMA). The SBMA provides purchasing power benefits to CalSTRS retirees and beneficiaries. This letter summarizes the estimated impact of increases in SBMA benefits as proposed in SB 868, which provide increases to those who have been retired the longest. The letter also analyzes increases in the purchasing level above the current maximum of 85%.

Option 1: One-Time Permanent Increase in Benefits based on Year of Retirement

SB 868 would provide a one-time permanent increase in benefits for retirees and beneficiaries with an initial retirement commencement year before 1999, with the adjustment being greater for those who have been retired the longest. Note that for beneficiaries of deceased retirees, the retirement date will be based on the member's original retirement date. The adjustment would apply to the sum of the monthly allowance, which reflects the 2% annual benefit adjustment, and the purchasing power payments to date.

As specified in the legislation, these additional benefits would be paid from the SBMA. The future 2% annual benefit adjustments and purchasing power payments would apply to the resulting additional benefits based on the effective date of the increase. That is, if the retiree receives a \$100 additional payment effective July 1, 2023, they would receive additional \$2 increases (2% of \$100) effective July of 2024 and each July thereafter. Any potential future purchasing power benefits on the increase under SB 868 would be based on a July 1, 2023 commencement date.

The following schedule details the percentage increases in the benefits for retirees and beneficiaries as specified in SB 868:

Retirement Date	Increase
After December 31, 1998	0%
January 1, 1990 to December 31, 1998	5%
January 1, 1980 to December 31, 1989	10%
Prior to January 1, 1980	15%

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Results – Option 1: One-Time Permanent Increase in Benefits based on Year of Retirement

The present value of the estimated increase in payments as of June 30, 2023 due to SB 868 is \$592 million. To estimate the impact on the SBMA, we reviewed the probability of sufficiency by modeling 200 different scenarios of inflation. The probability of sufficiency decreases from 66% to 65% if these additional payments are reflected. This is the probability the SBMA is not depleted prior to 2089 and assumes no future reductions in the 85% purchasing power level. Based on this analysis, adding the proposed benefit increase does not materially affect the probability of sufficiency. However, it should be noted that if ultimately the SBMA is insufficient to provide the benefits at the current level, the purchasing power level would need to be reduced below 85%. If this were to occur, the amount provided under this benefit proposal could affect how much the benefit level would need to be reduced.

This analysis only models varying inflation. It does not vary other assumptions such as mortality and the SBMA investment credit (which would only change if the investment return assumption for the DB Program were changed). Note that although results are based on the June 30, 2021 actuarial valuation of the DB Program, we have reflected actual inflation from June 30, 2021 to December 31, 2021 in our analysis.

Results – Option 2: Varying Purchasing Power Levels

We have estimated the impact of several alternatives under Option 2 incorporating varying purchasing power levels, as requested by CalSTRS staff. This analysis is based on current plan provisions and does not include potential impact of the one-time permanent increase specified in Option 1 (SB 868). If all assumptions are met, the current SBMA funding is projected to be sufficient to pay all future SBMA benefits through 2089 under each of the alternatives. We have also performed a stochastic analysis with varying levels of inflation to assess the likelihood of the SBMA being able to pay all benefits through 2089, as shown by the Probability of Sufficiency column in the table below. For purposes this analysis, we have assumed any changes in the purchasing power level would first be effective July 1, 2023, and we have included projected future new entrants.

We have also calculated the estimated present value of these alternatives as of June 30, 2021. We have used the increase in projected benefits through June 30, 2089 in our calculations, excluding projected new entrants. Note that there would be additional costs for future new entrants, as well as for purchasing power benefits paid after that date, but we have not estimated these.

The following table summarizes our results as of June 30, 2021. Note that the first row shows the baseline results from the current valuation projection. We have also shown the results for the one-time permanent increase under Option 1 (SB 868) for comparison.



Option Studied	Present Value of Increased Payments (\$Millions) ⁽¹⁾	Probability of Sufficiency ⁽²⁾
85% Purchasing Power Level (Current)	\$ 0	66%
Option 1:		
One-time Permanent Increase based on Year of Retirement (SB 868) ⁽³⁾	517	65%
Option 2:		
86% Purchasing Power Level	2,179	64%
87% Purchasing Power Level	4,527	60%
88% Purchasing Power Level	7,048	56%
89% Purchasing Power Level	9,753	52%
90% Purchasing Power Level	12,653	45%

1. The present value is as of June 30, 2021 and is based on the increase in projected SBMA payments through June 30, 2089 for current DB Program members compared to the projected SBMA payments at an 85% purchasing power level.

2. The Probability of Sufficiency is the probability the SBMA is not depleted prior to 2089 and is based on the stated purchasing power level and assumes no future reductions in that level. This analysis only models varying inflation. It does not vary other assumptions such as mortality.

3. The estimated present value for the increases under SB 868 as of June 30, 2023 (the specified implementation date) is \$592 million.

The probability of sufficiency shown above for Option 2 (varying purchase power levels) is less than a similar study as of June 30, 2019 that was completed in 2020. For example, the probability of sufficiency at the 90% level decreased from 51% in the prior study to 45% in this study. The purchasing power benefit is a highly leveraged benefit; that is, the benefit can go from being \$0 in one year to a significant amount in a few years if inflation is high. The leveraged nature of the purchasing power benefit calculation can cause noticeable year-to-year changes in the results if differences occur.

The primary reason for the lower probabilities of sufficiency this year was the recent high inflation, which is reflected two ways in the calculations. First, we have reflected the actual inflation through the end of calendar year 2021 which was greater than assumed. Second, the model we use to project the funded status of the SBMA assumes serial correlation for inflation; that is, if inflation is higher (or lower) than assumed this year, it is likely to exceed (or be less than) the assumption in the next year. Since the inflation is high in the current year, this is likely to result in higher-than-assumed inflation in the next few years. Higher inflation in the near-term results in significant projected increases in purchasing power benefits and increased stress on the SBMA.

Note that this analysis assumes the purchasing power level would remain constant at the stated level. In practice, the purchasing power level can be reduced to as low as 80%, so the probability of sufficiency would ultimately be higher if a reduction in purchasing power levels was factored in.



Additional Considerations

Before any changes to the SBMA are adopted, we recommend the following be considered:

- **Future variability** – As noted, the future health of the SBMA is dependent on a number of assumptions, with inflation, mortality, and future investment return likely having the greatest impact. The balance between the security of the current 85% purchasing power level and the value of providing additional benefits should be considered. Increasing the purchasing power benefits now increases the likelihood there will need to be a reduction below the current 85% level in the future.
- **Effective Date** – These cost estimates are based on a July 1, 2023 effective date. If the effective date is either before or after this date, there will be some difference in the estimated cost. If the effective date were earlier than July 1, 2023, the estimated cost would be higher due to an increase in the number of expected future payments.
- **Current DB Program** – Members, employers, and the state have experienced significant increases in their contribution rates to the DB Program over the last several years. Therefore, it may not seem appropriate to consider an increase in the SBMA benefits. However, based on discussions with CalSTRS staff, it is our understanding that it is well defined that the funding of the SBMA is independent of the funding of the DB Program. CalSTRS staff also indicated that current DB Program members are effectively vested in the SBMA funding, and therefore, future SBMA contributions for current members could not be used for other purposes unless the DB Program assets were depleted, in which cases SBMA assets could be used to pay DB Program benefits. We recommend legal counsel confirm the uses of SBMA assets before any changes to the SBMA are considered.

Comparison of Current Resources and Liabilities

Under the current provisions, the SBMA has a projected funded surplus of \$11.9 billion for current DB Program members as of June 30, 2021 based on an assumed inflation of 2.75%. That is, the value of the current resources (current assets plus projected future contributions on current member payroll) of \$30.7 billion exceeds the projected value of future purchasing power benefits for current members of \$18.8 billion. Each of the potential changes would reduce this surplus. In some cases, it would eliminate the current surplus and create an unfunded obligation which would need to be funded by contributions on payroll for future new entrants in excess of the value of the benefits expected to be earned.

Note that over half of the current estimated surplus relies on projected future contributions related to active member payroll. That is, the value of projected future contributions (\$9.7 billion) is greater than the value of purchasing power benefits expected to be earned by current active members based on service after the valuation date (\$2.6 billion). This \$7.1 billion excess of future contributions over future benefit accruals is over half of the current estimated \$11.9 billion surplus. That means the estimated surplus based on current assets and service accrued as of the projection date is \$4.8 billion, which is less than half of the total surplus.



Option Studied	Present Value of Total Surplus (\$Billions) ⁽¹⁾	Present Value of Accrued Surplus (\$Billions) ⁽¹⁾
85% Purchasing Power Level (Current)	\$ 11.9	\$ 4.8
Option 1:		
One-time Permanent Increase based on Year of Retirement (SB 868)	11.3	4.2
Option 2:		
86% Purchasing Power Level	9.8	3.0
87% Purchasing Power Level	7.4	1.0
88% Purchasing Power Level	4.9	-1.1
89% Purchasing Power Level	2.2	-3.4
90% Purchasing Power Level	-0.7	-5.8

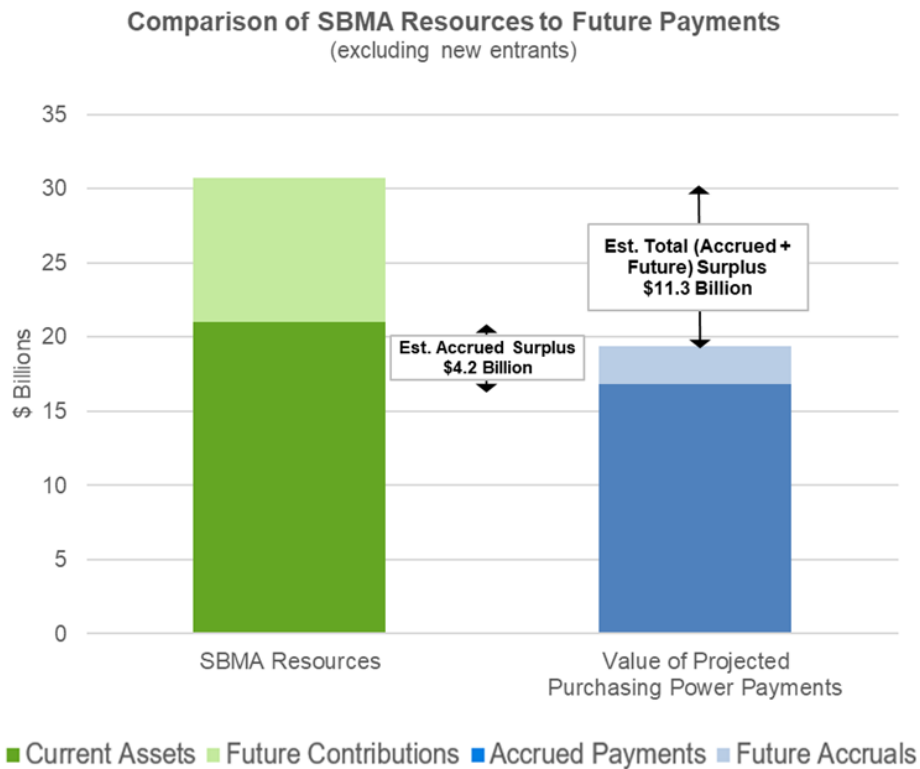
1. All values are as of June 30, 2021 and are based on current DB Program members only. Negative values indicate an unfunded obligation.

As with the projection of sufficiency, this estimate is based on the current actuarial assumptions and specified purchasing power adjustment shown, except that this estimate does not reflect any potential future DB Program members. Future results will be sensitive to future experience, in particular future inflation.

As noted in our SBMA projection study, the program is projected to be sufficient at approximately a 92% purchasing power level. This contrasts with the results shown in the prior table that there is small deficit at the 90% level. The difference between the two measures is that the projection reflects expected new members entering the program, and the comparison of resources and liabilities does not. The contributions received on new entrant payroll are more valuable than the estimated value of the associated benefits earned at the 90% purchasing power level. Therefore, as new entrants are added, the funded status (as measured by the comparison of resources and liabilities) is projected to improve.

Comparison of Current Resources and Liabilities Example – Option 1 (SB 868)

The following graph shows an example of the comparison of resources and liabilities for Option 1. Reflecting the potential impact of SB 868, the SBMA has a projected funded surplus of \$11.3 billion for current DB Program members as of June 30, 2021 based on an assumed inflation of 2.75%. That is, the value of the current resources (current assets plus projected future contributions on current member payroll) of \$30.7 billion exceeds the projected value of future purchasing power benefits for current members of \$19.4 billion, as shown in the following graph. This represents a decrease in the surplus of \$0.6 billion from \$11.9 billion without the additional benefit. Based on current assets and benefits accrued as of the valuation date, the estimated surplus is \$4.2 billion, also a decrease of \$0.6 billion.



Sensitivity to Future Experience and Risk Discussion

The results of any actuarial valuation or study are based on a set of assumptions. Although we believe the current assumptions provide a reasonable estimate of future expectations, it is almost certain that future experience will differ from the assumptions to some extent. The following provides a general discussion of the potential risks to the SBMA funding sufficiency as well as some specific examples of sensitivity to future experience. It is not intended to be a comprehensive analysis of all potential risks.

There are a number of factors that may affect future results. Future results may differ from those projected due to future experience deviating from the assumptions or changes to the assumptions themselves. Three of the key factors which could potentially impact future SBMA Program funding, as well as the ultimate cost of providing the additional benefits, are as follows:

- **Inflation** – Low price inflation tends to have a positive impact on the SBMA Program’s funded position. Short-term forecasts project inflation less than the 2.75% assumption; however, recent inflation has materially exceeded the assumption. Looking at long-term forecasts, the inflation assumption used by the Social Security actuary is 2.4%, and the implied inflation for 30-year Treasury Inflation-Protected Securities is about 2.2% as of February 2022.

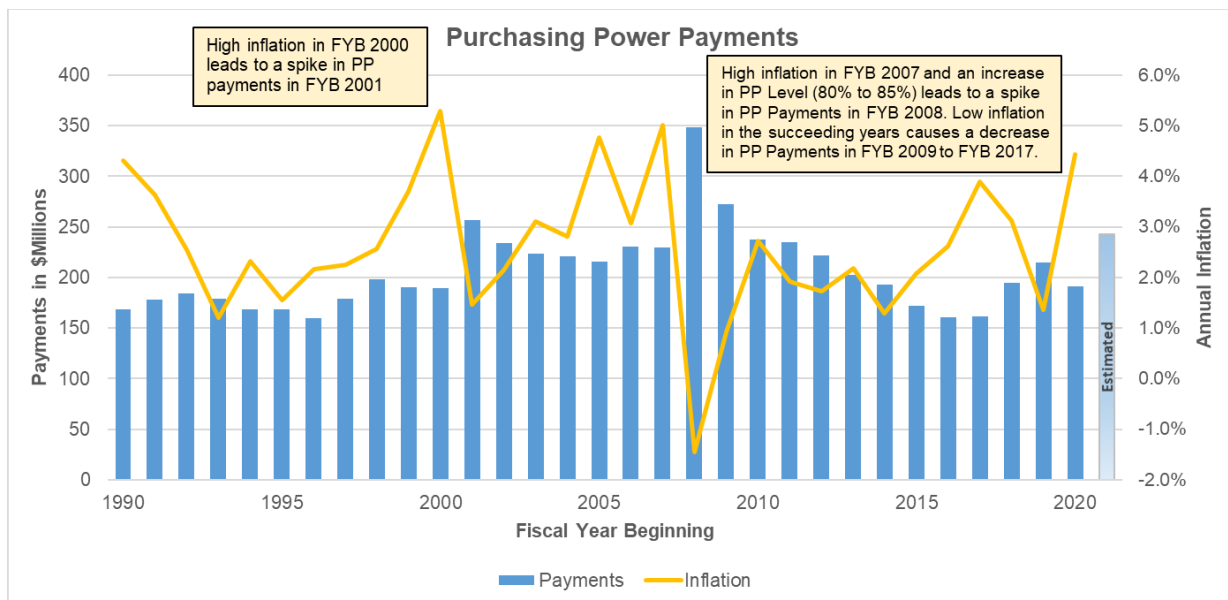
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- Investment Return** – The SBMA Program is credited with interest based on the DB Program return assumption, so the actual CalSTRS investment return in a given year has no direct impact on the SBMA funding. If the DB Program return assumption remains at 7.0%, there will be no impact on the SBMA Program funding projections. If the return assumption were lowered, this would reduce projected SBMA values; however, the impact would be much smaller than a similar change in the inflation assumption. An increase in the return assumption would improve future projections.
- Payroll** – Based on the current assumptions, the annual contributions being received have a greater value than the purchasing power benefits being earned each year. Therefore, if the payroll is less than projected, this would have a negative impact on the SBMA Program funding, as less-than-expected contributions would be received.

Variations in inflation, followed by rates of mortality and changes in the investment return assumption, are likely to have the greatest impact on the ultimate level of funding sufficiency. Variance in other demographic assumptions (such as termination, disability, and retirement from employment) could also impact future results.

One way to assess future risks is to look at historical measurements. The following graph shows the historical purchasing power payments and how they can vary from year to year, particularly due to inflation.



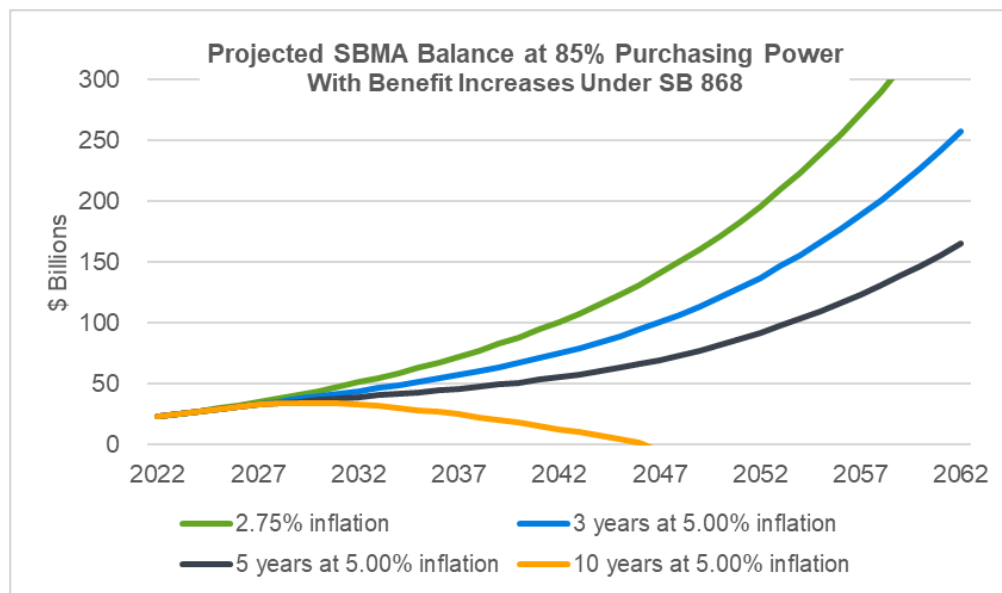
Risks specific to the DB Program are discussed in Milliman’s DB Program valuation report and the “Review of Funding Level and Risks” produced each fall by CalSTRS actuarial staff.

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Risk of short-term high inflation exceeding the assumption

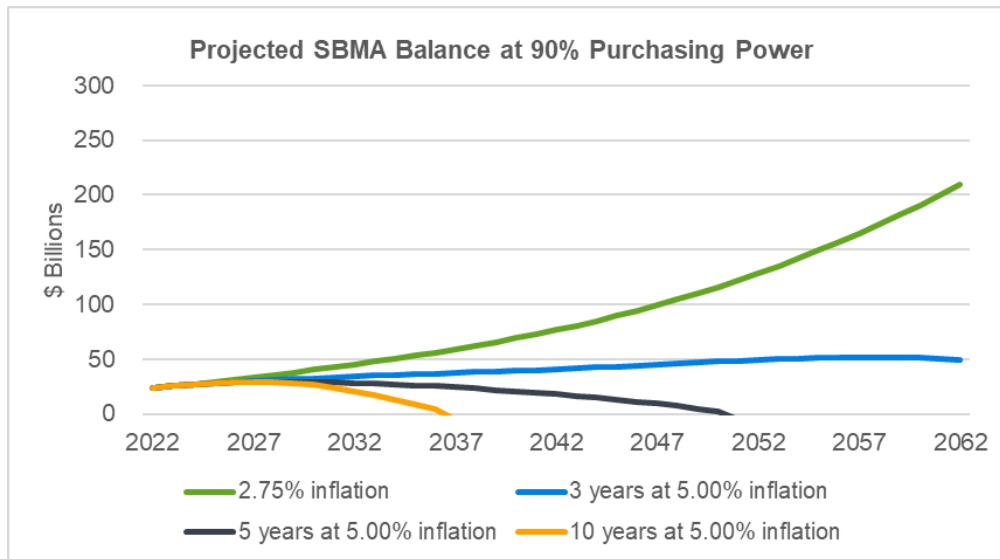
As an example of the potential impact of inflation on the sufficiency of SBMA funding, the following graph shows the projected SBMA balance based on the current inflation assumption of a level 2.75%, as well as under various inflation shocks, represented by future inflation of 5.00% for the next three, five, and ten years before returning to 2.75% for years after that. Each of the scenarios includes the increase in retiree benefits under Option 1 (SB 868). As shown, the SBMA balance is projected to increase if future inflation is 2.75% for all future years and for the two scenarios with short-term inflation shocks of five years or less. This indicates the current assets plus future SBMA contributions are projected to be sufficient to pay all purchasing power benefits at these levels of inflation and 85% purchasing power. This is not the case if 5.00% inflation occurs for the next ten years before returning to 2.75% for all future years; however, under this scenario the purchasing power level could be reduced below 85% and the SBMA would be projected to be sufficient at the lower purchasing power level.



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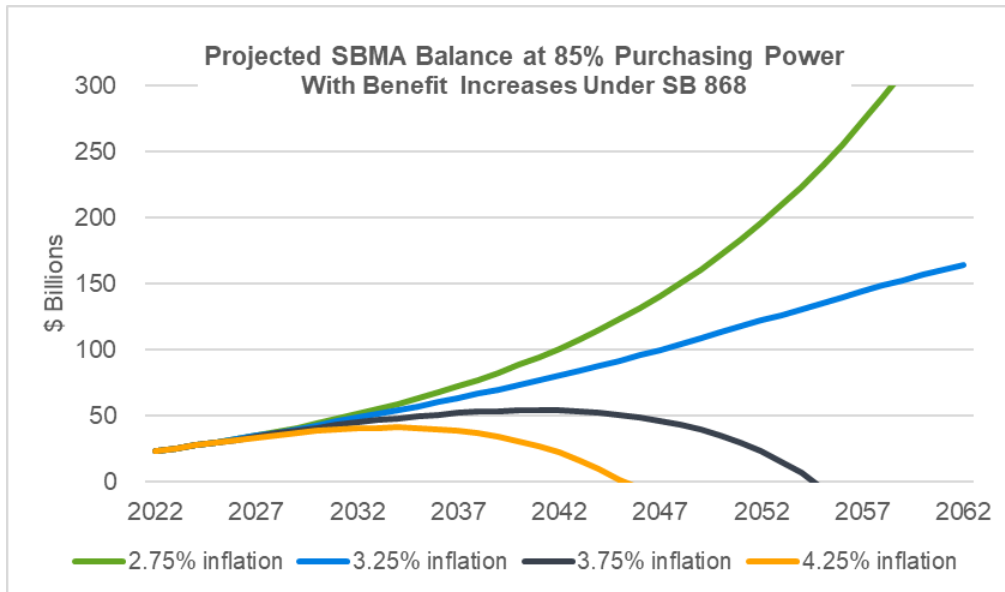
The following graph shows the same scenarios except reflect one of the varying purchasing power levels under Option 2 where 90% purchasing power is adopted effective July 1, 2023.





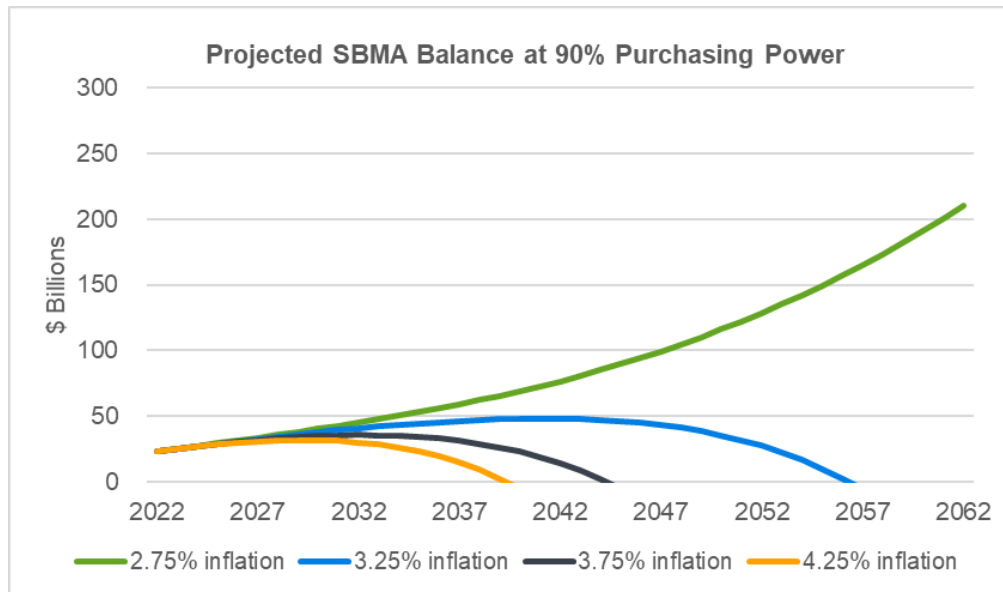
Risk of long-term inflation exceeding the assumption

Under the SBMA program, a rate of inflation that is higher than the 2.75% assumption will result in purchasing power allowances that exceed our projections. On the other hand, a lower-than-expected rate of inflation will result in lower purchasing power allowances. For example, if inflation is 2.75% each year in the future (as currently assumed), the balance of the SBMA is not projected to be depleted. If inflation is 3.75% each year in the future and the purchasing power level remained at 85%, the balance in the SBMA is projected to be depleted in about 35 years. In accordance with the board’s purchasing power policy, if the date of depletion is determined to occur prior to 2089, a reduction in the purchasing power level would be recommended. The following graph shows these projections along with two additional scenarios. Each of the scenarios includes the proposed increase in the retiree benefits under Option 1 (SB 868).





The following graph shows the same scenarios except reflect one of the varying purchase levels under Option 2 where 90% purchasing power is adopted effective July 1, 2023.



Assumptions and Methods

Please note that certain simplified modeling techniques and assumptions were used to produce the results of this analysis, which include estimating purchasing power benefits for current and future retirees and beneficiaries, including for people who are expected to become members of CalSTRS in the future and then retire and ultimately receive a purchasing power benefit. We believe these techniques are reasonable for purposes of this analysis but may need to be modified if the purpose of the analysis is expanded.

The actuarial assumptions and methods have not been updated since the last analysis and were adopted by the Teachers’ Retirement Board in January 2020. They are the same as those used in the June 30, 2021 DB Program valuation, except for the following modifications:

- **SBMA Funding** – For purposes of this analysis, we assumed that there would be no change to the annual appropriation to cover benefits paid from the SBMA. This funding equals 2.5% of pensionable payroll from the fiscal year two years prior, less \$72 million.
- **Treatment of Benefit Increases** – Additional benefits under the legislation would be paid entirely from the SBMA. Future 2% annual benefit adjustments and purchasing power payments would apply to the additional benefits based on the effective date of the increase, as previously discussed. A 1% load is applied to projected benefits to account for potential future purchasing power payments.

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- **Participant Data** – Actual purchasing power benefits for existing retirees and beneficiaries was not provided, so they were estimated based on historical CPI information provided by CalSTRS.
- **Historical Benefit Increases** – In the calculation of an individual's purchasing power benefit, the only previous post-retirement increases (outside of purchasing power benefits) are assumed to have been the 2% annual benefit adjustments. Certain retiree benefit increases that occurred in 2000 and 2001, such as the minimum guaranteed benefit and the ad-hoc COLA under AB 429, are treated as separate benefits with an effective date of the date of the increase. For current and future retirees, only the 2% annual benefit adjustment is assumed to occur in the future.
- **Projected Inflation** – In providing the estimated cost of the proposed benefit increase, we have assumed annual inflation of 2.75% after June 30, 2021, with the exception that we have assumed 4.32% inflation in the fiscal year ended June 30, 2022. The 4.32% figure represents actual California CPI for the first half of the fiscal year ended June 30, 2022 and a rate of 2.75% in the second half. Similarly, when illustrating alternative future inflation scenarios, we reflected actual California CPI for the first half of the fiscal year ended June 30, 2022 and the assumed level of inflation beginning in the second half.
- **Projected Payroll and Salary Growth** – In projections where the inflation is varied from the assumption, such as the stochastic modeling, we have assumed that projected salary and payroll are greater than or less than the assumed payroll and general wage growth assumption of 3.5% by the difference between actual and projected inflation. This affects the projected contributions to the SBMA and benefits payable to future retirees. For example, if in a given year projected inflation was 3.75% (1.00% greater than the assumed 2.75%), we have adjusted payroll growth used in projected contributions and salaries used in the projected benefits to be 1.00% higher than the corresponding assumption.
- **New Entrants** – The projection of future purchasing power benefits used in the probability of sufficiency calculation includes anticipated new active members replacing those active members who are expected to leave active employment each year. This expected number of new entrants is based on the average number of new entrants over the last 10 years and is approximately 23,000 new active members each year.
- **Equilibrium** – After 50 years, the population receiving purchasing power benefits is assumed to reach an equilibrium; that is, expected deaths from the group are replaced by the same number of new retirees eligible for the benefit. This is reflected in the projection with an increase in the purchasing power benefits paid of 3.50% each year starting in 50 years. This increase is equivalent to the assumed annual increase in payroll and therefore the annual increase in the average DB Program benefit.
- **Mortality Improvement** – After 50 years, the mortality of the retired population is assumed to improve over current levels; that is, retirees and beneficiaries are assumed to live longer. This is reflected in an annual increase in purchasing power benefits of 0.25%, in addition to the 3.50% increase described above. Note that prior to 50 years, a projection scale is included with the base mortality assumptions to reflect expected future mortality improvement.



- **Form of Payment Adjustment** – In the DB Program valuation, all members who have not yet retired are assumed to receive their benefit in the unmodified (member’s life only) form upon retirement. Since optional forms are assumed to be reduced on an actuarial equivalent basis, this assumption does not have a material impact on the DB Program valuation. However, this is not true for the actuarial projection of the SBMA. The value of a purchasing power benefit with a survivor continuance and an actuarial reduction made on the basis of the DB Program is usually greater than the value of a purchasing power benefit under the unmodified form. We have increased the projected purchasing power benefits for future retirements by 17.6% to account for the increased value of optional forms of payment. Similar to the DB Program, we have used the actual form of payment elected for current retirees and beneficiaries.
- **Retirement Timing** – Retirement from active status is assumed to occur at the middle of the year in the DB Program valuation. For purposes of calculating eligibility for the purchasing power benefit, retirement is assumed to occur on July 1 of the applicable year. There are three possible periods that affect the purchasing power calculation differently. The July 1 retirement assumption approximates actual experience and is the middle-cost option of the three, which is why we selected it. The three periods using July 1, 2021 to June 30, 2022 retirement dates are shown as an example. The percentage of the total service retirements based on current retirees is also shown.
 1. July 1 to August 31, 2021 (23% of retirements) – The first 2% benefit adjustment would be received September of 2022; CPI would be based on the year 2021. Under this approach, the first 85% Purchasing Power payment is projected to be made after 17 years (from the valuation date).
 2. September 1 to December 31, 2021 (8% of retirements) – The first 2% benefit adjustment would be received September of 2022; CPI would be based on the year 2020. Under this approach, the first 85% Purchasing Power payment is projected to be made after 16 years (from the valuation date). If this assumption were used, it would result in the highest estimated cost.
 3. January 1 to June 30, 2022 (69% of retirements) – The first 2% benefit adjustment would be received September of 2023; CPI would be based on the year 2021. Under this approach, the first 85% Purchasing Power payment is projected to be made after 18 years (from the valuation date). If this assumption were used, it would result in the lowest estimated cost.
- **Effective Date** – For each of the alternatives, the cost estimates are based on a July 1, 2023 effective date. This date is used so that all alternatives will be consistent with the date stated in SB 868. If the effective date is either before or after this date, there will be some difference in the estimated cost. If the effective date were earlier than July 1, 2023, the estimated cost would be higher due to an increase in the number of expected future payments.
- **School Lands Revenue** – The projection does not assume any additional revenues from school lands in the future. Currently this makes up less than 1% of the total contributions received by the SBMA. If this were included, it would not materially impact the results of the actuarial projection.



- **Stochastic Model** – The model varies actual inflation in the future, based on a geometric average inflation of 2.75% with an annual standard deviation of 2.0%, an annual reversion to the mean of 25%, and 200 different inflation scenarios.

Actuarial Certification

The cost estimates presented in this letter reflect the SBMA benefit provisions in effect as of June 30, 2021 and the actuarial assumptions and methods used in the June 30, 2021 DB Program valuation, except where noted.

These projections are subject to the uncertainties of a regular actuarial valuation; the projections are inexact because they are based on assumptions that are themselves necessarily inexact, even though we consider them reasonable. Thus, the emerging costs may vary from those presented in this letter to the extent actual experience differs from that projected by the actuarial assumptions.

In preparing the June 30, 2021 actuarial valuation upon which this letter is based, we relied, without audit, on information (some oral and some in writing) supplied by CalSTRS staff. This information includes, but is not limited to, statutory provisions, employee data, and financial information. We found this information to be reasonably consistent and comparable with information used for other purposes. The valuation results depend on the integrity of this information. If any of this information is inaccurate or incomplete, our results may be different and our calculations may need to be revised.

All costs, liabilities, rates of interest, and other factors for CalSTRS have been determined on the basis of actuarial assumptions and methods which are individually reasonable (taking into account the experience of CalSTRS and reasonable expectations); and which, in combination, offer a reasonable estimate of anticipated experience affecting CalSTRS. Further, in our opinion, each actuarial assumption used is reasonably related to the experience of the Plan and to reasonable expectations which, in combination, represent a reasonable estimate of anticipated experience under CalSTRS. The results were developed using models intended for valuations that use standard actuarial techniques.

Future actuarial measurements may differ significantly from the current measurements presented in this letter due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements; and changes in plan provisions or applicable law. Due to the limited scope of our assignment, we did not perform an analysis of the potential range of future measurements. The Teachers' Retirement Board has the final decision regarding the appropriateness of the assumptions and adopted them as indicated in Appendix B of the DB Program valuation report. Modified assumptions specific to this actuarial projection are discussed in the "Assumptions and Methods" section of this letter.

Actuarial computations presented in this letter are for purposes of determining the projected funding sufficiency of the SBMA. The calculations in this letter have been made on a basis consistent with our understanding of CalSTRS' current funding requirements. Determinations for purposes other than meeting these requirements may be significantly different from the results contained in this letter. Accordingly, additional determinations may be needed for other purposes.



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- (b) CalSTRS may provide a copy of Milliman's work, in its entirety, to other governmental entities, as required by law.

No third-party recipient of Milliman's work product should rely upon Milliman's work product. Such recipients should engage qualified professionals for advice appropriate to their own specific needs.

The consultants who worked on this assignment are retirement actuaries. Milliman's advice is not intended to be a substitute for qualified legal or accounting counsel.

The signing actuaries are independent of the plan sponsor. We are not aware of any relationship that would impair the objectivity of our work.

On the basis of the foregoing, we hereby certify that, to the best of our knowledge and belief, this letter is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices, including the relevant Actuarial Standards of Practice. We are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

We respectfully submit this letter and we look forward to discussing it with you.

Sincerely,

Handwritten signature of Nick J. Collier in black ink.

Nick J. Collier, ASA, EA, MAAA
Consulting Actuary

Handwritten signature of Scott D. Preppernau in blue ink.

Scott D. Preppernau, FSA, EA, MAAA
Consulting Actuary

Handwritten signature of Julie D. Smith in black ink.

Julie D. Smith, FSA, EA, MAAA
Consulting Actuary

NJC/SDP/JDS/va

cc: Jordan Fassler
David Lamoureux
Rick Reed